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JOURNAL OF ECONOMICS AND ECONOMIC EDUCATION RESEARCH

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Dr. Larry R. Dale
Director Center for Economic Education
P. O. Box 2890
State University, AR 72467
e-mail; Dalex@cherokee.astate.edu
[870]-972-3416

ECONOMICS EDUCATION ARTICLES

AN EVALUATION ON ACADEMIC PERFORMANCE IN INTERMEDIATE MICROECONOMICS: A CASE OF PERSISTENCE

Chin W. Yang, Clarion University
Rod D. Raehsler, Clarion University

ABSTRACT

This paper uses an ordered-probit model on a sample of 488 students who enrolled in intermediate microeconomics. Analysis on the estimated model and further study into the marginal impact of each explanatory variable shows that a phenomenon of persistence can be used to describe final grades in intermediate microeconomics. A strong academic performance in principles of microeconomics translates to a higher probability of earning a high grade in intermediate microeconomics. We also show that mathematical preparation has a positive effect on the grade in intermediate microeconomics as well as enrollment in a remedial mathematics course for students deficient in mathematical preparation when entering college. Gender and academic major do not have a discernable effect on the grade distribution in intermediate microeconomics.

INTRODUCTION

A principles of microeconomics course provides students with a basic understanding of consumer theory and the theory of the firm without the need of calculus. Intermediate microeconomics, on the other hand, presents a more detailed theoretical extension of the principles course with greater emphasis on mathematical concepts covered in a basic business calculus course. Von Allmen and Brower (1998) showed that academic performance in calculus was an important determinant to student performance in intermediate microeconomics. Unfortunately, they used a relatively small sample size (n=99) and did not consider how academic performance in the principles of microeconomics influenced the final grade in

intermediate microeconomic theory. This is an important venture in that it helps underscore the learning process in economics. The concept of persistence in the learning process suggests that the final grades in the principles of microeconomics and the intermediate microeconomics courses should be positively correlated.

Literature studying factors influencing academic performance has been very extensive in recent years beginning with a significant number of articles devoted to the economics discipline and expanding to a large number of other business disciplines. The vast majority of work concentrates on student performance in the principles of macroeconomics and the principles of microeconomics courses offered by all universities. The prevalence of studies devoted to the beginning courses in economics is primarily a result of the availability of large data sets due to greater demand for these courses. Spector and Mazzeo (1980) present a study of grades in introductory economics close to the approach of our analysis by utilizing a probit model to determine factors influencing final grades. Borg and Shapiro (1996), Becker and Watts (1999), Ziegert (2000), Marburger (2001), Cohn, Cohn, Balch, and Bradley (2001), Walstad (2001), and Grimes (2002) are a few important examples of studies that discuss evaluation of students and faculty in a principles of economics environment. An equally significant amount of literature has been devoted to teaching methods and techniques in principles of macroeconomics and principles of microeconomics courses. Examples of this growing area of analysis include Sowey (1983), Borg, Mason, and Shapiro (1989), Watts and Bosshardt (1991), Becker and Watts (1996), Raehsler (1999), Vachris (1999), Parks (1999), Oxoby (2001), Becker and Watts (2001a, 2001b), Colander (2003), and Jensen and Owen (2003).

To somewhat of a lesser extent, work has recently been done to determine factors relevant to grades earned by students in upper-level economics courses as well as courses in related business disciplines. Froyen (1996), Salemi (1996), Findlay (1999), Gartner (2001), Borg and Stranahan (2002), Walsh (2002), and Weerapana (2003) represent a good cross section of papers dealing with teaching intermediate macroeconomics and related upper-level economics courses. Becker (1987) and Becker and Greene (2001) are notable examples of research on student performance in business statistics. Interestingly, several papers in the accounting education field deal with gender-related issues on grade performance in accounting courses and on the Certified Public Accounting examinations. Examples include Lipe (1989), Tyson (1989), Ravenscroft and Buckless (1992), Murphy and Stanga (1994), and Brahmasrene and Whitten (2001). Use of similar model specifications to measure factors influencing student performance in finance courses can be found

in Ely and Hittle (1990), Cooley and Heck (1996), Sen, Joyce, Farrell, and Toutant (1997), Chan, Shum, and Lai (1996), and Chan, Shum, and Wright (1997).

Surprisingly, only a few studies are devoted to explaining student performance in intermediate microeconomics courses. Von Allmen and Brower (1998), as discussed above, employed an ordered probit model with only a sample size of 99 students. In addition, they did not provide significance tests on the threshold variables necessary when using the ordered probit model. Yang and Raehsler (2005) apply a similar ordered probit model specification with a slightly larger sample size (n = 195) and conducted the important analysis on the threshold variables. This is important in order to show that the model specification is appropriate for the data employed. Both studies, however, suffer from inadequate sample sizes.

In this paper, we significantly expand the sample size and include an additional variable that measures pre-calculus and calculus performance in order to extend the work of Von Allmen and Brower. By including the final grade earned in principles of microeconomics as an explanatory variable, we are able to test whether the learning process in microeconomics follows a pattern of mean reversion or one of persistence. A mean reversion pattern would indicate that a strong academic performance in principles of microeconomics (ECON 212) would lead to a lower grade in intermediate microeconomics (ECON 310). Persistence, which is a grade pattern that educators hope prevails, implies that a higher grade in ECON 212 translates to a higher grade in ECON 310. At first glance it appears relatively straightforward that a pattern of persistence would be most likely when comparing sequence courses in a field. Nevertheless, a case can be made to support the plausibility of a mean reversion pattern in grades between sequenced courses when student composition or course objectives are considered. Yang and Raehsler (2006) show that a mean reversion pattern of grades exists between a first course and a second course in business statistics. We believe this is possibly a result of two factors related to grading: the type of students enrolled in each course and the material presented in each course. A broader spectrum of students enroll in the first business statistics course each semester. While the course is required of all students in the College of Business Administration, a significant number of students with other academic majors take the course to satisfy basic general education requirements. Students outside the College of Business do not typically enroll in the second business statistics course changing the grading pattern between the two courses. Business students typically will do better than students outside the college in the first business statistics course while they compete against each other in the

second course. In addition, the first business statistics course concentrates on the theory behind statistics while the second course is more applied. Therefore, the mean reversion pattern might be a result of students being more adept at using computer software than in solving problems related to theory. While we did not test to see which explanation might cause mean reversion in grades between the two courses, we suspect that other sequence courses in mathematics may follow the same type of pattern. Clearly, given that some students taking ECON 212 (non-business students) might not take ECON 310, both grade patterns are plausible. In the current analysis paper we also test to see whether mathematical preparation and the incorporation of a remedial mathematics course in the curriculum is helpful to students in ECON 310.

The remainder of this paper is organized as follows: Section II provides a summary of the data used in this analysis along with a presentation of the ordered probit model estimated, Section III discusses the empirical results, Section IV shows calculations of marginal probabilities for continuous and discrete explanatory variables, and Section V provides concluding remarks.

DATA AND THE ORDERED PROBIT MODEL

Data for this study came from Clarion University, a public university in western Pennsylvania. Enrollment at Clarion University is approximately 6,000 and the school is part of the Pennsylvania State System of Higher Education; a collection of fourteen universities that collectively make up the largest higher education provider in the state of Pennsylvania (106,000 students across all campuses). The College of Business Administration has a current enrollment of approximately 900 students and offers seven various academic majors leading to a Bachelor of Business Administration degree. These include accounting, management, industrial relations, economics, international business, finance, real estate, and marketing. The college is accredited by the Association to Advance Collegiate Schools of Business (AACSB) and has enjoyed this status since 1998. A sample of 488 students was utilized in this study and was obtained from computerized student transcript records beginning in the fall semester of 1999 through the spring semester of 2005. Variables collected include student cumulative grade point averages, identification of gender and academic major, assessment scores for MATH 131 (pre-calculus) and MATH 232 (business calculus), the term ECON 310 was taken, a dummy variable to identify whether or not a student took MATH 110 (remedial mathematics), and final grades in both ECON 212 and ECON 310.

We have been able to generate a substantial sample size in a relatively short time frame due to a unique curriculum in the College of Business Administration at Clarion University. All students in the business college at Clarion University are required to pass ECON 310 in addition to the ECON 212 course required by all business programs. As a consequence, we enjoy a much larger and more diverse base of students taking intermediate microeconomics than observed in previous studies. In a sense, we have a large captive audience that makes it easier to generate substantial sample sizes when analyzing student performance in this upper-level economics course.

In this paper we utilize an ordered probit model in favor of a conventional linear model since the latter may produce biased variance and spurious probability estimates (Greene, 2003). Given that the letter grades assigned to ECON 310 are ordinal (the grades are A, B, C, D, and E), an ordered probit model is appropriate for this as a dependent variable. Assuming that sensible grading curves are applied to most courses and given the significant variation in the mathematical background of business students, the difference between an A and a B may well not be equivalent to the difference between a B and a C (and so on).

In what follows, we employ the latent regression model originally developed by Zavoina and McElvey (1975). For a given set of explanatory variables X and y* (unobserved dependent variable), we have

$$y^* = X'B + e \qquad \textit{Formula (1)}$$

or, using available data, the matrix equation can be written as

$$y^*_i = B_0 + B_1 GPA_i + B_2 MATH_i + B_3 MAJOR_i + B_4 GENDER_i + B_5 TERM_i + B_6 D_{1i} + B_7 D_{2i} + B_8 D_{3i} + B_9 REM_i + B_{10} m_1 + B_{11} m_2 + e_i \qquad \textit{Formula (2)}$$

where y* is the unobserved latent variable indicating potential letter grades in ECON 310. Specifically the values are

$y = 0$ (or final grade of D) if $y^* \le 0$ *Formula (3)*

$y = 1$ (or final grade of C) if $0 < y^* \le m1$ *Formula (4)*

$y = 2$ (or final grade of B) if $m_1 < y^* \le m_2$ *Formula (5)*

$y = 3$ (or final grade of A) if $m_2 \le y^*$ *Formula (6)*

Note that m_1 and m_2 denote threshold variables on which letter grades are determined. The remaining variables in equation (2) are defined as follows:

GPA	*= the cumulative grade point average on a 4.0 scale.*
GENDER	*= 1 for male students and 0 for female students*
MAJOR	*= 1 for students majoring in Accounting, Economics, or Finance (AEF), and zero for students majoring in Management and Marketing (MM).*
TERM	*= is a proxy to control for grade inflation and different instructors over the sample period.*
REM	*=1 for students who were required to take a remedial mathematics course (MATH 110 or intermediate algebra) based on university entrance examinations.*
D_1	*= 1 indicates that a student received a final grade of D in ECON 212 (principles of microeconomics), zero otherwise.*
D_2	*= 1 indicates that a student received a B in ECON 212 and zero otherwise.*
D_3	*= 1 indicates that a student received an A in ECON 212 and zero if he or she received a letter grade other than an A.*
MATH	*= the average score on MATH 131 (pre-calculus) and MATH 232 (business calculus) assessment.*

where e_i is a normally distributed error term with a mean of zero and a constant variance. Note that D_1, D_2, and D_3 are included in the model to examine the relationship between the two statistics courses. The m_1 and m_2 terms represent threshold variables (four letter grades less two). Note that only four letter grades are available from the data set as failing grades are not considered. This is because a student is required to repeat ECON 310 if he or she receives a failing grade in the course. A simple linear probability model is ruled out in order to avoid the generation of negative probability variables and negative variances; both of which are unfeasible.

EMPIRICAL RESULTS

The ordered probit model based on equation (2) is estimated using the statistical package (TSP version 4.5, 2002) and the results are reported in Table 1.

Table 1: Estimates of the Ordered Probit Model (Equation 2)				
Variables, Measures	Parameter Estimate	Standard Error	t-statistics	P-value
Constant	-0.688	0.425	-1.620	0.105
GPA	0.150	0.118	1.269	0.205
MATH	0.545	0.092	5.955	0.000
MAJOR	-0.010	0.104	-0.101	0.919
GENDER	0.076	0.106	0.713	0.476
TERM	0.007	0.013	0.573	0.507
D_1	-0.200	0.228	-0.874	0.382
D_2	0.642	0.119	5.390	0.000
D_3	1.642	0.178	9.246	0.000
REM	-0.016	0.113	-0.145	0.885
m_1	1.556	0.090	17.252	0.000
m_2	2.682	0.118	22.626	0.000
Sample Size	488			
Scaled R-square	0.371			
Likelihood Ratio	206.999			0.000
Log-Likelihood Function	-522.249			

In Table 1, student cumulative grade point average (GPA) is only marginally significant and, therefore, is not as important a predictor of the final grade in ECON 310 (p-value = 0.205) as we anticipated. Grade point averages, unlike SAT scores (a good predictor for freshman academic performance), may represent how much effort a student places in a course more than inherent academic ability. We estimated equation (2) replacing GPA with the student SAT score and found that SAT scores were not important in determining the final grade in ECON 310. This is consistent with the notion that as students progress forward of their

freshman year, SAT scores and grades are not as closely linked. The ECON 310 course is typically taken by first-semester juniors.

Not surprisingly, mathematical preparation (MATH) plays a significant role in determining academic performance in ECON 310 with a coefficient value of 0.545 (p-value of 0.000). Students with a more proficient mathematics background have a greater probability of earning a higher grade in ECON 310 than those who are less mathematically prepared. As in the Von Allmen and Brower (1998) study, mathematical knowledge plays a crucial role in student performance in intermediate microeconomics. It is important that this portion of our analysis supports their work with a much larger sample size. Related to this, the coefficient on REM was found to be insignificant (p-value = 0.885). As a consequence, no difference in grade pattern is ECON 310 could be attributed as to whether a student was required to take a remedial mathematics course. One would expect that students required to take remedial mathematics (MATH 110) would not do as well in ECON 310 and that the coefficient on REM should be negative. The statistical insignificance of the REM coefficient, therefore, suggests that the MATH 110 course has removed the disadvantage these students had with regard to mathematical ability relevant to ECON 310. This analysis is unique compared to previous work in the economic education literature and lends support to the use of remedial courses to better prepare students for upper-level courses.

The academic major (MAJOR) of a student and the semester ECON 310 is taken by the student (TERM) do not appear to influence the final letter grade in intermediate microeconomics. The insignificance of MAJOR (p-value of 0.919) counters any belief that a particular group of academic majors typically known for more extensive quantitative preparation (accounting, economics, and finance) do not have an advantage over other students (marketing and management majors) with regard to ECON 310 grades. The insignificant coefficient on TERM (p-value of 0.567) is not surprising given that faculty members in the Department of Economics at Clarion University are required to submit their course grade distributions in an attempt to curb any grade inflation or deviations in grades across instructors.

The estimated coefficient on GENDER is positive indicating a male student may have an advantage in obtaining a better letter grade than a female counterpart in this particular course. However, the relationship is not found to be statistically significant (a p-value of 0.476) thereby indicating that gender does not play an important role in predicting final grades in the intermediate microeconomics course. This result contradicts a common belief in education that males outperform females in more quantitatively demanding business and economics courses.

The coefficient of D_1 (the dummy variable of those students receiving a D in ECON 212 relative to those earning a C) is negative but statistically insignificant (p-value of 0.382). While a negative coefficient would imply that students receiving a D in ECON 212 have a lower probability of earning a good grade in ECON 310, the lack of statistical significance implies that the effect is negligible. The coefficients on D_2 and D_3 (D_2 =1 and D_3 = 1 denote students that receive a B or an A in ECON 212 are both significant (p-values of 0.000 for each) and positive. This indicates that students with a better foundation in principles of microeconomics have greater probabilities in obtaining a good letter grade in intermediate microeconomics. The phenomenon of mean reversion (a poor letter grade in principles of microeconomics translating into a better letter grade in intermediate microeconomics and vice versa) does not show up when analyzing our data. Rather, we witness the phenomenon of persistence: those who attain good grades in principles of microeconomics have a greater probability of continued academic success in intermediate microeconomic theory. This result is as puzzling as it is interesting. The persistence phenomenon in academia, unlike that in regression toward the mean, presents problems in economic education: it is more difficult to practice the pedagogical principle of teaching to the mean. It is possible that this result may not be consistent across different types of academic institutions that employ varying admission standards. In addition, this result might change if we knew the number of times students repeated either ECON 212 or ECON 310. Currently, university privacy policy prohibits us from obtaining this type of data.

Finally, significant coefficients on the threshold variables m_1 and m_2 suggest that the use of the four-category ordered probit model is indeed justified. The goodness of fit measure, the scaled R-squared, is preferred for its consistency and marginal measurement (Estrella, 1998). Its value (0.371) is relatively satisfactory in terms of the number of significant coefficients and the likelihood ratio test (p-value of 0.000) confirms that we have a well-specified empirical model.

SENSITIVITY ANALYSIS AND MODEL APPLICATION

The ordered probit model specification allows us to measure how changes in important explanatory variables influence the marginal probability of a student receiving various grades in intermediate microeconomics. For a specific set of values of **X**, we can calculate the initial probabilities to obtain a letter grade in intermediate microeconomics. Letting the cumulative normal function be N(B'X), the probabilities for each grade in ECON 310 can be calculated as below:

$Prob\ [y=0\ or\ D] = N(-B'X)$ *Formula (7)*
$Prob\ [y=1\ or\ C] = N\ [m_1 - B'X] - N\ (-B'X)$ *Formula (8)*
$Prob\ [y=2\ or\ B] = N\ [m_2 - B'X] - N\ (m_1 - B'X)$ *Formula (9)*
$Prob\ [y=3\ or\ A] = 1 - N\ (m_2 - B'X)$ *Formula (10)*

where B'X is a set of specific values of X for the estimated coefficients (B) and the threshold values ($m_1$and m_2). For a typical business student, the average values of GPA, MATH, GENDER, MAJOR, TERM, D_1, D_2, D_3, and REM in our sample are 3.046, 2.904, 0.398, 0.457, 6.745, 0.057, 40.4, 15.9, and 0.592 respectively. Substituting these values into Equations (7), (8), (9), and (10), we find the probabilities of obtaining letter grades A, B, C, and D to be 8.44 percent, 48.70 percent, 33.27 percent, and 9.59 percent (this is summarized in Table 2). It is to be noted that those who repeated the course would eventually receive an official letter grade in order to remain in the business program. The actual proportion of students receiving a letter grade of A or B in intermediate microeconomics is approximately 57 percent while the remaining 43 percent received either a C or a D in the course. From experience, this grade distribution would have been different without a substantial grading curve needed to slightly inflate final grades.

Table 2: Student Performance in Intermediate Microeconomics and Marginal Probabilities with Changes in MATH

Grade	Probability of Grade (Equations 7-10)	Marginal Effect for Unit Increase in MATH
A	8.44%	+9.28%
B	48.70%	+12.11%
C	33.27%	-12.94%
D	9.59%	-8.45%

Average values are selected for other explanatory variables. MATH is the average score of MATH 131 (pre-calculus) and MATH 232 (calculus) required of all business majors.

Now that the average grade distribution in ECON 310 has been derived from the model specification, we now proceed with a sensitivity analysis that evaluates changes in grade probabilities in response to changes in continuous explanatory variables. Since mathematical preparation (MATH) is such an important

predictor of performance in ECON 310, this is the first such variable we consider. By taking derivatives of equations (7), (8), (9), and (10) with respect to MATH we obtain the following:

$$d\{Prob[\ Y=0 \text{ or } D]\}/\ d\{MATH\} = -N(B'X)\ (B^*_2) \qquad \text{Formula (11)}$$

$$d\{Prob[\ Y=1 \text{ or } C]\}/\ d\{MATH\} = [N(-B'X) - N(\mu_1 - B'X)]\ (B^*_2) \qquad \text{Formula (12)}$$

$$d\{Prob[\ Y=2 \text{ or } B]\}/\ d\{MATH\} = [N(\mu_1 - B'X) - N(\mu_2 - B'X)]\ (B^*_2) \qquad \text{Formula (13)}$$

$$d\{Prob[Y=3 \text{ or } A]\}/\ d\{MATH\} = N(\mu_2 - B'X)\ (B^*_2) \qquad \text{Formula (14)}$$

where N is the normal density function and B^*_2 is the estimated coefficient on MATH in equation (2). Equations (11), (12), (13), and (14) measure the marginal effects of changes in MATH on the probability of obtaining the identified letter grade for the average student in ECON 310. This directly follows work presented in Greene (2003). Note that the sum of the marginal effects must equal zero for consistency. The results indicate that if MATH increases by one unit, probabilities to obtain an A and B are expected to increase by 9.28 percent and 12.11 percent respectively and probabilities to receive a C and D are expected to decrease by 12.94 percent and 8.45 percent respectively (see Table 2). Even though the estimated coefficient on MATH in the ordered probit model is highly statistically significant (the p-value is 0.000), the marginal effects of MATH on grade probabilities appear to be relatively moderate. While this is a measure made under the assumption that all other explanatory variables are fixed, it illustrates one reason why evaluating marginal probabilities is an important addition to significance tests on estimated coefficients when using the ordered probit model.

If, however, a variable is discrete such as dummy variables D_2 and D_3, we must reevaluate equations (7), (8), (9), and (10) with the dummy variables (D's) equal to zero and one before calculating the difference in the two probabilities. In other words, substituting 0 and 1 into the estimated equations and comparing numerical values obtained serves as sensitivity analysis for discrete variables. The results are reported in Table 3.

Table 3: Impacts of Letter Grades in Principles of Microeconomics on Letter Grades in Intermediate Microeconomics

Equation	$D_2 = 0$	$D_2 = 1$	Change	$D_3 = 0$	$D_3 = 1$	Change
Equation (7) P[y=0 or D]	0.1216	0.0394	-0.0822	0.1285	0.0030	-0.1255
Equation (8) P[y=1 or C]	0.5484	0.5406	-0.0078	0.5427	0.1121	-0.4306
Equation (9) P[y=2 or B]	0.2645	0.2278	-0.0367	0.2639	0.3411	0.0772
Equation (10) P[y=3 or A]	0.0655	0.1922	0.1267	0.0649	0.5438	0.4789
D_2 =1 indicates a student receives a letter grade of B in principles of microeconomics.						
D_3 =1 indicates a student receives a letter grade of A in principles of microeconomics.						

An examination of Table 3 indicates that in a principles of microeconomics course, if a typical student received a B ($D_2 = 1$) he or she is expected to have a 12.67 percent greater chance of obtaining an A in intermediate microeconomics. This same student will expect to see his or her probability of obtaining a B, C, or D in ECON 310 diminish by 3.67 percent, 0.78 percent, and 8.22 percent respectively. This clearly suggests that academic performance in principles of microeconomics (a letter grade of B) is at least as important as the average score in the two mathematics courses (MATH) when results are compared. For a student who obtained an A in microeconomic principles ($D_3 = 1$), he or she is expected to perform satisfactorily in intermediate microeconomics as well. Specifically, for a student receiving an A in principles of microeconomics the probabilities of getting an A or B in intermediate microeconomics increase by 47.89 and 7.72 percent respectively while the probabilities of getting a C or D are expected to decrease by 43.06 percent and 12.55 percent respectively. It signals an important message: an A student in principles of microeconomics can expect a higher grade (most likely an A) in intermediate microeconomic theory. This supports the notion of persistence of the grade distribution rather than mean reversion when calculating the marginal probabilities as well as when analyzing coefficients in the ordered probit model.

CONCLUSION

Literature abounds in evaluating the performance in economics courses. The purpose of this paper, however, concentrates on the determinants of performance in intermediate microeconomics, a required course for business majors at Clarion University. A sample of 488 students was used to estimate the ordered probit model: a model appropriate for ordinally scaled data. The results indicate that (i) cumulative grade point average is marginally significant, (ii) average scores of the two math courses is a significant predictor on performance in intermediate microeconomics, (iii) a student who received a D in principles of microeconomics has a tendency to perform poorly in intermediate microeconomics (albeit the relationship is not statistically significant with a p-value of 0.382), (iv) a student who received an A or B in principles of microeconomics is expected to also perform well in intermediate microeconomics (with a p-value of 0.000), (v) taking the remedial math course has little impact on academic performance in intermediate microeconomics, and (vi) coefficients on the threshold variables are highly significant indicating the appropriateness in using the ordered probit model.

The sensitivity analysis conducted suggests that better performance in preparatory mathematics helps students perform better in ECON 310 even at the margin. In addition, prior grades in principles of microeconomics play a critical role in determining final grades in intermediate microeconomics. Given that this relationship remains equally strong when conducting marginal analysis as with analysis of the dummy variable coefficients in the ordered probit model, the persistence hypothesis of grades in principles of microeconomics and intermediate microeconomics holds.

We also found that the remedial mathematics course (intermediate algebra) helps to diminish any handicap these students may have regarding an exceptional lack of initial mathematical preparation needed for intermediate microeconomics. This implies that intermediate algebra is indeed necessary for students placed into lower percentiles in freshmen-level mathematics placement examinations and that the course successfully prepares students for material used in intermediate microeconomics.

All of these results are very encouraging from a pedagogical standpoint in that it tells us that earlier foundation material does matter in looking at student performance in the related upper-level course. There is often a perception that courses in a business college curriculum are disjoint without an established linkage. The strong linkage established here between mathematics, principles of

microeconomics, and intermediate microeconomics is an important counter to this perception. Possible extensions of this research include performing a similar type of analysis at other universities with different admission and retention policies and trying to obtain data to incorporate any course repeats students have for the two microeconomics courses.

While results in this study provide insight into the basic learning pattern in microeconomics, it is important to outline some limitations in this analysis. Clearly, selecting all students taking a sequence of courses during a significant period of time provides for a sample size much larger than in related studies. It is equally clear, however, that this does not constitute a true random sample. As a consequence, empirical results should be viewed as biased in a sense that statistical tests utilized assume a sense of randomness in the data collection scheme. Replicating this study at other universities would allow us to provide a random sample and would represent a unique contribution in this area of research. Additionally, the current analysis did not account for differences in the teaching experience among instructors of courses studied. One would anticipate that grade distributions will vary across instructors with different degrees of teaching experience and that this could confound our explanation concerning the grade patterns between courses. While we believe the enforcement of a departmental grade distribution minimizes the possibility of grade variations across instructors, it would be interesting to explore this possibility in future studies.

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TEACHING PRINCIPLES OF ECONOMICS: INTERNET VS. TRADITIONAL CLASSROOM INSTRUCTION

Doris S. Bennett, Jacksonville State University
Gene L. Padgham, Jacksonville State University
Cynthia S. McCarty, Jacksonville State University
M. Shawn Carter, Jacksonville State University

ABSTRACT

Although still in its infancy, the use of the internet as a means to teach college courses, including economics, is growing. Previous research concerning the level of student learning in economics courses via the internet versus a traditional classroom has been scant and inconclusive.

This paper explores the factors that influence student performance in both principles of macroeconomics and principles of microeconomics and compares student achievement in courses taken in traditional classroom settings with those done via the internet. We provide a brief summary of the relevant literature, a description and statistical analysis of our data, and a discussion of our findings. Future ideas for research are noted.

INTRODUCTION

This paper seeks to determine how student performance in college principles of macroeconomics and microeconomics courses is affected when the course is taken via the internet rather than in a traditional classroom setting. Factors used to evaluate student performance are: the final average percentage grade for students completing principles of economics courses at our university during 2005, traditional versus online class structure, gender, age, GPA, ACT or SAT scores, and previously taken economics courses. From analysis of these variables, we will draw

conclusions that will help economics instructors and advisors to better meet the needs of students who have both internet and traditional classroom options available to them.

Our university, Jacksonville State University, began offering internet principles of economics courses in the fall of 1999. Based primarily on anecdotal evidence, where many of the pertinent professors had noted the immaturity and lack of self-discipline of our sophomores (those who usually take the principles courses), we hypothesized that those students registered for an internet economics course would perform worse that those in a traditional setting. The three economics professors who taught principles courses during 2005 participated in this study. The sample consisted of 498 students, with 406 from the traditional courses and 92 in the internet courses. The final course average grade, expressed as a percentage, was used to measure the student's learning.

Multiple choice tests are the primary means used to assess learning and determine grades for both the internet and traditional economics courses. When the same professor teaches both an internet and traditional course in a semester, the tests used in both classes are identical. Internet course tests are proctored by university-sanctioned educators. Internet students receive the same amount of time to complete the tests as those who are in the traditional courses.

A concise review of the literature on student achievement from web-based economics courses will be followed by a summary of the key characteristics of the students in the microeconomics and macroeconomics online and traditional classes. Next, we describe our methodology and the results. Last, we offer some possible explanations of our findings and propose some areas for future research.

LITERATURE REVIEW

Research on the performance of students taking internet, or online, principles of economics courses is relatively scarce to this point, probably due to the relative infancy of this course option. Navarro (2000) analyzed roughly 50 colleges which together had offered over 100 internet economics courses. He found that principles of microeconomics and macroeconomics accounted for about 70% of all economics internet courses, but that these accounted for only a very small percent of the total university economics courses offered. One source of concern among both college administrators and faculty was that the introduction of internet classes would impair the role of traditional classes. Navarro found otherwise: instead of

moving traditional students into internet courses, the internet courses have expanded the market scope and pool of students.

Online economics students tend to have certain characteristics. Brown and Liedholm (2002) found that those taking internet principles of microeconomics courses had higher ACT scores, more college experience, longer work schedules, and fewer reported study hours than traditional students. Shoemaker and Navarro (2000) determined that the online students in their introduction to macroeconomics courses were less likely to have taken previous economics courses and had higher GPAs than their traditional macroeconomics students. Keri (2003) noted that online economics students tend to be older, with the average age at 28.

The evidence on student's achievement and the pertinent factors affecting performance in internet versus traditional courses has been inconclusive. A significant number of the respondents to Navarro's (2000) survey stated that those students performing the worst in internet economics courses were those who lacked motivation and self-direction. Gabe Keri (2003) found that end-of-semester grades for online economics courses were positively correlated with years in college, with juniors performing much better than freshmen and with sensational learners (those who tend to be cavalier about work and need stimulation in their learning environment) scoring significantly worse in internet courses. Brown and Liedholm (2002) found that although women did worse in traditional microeconomics courses, they performed equally well with men in online courses. Overall, they found traditional students scored better than those taking the online course, the difference being that traditional students did significantly better on the most complex material, but the same as online students on the basic concepts. In their review of MBA Managerial Economics and Statistics courses, Anstine and Skidmore (2005) found that average test scores from online and traditional courses were similar, but that when they did an OLS regression, controlling for such factors as pretest scores, entrance exam scores, math background, GPA, gender, age, and reported study hours, online students scored significantly lower than did traditional students. However, when they did separate regressions for the two courses, the difference was significant only for the statistics class. Shoemaker and Navarro (2000) found that the internet principles of macroeconomics students scored significantly better than the traditional students. They also noted that gender, ethnicity, class level, and previous economics courses taken made no statistical difference.

METHODOLOGY AND RESULTS

Student learning was measured by the final average grade in the course. Factors hypothesized to influence the final grade were type of instruction, online or traditional in-class, student gender, age, GPA, ACT score, and whether the student had taken a previous economics course. Since most research has shown that men outperform women in principles of economics (Anderson, Benjamin, and Fuss1994; Ballard and Johnson 2005; Becker 1997; Dynan and Rouse 1997; Greene 1997, Ziegert 2000), we hypothesized that the final average for men would be higher than the final average for women. ACT is an indication of student ability. GPA measures how much effort a student has put into his or her studies. Age, GPA, ACT, and having taken a previous economics course are expected to have a positive effect on performance.

Descriptive statistics for the variables used in our analysis of online and in-class instruction are given in Table 1. The mean and standard deviation were calculated for the combined sample, and then for the sample separated into micro and macro classes. A t-test for differences in means was used to test for significant differences between the variables in the two different learning environments in each of the three groups.

A simple comparison between final averages in traditional (69.5) and online (69.3) instruction in all principles courses revealed no significant difference in the final average for the combined group of 498 principles students. When the large group was separated into micro and macro classes, we found significant differences between the students' final averages in the traditional and online classes. Students in the traditional micro classes had a final average of 67.1, compared to 60.2 for the students who took the course online. In the macro classes, however, the online students outperformed those in traditional classes. The online students' average (81.2) was significantly higher than the in-class students (71.6).

Both courses and types of instruction had a higher proportion of women than men. The micro online classes had a significantly higher percentage of women than the traditional classes. These proportions reflect the gender composition for the whole University, which is 59% female and 41% male. The students in the online classes were all significantly older than the students in the traditional classes. The average age in traditional classes was 22.4 years; in online classes, 26.7 years.

Table 1: Descriptive Statistics by Course and Type of Instruction

	Both Inclass	Both Online	Micro Inclass	Micro Online	Macro Inclass	Macro Online
Final average	69.5	69.3	67.1*	60.2*	71.6***	81.2***
	(21.2)	(27)	(22.4)	(31.7)	(19.7)	(11.2)
Men	43.8%	37%	45.7%*	32.7%*	42.2%	42.5%
Women	56.2%	63%	54.3%*	67.3%*	57.8%	57.5%
Age	22.4***	26.7***	22.3***	26.7***	22.5***	26.9***
	(4.4)	(8.5)	(4.8)	(8.2)	(4.0)	(9.0)
GPA	2.62	2.69	2.58	2.57	2.65*	2.86*
	(.66)	(.67)	(.68)	(.68)	(.65)	(.63)
ACT	20.1	20.6	20.3	20.5	20	20.7
	(4.0)	(3.7)	(3.9)	(4.2)	(3.5)	(3.7)
Previous Economics Course	39.7%	34.8%	46.3%	46.1%	51.8%*	37.5%*
Number of Observations	406	92	188	52	218	40

* significant at 10%
*** significant at 1%

GPA was significantly higher for online students in macro; however, it was 0.01 points lower for the online micro students. ACT was higher, but not significantly, for all online classes. A significantly higher percentage of students in the traditional classes in macro had had a previous economics course.

Table 2 contains summary statistics for the final grade average by gender for the micro and macro courses for both types of instruction.

Table 2: Final Averages by Gender and Type of Instruction				
	Micro Inclass	Micro Online	Macro Inclass	Macro Online
Women	69.8*	61.1	73.9**	81.5
	(18.4)	(30.3)	(17)	(10.6)
	n=102	n=35	n=126	n=23
Men	63.9	58.2	68.5	80.9
	(26.2)	(35.2)	(22.8)	(12.3)
	n=86	n=17	n=92	n=17
* Significant at 10% ** Significant at 5%				

Contrary to most previous research, we found that women outperformed men in both courses and in both types of instruction. Women's final averages were significantly higher than those of men in traditional classes of both micro and macro. In the online sections women's averages were higher, but the difference was not statistically significant.

The empirical model used in ordinary least squares estimation is:

GRADE = f(GPA, ACT, AGE, GEN, OL, PREV, MICRO, PROF)

The variables are defined as:

GRADE	Student's final grade average for the course
GPA	Student's overall grade point average
ACT	Student's score on the American College Test
AGE	Student's age
GEN	Dummy variable equal to1 if student is male.
OL	Dummy variable for type of instruction equal to1 if the class is online.
PREV	Dummy variable equal to 1 if student had a previous economics course.
MICRO	Dummy variable equal to 1 if the course is microeconomics.
PROF	Dummy variable for the different professors 1,2, and 3.

Regression results for the combined sample, including both micro and macro courses are in Table 3.

Table 3: Regression Results for All Principles Courses

Variable	Coefficient	p-value	VIF
Constant	11.52	0.61	
GPA	19.44	0.00	1.2
ACT	0.21	0.34	1.2
AGE	0.15	0.31	1.1
GEN	- 1.17	0.47	1.1
OL	- 5.33	0.06	2.1
PREV	0.62	0.71	1.1
MICRO	-13.59	0.00	3.1
PF1	13.34	0.00	2.5
PF2	9.73	0.01	4.7
$R^2 = 42.4\%$ n = 495			

GPA had a very significant positive coefficient. The dummy variable for micro was significant and negative, indicating that class averages were lower in micro, in general, than in macro. The dummy variable for online classes was negative and significant (6%). Indicator variables for professors 1 and 2 were positive and significant.

Regression results for the micro traditional and online classes are shown in Table 4.

GPA was positive and very significant for the micro classes. The coefficient for the online classes was negative and significant at 10 percent.

Regression results for macro are shown in Table 5.

Table 4: Regression Results for Micro			
Variable	Coefficient	p-value	VIF
Constant	11.76	0.22	
GPA	21.22	0.00	1.2
ACT	0.10	0.77	1.2
AGE	0.09	0.69	1.2
GEN	-2.19	0.42	1.1
OL	-5.98	0.10	1.4
PREV	-2.58	0.38	1.1
PF2	-3.70	0.22	1.3
R^2 = 39% n = 240			

Table 5: Regression Results for Macro			
Variable	Coefficient	p-value	VIF
Constant	25.15	0.00	
GPA	17.66	0.00	1.2
ACT	0.22	0.42	1.1
AGE	0.16	0.36	1.1
GEN	- 0.95	0.61	1.0
OL	- 4.17	0.28	2.4
PREV	3.05	0.09	1.0
PF3	-10.76	0.01	2.3
R^2 = 43.4% n = 258			

GPA was again positive and highly significant, and the dummy variable for one teacher, professor 3, was negative and significant. In the macro classes, having a previous economics course had a significant, positive effect.

In each of the three regressions, GPA was consistently positive and highly significant, indicating that student effort is an important determinant of performance in principles of economics. The indicator variable for the online classes was negative in all three regressions and significant for the combined group and for the micro classes. The coefficient for micro was negative and significant in the combined regression. Several of the indicator variables for the different professors were significant. The coefficient for professor 1 in micro was positive and significant and larger than the positive coefficient for professor 2. The coefficient for professor 3 in macro was negative and significant. This may be due to differences in types of tests given by the different teachers. Professor 3's tests were fill-in-the-blank and multiple choice, while professor 2's tests were multiple choice. Professor 1's tests were 60% multiple choice and 40% problems. Professor 3's students' scores may have been lower, because with fill-in-the-blank, there is no chance for partial credit. With professor 2's multiple choice questions, there is no chance for partial credit, however, there is a 25% chance of guessing the correct answer. Perhaps Professor 1's students had higher averages because they had the advantage of the possibility of partial credit on the problems.

SUMMARY AND CONCLUSIONS

At first glance, our results indicated no difference in students' performance in traditional and online classes for the entire sample. On further examination of the data separated by course, we found significant differences in student achievement in traditional and online classes. In both the simple descriptive statistics and the regressions we found that students performed better in micro in traditional classes. The average final grade for the in-class sections, 67.1, was significantly higher at the 10% level than the average for the online classes, 60.2. In the micro regression the indicator variable for the online classes (-5.976) predicts that online students score almost 6 points less than micro students in class. The difference was significant at the 10% level. This result is consistent with those of Brown and Liedholm (2002) who found that students in traditional micro courses scored better than those taking the course online.

Conversely, students in macro online course had final averages (81.2) significantly higher at the 1% level than students who took the course in a traditional

class (71.6). This difference was significant at the 1% level. Shoemaker and Navarro (2000) had similar results. The difference in performance between the two courses in the different environments may be due to a combination of factors. Because micro is more quantitative, it is more difficult for students who struggle with math. The method of course numbering at our university may also contribute to the higher macro averages. Although at JSU micro and macro may be taken in any order, students generally take micro first, perhaps because the course number is EC 221 and macro is EC 222. The indicator variable for having taken a previous economics course was positive and significant for the macro regression.

Contrary to most previous research (Anderson, Benjamin, and Fuss1994; Ballard and Johnson 2005; Becker 1997; Dynan and Rouse 1997; Greene 1997, Ziegert 2000), women outperformed men in both courses and both methods of instruction. The differences in final averages for women (73.9) and men (68.5) in the traditional macro classes were significant at the 5% level; in micro, the difference between women (69.8) and men (63.9) was significant at the 10% level. This result may be due to matching instructor and student gender. Research by Ballard and Johnson (2005), Jensen and Owen (2001), Dynan and Rouse (1997), and McCarty, Padgham, and Bennett (2006) suggests that matching student and teacher gender enhances learning. In our sample two of the three professors are female, so female students were more likely to match the gender of the professor, which may account for their higher scores.

Although the only significant difference in GPA was in the macro sections; the students in the online course had significantly higher GPAs than the in-class students. The coefficient of GPA was positive and highly significant in all of the regressions. This indicates that effort has an important impact on performance in economics. As Keri (2003) found, students in the online sections in our sample were significantly older than those in the traditional classes.

Our research represents a first attempt to quantitatively compare online with traditional instruction in economics classes at JSU. In order to control for as many variables as possible, analysis should be conducted for the same professor teaching the same course in the same semester with the same tests in the online and traditional classes. However, these restrictions applied at our university would limit sample size. In future research, other factors that might affect student learning should be examined. For example, math background, class rank, work schedules, ethnicity, income, and personality type may all have an impact on student performance.

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DOES *HOMO ECONOMICUS* CHEAT LIKE A WEASEL? A REVIEW OF EVIDENCE ON CHEATING BY ECONOMICS MAJORS

Patrick A. Taylor, Millsaps College

ABSTRACT

There is substantial literature reporting the results of research into many aspects of college students' cheating behavior. Some of that literature looks specifically at how a student's choice of academic major is related to his or her cheating behavior. A review of some of that literature provides no theory and little direct empirical evidence to support the conclusion that students majoring in economics cheat at a rate different from other students. Also the literature to date does not consider factors which may outweigh those frequently addressed in the literature. Including those variables may add considerably to our understanding of cheating in college.

INTRODUCTION

Most college students cheat; at least they say they do. Bowers (1964) found about three-fourths of college students in his very large sample self reported having cheated in one way or another at least once. Thirty years later, McCabe and Bowers (1994) found students were still reporting themselves to be cheating at about that same rate. McCabe, Treviño, and Butterfield (2001) continued to find much that same rate of cheating, though the preferred modes of cheating may have changed some since Bowers' 1964 study.

The present concern is with students who choose the economics major and whether the probability they will cheat is different from that of other students. If economics majors are more prone to cheat, that implies either studying economics actually teaches students to cheat or antecedent conditions that predispose students to choose economics also predispose them to cheat more.

The conventional wisdom regarding cheating by economics and business students seems to be that they are going to learn (or had already learned) to be strict maximizers of a utility function whose major component is monetary return. Furthermore, the story seems to be, in so doing they are largely unconstrained by moral or ethical considerations. This suggests students of economics and business have their moral compasses reset (or set!) so as to deem morally acceptable a wider range of behaviors than do other people. At least anecdotally, the question is generally phrased in the prejudicial one-tailed form: Do economics majors cheat more than students who choose other majors? However, there is neither theoretical nor solid empirical evidence to support the conclusion that they do cheat more. In the absence of such evidence, there is no reason to believe economics students will be any more (or less) likely to cheat than will other students. Hence, the conventional wisdom may be conventional but not wise.

Concerning cheating by economics majors, much of the work done to date condemns them through guilt by association with those highly suspect academic reprobates, business majors. In those studies considering academic major as one of the possible determinants of cheating, beginning with Bowers (1994), economics majors and business majors are usually tarred with the same brush. Bowers' choice to combine business and economics major apparently influenced many later researchers to do the same.

For those who teach economics it is important to look at economics majors alone in order to know whether they are more likely to cheat than are other students. Either students who choose economics are already more prone to cheat or we are somehow teaching students to cheat, however unintendedly, once they enter the major. Regardless of which is the case, we who teach economics are doing something wrong. We are either accepting into our major students who are systematically more likely to cheat or we are teaching them to cheat once they become economics majors.

It might be worth investigating the source of the general perception that economics and business majors can be expected to be less honest than average. That investigation will have to wait for another day, however.

Mark Twain once said, "Supposing is good, but finding out is better." Economists both suppose and find out. Next I briefly deal with the supposing part before turning to what has been found out so far.

ECONOMIC THEORY OF CHEATING IN BRIEF

Homo economicus is expected to be self-interested and rational. At least as a first approximation, economists takes that to mean one engages in behavior for which the additional benefits outweigh the additional cost. Making such choices increases the level of attainment of whatever objective one happens to be pursuing. But knowing this does not go far in helping us understand the specific choices an individual makes. That is so because we are investigating matters about which we have little way of knowing how a given individual assigns values to either benefits or costs. Beyond our saying, Ah ha! Student X cheated so for him or her in that instance the marginal benefits of cheating must have exceeded the marginal costs of doing so, we can not say much else.

Becker (1968) rigorously applied economic theory to the study of criminal behavior. As applied to academic honesty, Becker's analysis suggests *all* students will cheat more when the benefit - cost ratio increases and will cheat less when that ratio falls. As Kerkvliet (1994) put it so well, cheating is, ". . . a rational act of the expected-utility maximizing student." (p. 124). However, there is little in the literature reviewed below to lead one to believe economics majors assign benefits and costs differently than do other students. Hence, there is no reason to expect them to cheat more (or less) than average.

If students of economics are better informed about the nature of opportunity costs and are therefore better able to evaluate costs and benefits of choices then they will cheat more when the incentives favor that choice and cheat less when that is the low opportunity cost option. The optimal level of any activity is seldom zero, after all.

According to Callahan (2004), the cost of cheating is low because cheaters are rarely punished, even if they are caught. He also notes the typical benefit-cost calculation for faculty members provides little incentive for them to take steps to deter, detect, and punish cheating. Furthermore, Callahan suggests administrators may be reluctant to back faculty members who bring cheating charges. He correctly notes the buyers' market nature of higher education for most undergraduate institutions. Administrators may be inclined to think of faculty members as "hired help" so, when balanced against the "customer is always right" attitude, they find it hard to back faculty attempts to get tough with cheaters.

For the present purpose, that is sufficient supposing. What has been found out about cheating by economics students?

THE LITERATURE ON CHEATING BY ECONOMICS MAJORS

This section provides details of previous work on cheating by college students, especially students of economics. The main body of relevant literature can be loosely organized into three main categories: cost-benefit studies; self reported survey based studies including review articles, most of which are attributable to McCabe and his several colleagues; and what are referred to below as econometric studies. It is in that order those three tributaries, the confluence of which forms the river of cheating literature, are considered below. The section concludes with some discuss of the question whether economists' brains might work a bit differently than do the brains of "normal" people such that they are more apt to cheat.

Cost-benefit studies

Bunn, Caudell and Gropper (1992) and Kirkvliet (1994) estimate models which explicitly try to apply the benefit-cost approach to the study of student cheating. Neither study, however, singles out economics majors. In the case of the Kirkvliet study, measures of both the benefits and costs of cheating are mostly of the psychic sort. In fact, it is only by implication that one may be able to attach any monetary value to either study's measures. For example, Kirkvliet includes a dummy variable measuring whether a student's parents were college graduates. He finds that students with college educated parents tend to cheat more. Because college graduates ordinarily earn higher incomes than do those without degrees, one may conclude students from wealthy families tend to cheat more, regardless of their major.

Looking at the matter again later, Krikvliet and Sigmund (1999) included in their model several individual characteristics such as; sex, grades, year in college, and level of alcohol consumption. None materially altered the benefit-cost ratio, hence were not shown to influence cheating behavior. Though Kirkvliet and Sigmund did not include academic major among their variables, as noted below, it seems unlikely that including major would significantly affect the benefit-cost ratio, hence would have little, if any, impact on cheating behavior.

Several authors, Callahan (2004); Crown and Spiller (1998); and McCabe, Treviño, and Butterfield (2001) note an increase in professional rewards, financial and otherwise, that flow to those having a meaningful college degree. Therefore the returns to completing college with attractive grades is higher, meaning the net benefits of cheating will be higher, holding fixed the probability of being caught and

sanctioned for cheating. But, as Callahan (2004) notes, cheaters are not likely to be sanctioned if they are detected.

Survey-based and review studies

Since McCabe, Treviño, and Butterfield (2001) summarized the work McCabe and various colleagues and others did over the previous decade, there has not been much investigation of cheating behavior of economics majors. As McCabe, *et al* (2001) note, most studies find contextual variables have the strongest influence upon students' attitudes and behavior regarding academic honesty. They find especially important students' perceptions of the extent to which peers cheat and the existence of an effective honor code system. However, neither McCabe and his colleagues nor others provide strong, direct evidence as to whether economics majors cheat more or less than do others. Furthermore, most of the evidence there is comes primarily from analysis of self reported direct question survey data, which is suspect, as discussed below.

The main theme running through all of the work on cheating McCabe and his several colleagues have done is peer behavior is the most important determinant of the amount of cheating a student is likely to do. That in turn is most strongly influenced by the culture of the institution as it pertains to the deterrence, detection, and punishment of cheating. The lesson for economics departments is cheating deterrence is best achieved by making sure the department and the entire institution create and inculcate what is (and students perceive to be) a "just community" (McCabe, Treviño, and Butterfield, 1996, p. 461).

Of the variables usually identify as playing significant roles in determining the probability a student will cheat, academic major is ordinarily thought of as an individual, rather than contextual, variable. While it is perfectly reasonable to think of ones choice of major as a purely individual trait, the milieu from which one comes is also likely to have some bearing upon that choice. Hence, looking at major choice only as an individual variable may misstate the problem to some degree. As Crown and Spiller (1998) note, it may be more appropriate to think of major choice as a composite variable, some of whose antecedents are contextual and some individual. In effect, this is the old nature versus nurture debate.

Table 1 lists some of the variables most often considered in studies of college student cheating. It also notes some of the authors who have employed particular variables in their work on cheating. As one can see, there is a mix of contextual and individual variables. As discussed further below, not many of these

variables pertain to either nature or nurture happening in life before the student reaches college.

Table 1: Variables Affecting Cheating	
Contextual Variables	
Effective Honor Code	McCabe *et al.*
Institutional/Faculty Diligence	McCabe *et al.*
Seen (or think) peers cheat	McCabe *et al.*; Bunn *et al;* Mixon; Carrell *et al.*
Full-time Faculty	Nowell & Laufer; Kirkvliet & Sigmund
In-class warnings	Kirkvliet & Sigmund
Size of institution	McCabe *et al.*
Probability of detection	McCabe *et al.*
Severity of Sanctions	McCabe *et al.*
"Just community"	McCabe *et al.*
Fraternity/Sorority membership	McCabe *et al.*; Kirkvliet & Sigmund
Individual Variables	
Academic major	Nowell & Laufer; Bowers, Krikvliet & Sigmund; McCabe *et al.*
Grades (GPA)	Many
Off campus work load	Kirkvliet; Kirkvliet & Sigmund; Nowell & Laufer
Year in college	Kirkvliet & Sigmund; Nowell & Laufer
Course load	Kirkvliet & Sigmund
Demographic variables - age, sex, race, etc.	Many
Religious practice of student	Nowell & Laufer
Extra Curricular Activities	McCabe *et al.*
Socio-economic group	McCabe *et al.*
Alcohol Consumption	Kirkvliet
Student contribution to cost	Diekhoff *et al.*

As McCabe, *et al.* show, previous work in the area strongly supports the primacy of contextual variables, over individual variables, as factors influencing whether and to what extent students cheat. McCabe, Treviño, and Butterfield (2001) reach that conclusion following their review of several studies from the decade ending in 2000. McCabe, *et al*, (1996, 1997, 1999, 2001) consistently find contextual variables, especially peer cheating and the existence of a credible honor code, are more important influences upon cheating than are individual variables. If contextual variables are the more influential of the two, then a student's choice of major, an individual variable, is not likely to be decisive in determining whether that student will decide to cheat in college.

McCabe and Treviño (1993) found the single most important influence upon the probability a student will cheat is the student's perception of the extent to which her or his peers are cheating. In that particular study, no consideration was given to what sort of an influence the student's major choice might have, however. In their 1997 study, McCabe and Treviño continue to find factors surrounding peer behavior to be the most important influence upon the decision to cheat. They go on to say contextual variables as a whole account for more than twice as much of the variation in cheating behavior (21% versus only 9%) than do several individual variables. Of course, that means the remaining 70 percent of variation is explained by neither contextual nor individual variables.

To the extent McCabe and Treviño's numbers are accurate, the upper limit of the possible influence of academic major in explaining variation in cheating behavior is only nine percent. Because there are several other individual variables which have been found to play at least some role; gender, age, grades, for example, the share of variation for which academic major can be responsible must be quite small. That does not mean, however, it is not worth knowing whether students who choose the economics major are systematically more (or less) inclined to cheat. It would also be interesting and valuable to know what factors account for the other seventy percent of variation.

Baird (1980) found business majors tend to cheat more. He did not separate economics and business majors. But he also found males tend to cheat more than females. Though he did not report the gender mix among the business majors in his sample, during the time when his study was done, business majors were predominately males. If that was true of his sample, then males were over-represented in his sample, hence we can not be sure his finding is due to the fact that economics majors cheat more than others or that males cheat more than females.

There is evidence (Baird, 1980; Moffatt, 1990; and Roberts, Anderson, and Yanish, 1997) that students majoring in business, which may or may not include economics majors, tend to cheat more than do other students. Baird's evidence is weak, however. Of the twenty three questions on his survey, the effect of major (business only) was statistically insignificant for nineteen of the questions.

Moffatt (1990) found 87 percent of economics majors self reported having cheated at least once, which was the largest percentage of four groups of majors at which he looked. The other three grouped together several majors: communications, political science, and psychology combined; English and history combined; and several disciplines in the physical sciences combined. According to his study, students in those three groups cheated at the rates of 80 percent, 65 percent, and 60 percent, respectively. It is not clear why Moffatt looked at economics majors by themselves and combined several other majors in his other three groups. His having done so makes it difficult to know what to make of his survey results. Furthermore, it is not possible to say whether the 87 percent of economics major respondents who reported having cheated is statistically different from the responses of his other groups of majors or the roughly 75 percent Bowers (1994) and McCabe and Bowers (1994) found.

Econometric studies

Since Bowers' 1964 study, only Kirkvliet (1994), Nowell and Laufer (1997), and Carrell, Malmstron and West (2005) have done quantitative analyses of factors influencing students to cheat. Kirkvliet's study looked at students in principles of economics classes but not specifically at economics majors. His study included only individual variables, excluding academic major. Of those he looked at, a student's alcohol consumption was most likely to be linked to cheating behavior.

To corroborate what McCabe and his colleagues have had to say about cheating, Carrell, *et al*, (2005) examined the relationship between peer cheating and the probability a student will cheat. Various versions of their models, estimated using both logit and two-stage least squares techniques, did not include academic major and explained only from 7.5 to 11 percent of the total variation in cheating behavior.

Compared to studies whose conclusions are based upon direct question survey results, Nowell and Laufer's (1997) work has an advantage in that it reports results of a combination of observed experimental data and students' responses to

a random response type questionnaire. Nowell and Laufer make the case that random response type instruments may produce more honest responses than do direct question instruments. Concerning self-reported survey data and observed behavior data, while each has its advantages (Kerkvliet, 1994) and disadvantages (Umeseh and Peterson 1991), using the two methods together strengthens the conclusions one might be able to draw from Nowell and Laufer.

They found economics majors are no more likely to cheat than are students pursuing other majors. The logit model Nowell and Laufer estimate found being an economics major increases the odds of cheating between only about 2 and 4 percent. That finding, however, is not nearly statistically significant, in addition to being absolutely small. The only other individual major for which Nowell and Laufer test is computer information systems. They found students choosing the CIS major had a 28 percent higher probability of cheating. Hence, they can not confirm the findings of Bowers and those whose findings tend to support the conclusion that business and economics majors are more likely than average to cheat.

As for the random response portion of their study, Nowell and Laufer found instances of cheating during the experiment were twice as numerous as their survey responses suggested. This raises serious questions about the validity of any study based upon survey data, be it a direct question or random response type survey. More is said about survey issues below.

Do economists think differently?

Some people appear to believe that economists think differently than do other people. In fact, Carter and Irons (1991) find economics majors are different from other students in that they appear to be better than others at behaving rationally (in the economic sense of the word). But they also find economists tend to be born, not made. Their work suggests students who choose the discipline come to economics because of predispositions developed before reaching college. However, that does not mean economics majors cheat more and Carter and Irons present no evidence that they do. Furthermore, of the differences between economics and other majors, their model explains very little (between 5 and 17 percent) of total variation in cheating behavior.

Frank, Gilovich, and Regan (1993) found economics majors are more self-interested and less likely to behave cooperatively the more courses in economics they have taken. They also suggest economics majors may be less honest than other students, though they do not systematically investigate that question. Frank (2004)

believes economists are less cooperative specifically because they have studied economics rather than being predisposed to behave more self-interestedly. Furthermore, he finds a little evidence that studying microeconomics in certain ways might cause students to be more accepting of dishonesty, at least in others if not in themselves. However, Frank draws no conclusions as to what this might mean for the likelihood that economics majors will cheat.

SOME QUESTIONS

As noted above, much of the literature categorizes variables thought to influence cheating behavior as either individual or contextual variables. This raises the question as to the extent to which economics majors may be affected by both contextual and individual variables. It also raises the question whether the effects of individual and contextual variables are structurally different for economics majors from their effects upon the general population of college students.

It also begs the question as to whether there may be circularity between individual and contextual variables. For instance, college students self select into major fields of study. Are there common antecedent influences predisposing students to choose economics which also predispose them to cheat more than their peers? And are there contextual influences that either increase or decrease the rate of cheating by economics majors (McCabe, Treviño and Butterfield, 2001)? If so, does this mean those directing economics major programs should try to identify informal leaders among their group of majors and try to influence them to model academic honesty?

The entire matter of the circumstances under which a student grew up is essentially absent from the literature on cheating. In fact, there is perhaps an entire array of variables composing the circumstances of ones upbringing that may be important in shaping cheating behavior. These influences may help form moral and ethical predilections which in turn shape the ways in which one finally solves moral and ethical dilemmas, such as whether to cheat. To date, there have been no attempts to incorporate such information in models of student cheating behavior.

McCabe and Treviño (1997) discuss some sources of influences upon cheating that do not fit conveniently into the individual-contextual dichotomy. Using a concept from psychology, they mention variables of either sort may affect students differently depending upon the individual's locus of control. One who believes life outcomes are under his or her own control has an internal locus of control. One who believes outcomes are largely controlled by circumstances beyond

their control has an external locus of control. McCabe and Treviño find little evidence to support the notion that cheating behavior is related to locus of control. However, McCabe, Treviño, and Butterfield (1999) also mention in passing the potential role of ones upbringing as an influence upon her or his likelihood to cheat.

PROBLEMS WITH SURVEY DATA

The empirical work reviewed here, indeed nearly all of the empirical work on the subject, is based upon self reported data, usually in the form of direct question survey responses. While surveys certainly have their place in social science research, as Kirkvliet (1994); Kirkvliet and Sigmund (1999), and Sudman and Bradburn (1974) point out, there are reasons to use caution when searching survey data for meaning. Other than perhaps Frank, *et al*, (2004), no one argues that students of economics are systematically more (or less) inclined to respond truthfully to surveys asking about their own cheating behavior. Furthermore, neither is there theory giving reason to believe economics majors' survey responses will be less (or more) honest than will be others' responses. Using a random response type instrument, as did Nowell and Laufer (1993), may help in this regard, however.

Until such time as better experimental results are available or we invent survey instruments that are better at eliciting truthful responses, we are going to have to be very careful interpreting the results of studies of cheating using self reported data.

THE CASE FOR MISSING VARIABLES

Based upon the results of research reviewed here, particularly the work of McCabe and his colleagues, it seems fair to say contextual variables are likely to be the largest influence upon the cheat/don't cheat decision. McCabe, Treviño and Butterfield (1996) find students are less likely to cheat if they perceive their campuses to be "ethical communities" (p. 461). This raises the question whether students who have been raised in an "ethical community" are less likely to cheat. The literature so far does not address that question. As noted below, designing questions and a survey format to get at that question may not be easy, however.

According to Frank, Gilovich, and Regan (1993) students of economics are more self interested and tend to cooperate with others less than students pursuing other academic majors. If true, that may mean economics majors are less influenced by what their peers are doing than is the typical student. As related to the

dichotomy between individual and contextual variables, this would mean economics majors are perhaps more driven by the effects of individual variables. That argues for including in the examination more extensive measurement of individual variables, such as family background and other early life influences.

Here are some questions about the influences upon cheating behavior the literature has yet to address very well, or at all. While this set of questions is merely suggestive, it may include the more important heretofore unmeasured influences. How would parents react to their student being charged with cheating? Did parents ever discuss cheating as unacceptable behavior? Did parents (or teachers) cheat in college? At what age did the student first notice peers cheating? Does the student have plans for graduate study? How risk averse is the student? What is the student's expected income in his or her first job? How large is the earnings gap between college graduates and non-graduates? Does the student find the institution to be a "just community"? How frequently does the student's family attend religious services?

Several of these questions have been at least implied by others, but none of them have been specifically included in empirical work to date. Some of these influences could be easily measured. For example, it would be relatively easy to find data as to the size of the income gap between college graduates and those without degrees. Other variables, however, would only be measurable through self-reported survey responses, the voracity of which is suspect, as noted above. It would be informative to see which, if any, of these would improve the power of statistical models to predict cheating behavior.

CONCLUSIONS

Considering the body of work so far, it appears applying the economic model to student behavior does not lead to the conclusion that economics majors are more likely than average to cheat. There is neither theory nor convincing empirical evidence sufficient to support the argument *homo economicus* is more inclined to cheat than are her or his peers. Additionally empirical studies are able to explain a relatively small part of total variation in measured cheating differences, regardless of whether academic major is included as an explanatory variable. Of those studies for which it is possible to determine the size of explained variation, shares range from about 7.5 percent (Carrell, *et al*, 2005) to a high of about 30 percent (McCabe and Treviño, 1997). Therefore, statistical work to date leaves unexplained a rather

large share of total variation in the data. Furthermore, there are methodological issues in using self-reported survey data.

To address some of the shortcoming of the present state of the literature on cheating further work will have to be done. In addition there are important influences upon students' decision to cheat that are not investigated in the existing literature. In particular, we have yet to systematically include data from the pre-college stage of students' development, including the influences of their upbringing and family background. Controlling for other influences, if economics majors cheat differently than does the average student, we need to know why, if we are to find ways to improve the situation.

Scholars have made good progress in their investigations of the antecedents of cheating behavior so the state of the art is not deplorable. However, heretofore unexplored territory exists and covering that ground holds the promise of advancing the state of the art. We may find, to paraphrase Pogo, we have met *homo economics* and he is all of us!

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ECONOMICS ARTICLES

RECREATIONAL DEMAND FOR A GULF COAST TOURISM DESTINATION

Inhyuck "Steve" Ha, Western Carolina University

ABSTRACT

Policy makers are often faced with limited resources and continuing demand for public services, and must make difficult decisions about how to allocate the public funds entrusted to them. To assess the economic value of ecosystems, such as beaches, a recreation demand function is estimated using the individual travel cost method (ITCM) for tourist areas in Northwest Florida. Visitor behavior patterns, broken down by the purpose of trip, such as business, vacation, and visits to friends and relatives (VFR), are examined. Survey data provided determinants of length of stay in the recreation area. The empirical results demonstrate the elasticities of income and prices of recreation products. Consumer surplus is also estimated to measure the changes in welfare according to the changes in value of resources.

INTRODUCTION

Policy makers in beach communities are faced with limited resources and continuing demand for public services, and must make difficult decisions about how to allocate the public funds entrusted to them. Those in charge of protecting and managing vital beach resources must justify their decisions in terms of benefits to the natural environment and demonstrate fiscal accountability if they wish to maintain public support. Often they are asked to justify their decisions in terms of the economic value that is generated for the community (Font, 2000). One of the primary economic benefits that these communities enjoy is spending related to beach tourism. Beach related tourist activity in the Northwest Florida area has long been a major source of employment for local residents, sales for local companies, and tax revenues for local government. Tourism's contribution to economic activity in the area is therefore an important consideration in community planning. Economic

analyses that provide tangible estimates of these economic interdependencies and a better understanding of the role and importance of tourism in a region's economy are valuable to policy makers.

The purpose of this paper is to estimate a recreation demand function to estimate the economic value of ecosystems, such as beaches, using the individual travel cost method (ITCM) for tourist areas in Northwest Florida. Once the demand curve has been defined and estimated, one can also estimate the average consumer surplus, or economic benefits, for the recreational amenities of the beach. It is often mistakenly assumed that market price is the same as economic value. Actually, the market price represents the minimum amount that someone buying a good is willing to pay for it. People purchase marketed goods only if their willingness to pay is equal to or greater than the price of the good. Many people are actually willing to pay more than the market price for a good, reflecting an economic value greater than the market price. For policy makers to make resource allocation decisions based on economic values, what they need to know is the net economic benefit of a good or service. For individuals, incremental net benefits beyond the price paid are called consumer surplus, and are measured as the difference between the price actually paid for a good, and the maximum amount that an individual is willing to pay for it.

This paper consists of six sections. They are literature review, data, the theoretical model, empirical results, consumer surplus, and conclusion.

LITERATURE REVIEW

Assessing the economic value of ecosystems such as a beach is challenging because the intangible beach amenities that vacationers seek are not bought and sold in markets as are other commercial goods and services (Pendleton, 1999). Thus, determining value requires the estimation of how much money or purchasing power people are willing to give up to avail themselves of all that a particular beach has to offer. For the past several decades, the demand for recreational trips has been estimated using either direct or indirect method1. In the direct method, vacationers are asked how much they would be willing to pay for an amount of recreation. The contingent valuation method (CVM) is a well-known approach to directly estimate the non-market value of recreational trips. Estimated values of a non-market good can be specified in monetary terms by willingness-to-pay (WTP) or willingness-to-accept (WTA). In the CVM approach, monetary values are based on the hypothetical questions associated with WTP or WTA for non-market goods.

On the other hand, the travel cost method (TCM) is one of the most popular indirect method approaches. Since Hotelling's letter was published in response to a US National Parks solicitation in order to value the economic benefits of National Parks (Hotelling, 1949), the TCM has been one of the useful tools to measure the value of a non-market resource. In the TCM approach, values for non-market goods can be inferred from the relationships between non-market use value and other market goods and services that are purchased as complements to a site visit (Bishop, 1979; Herath, 1999). The observed travel cost is used as a price proxy in this method2.

Two major variants of the TCM are the zonal travel cost method (ZTCM) and the individual travel cost method (ITCM). In the ZTCM, the area surrounding the recreation site is divided into various zones of origin. Each zone has an associated average travel cost to the site (Garrod and Willis, 1999). The visitation rate per zone given time period, which is weighted by the number of visitors and the reverse of the sample size and its population, can be estimated on the average travel cost. According to Herath (1999), visits per thousand residents per year t (Vt)3 can be obtained as follows.

$$V_t = \sum_i \left\{ \left(\frac{1}{R_{it}} \right) \left(\frac{V_{it}}{n_t} \right) \times N_t \times (52) \times (1000) \right\} \tag{1}$$

where R_{it} = the total population of residents in area i in time t; V_{it} = visitors from area i in time t; n_t = the sample size in time t; and N_t = total number of visitors per week in time t.

Compared to the ZTCM, the estimation using ITCM is relatively straightforward when the individual number of visits correlates with travel cost and other economic and socio-demographic variables (Dobbs, 1993; Smith and Kaoru, 1990; Ward and Loomis, 1986). The Individual Travel Cost Method assumes that the value of the beach or the recreational activities it offers is reflected in how much people are willing to pay to get there. It is referred to as a "revealed preference" method, because it uses actual spending behavior to infer values. The premise of this method is that the time and travel cost expenses that tourists incur to visit a beach represent the recreational value of the beach. The advantages of the Individual Travel Cost Method are that it 1) imitates the conventional methods used by economists to estimate economic values based on market prices; and 2) it is

based on what people actually do rather than on what people say they would do in a hypothetical situation (Bell and Leeworthy, 1990).

The Individual Travel Cost Method uses survey data from individual visitors to link the demand for tourism to its determinants. Determinants include how far the tourist must travel to get to the beach, the amount of time spent, travel and on-site expenses, how often they have visited the beach in the past, their income and other socioeconomic characteristics, etc. Because the tourist's costs will vary as the determinants vary, this method allows us to calculate the amount of beach visits "purchased" at different "prices." These values are used to construct the demand function for a beach vacation. The demand function relates price and quantity by illustrating how many units of a good will be purchased at different prices. In general, at higher prices, less will be purchased giving the demand function (the graphical representation of the demand function is referred to as the demand curve) a negative slope. Using survey data and regression analysis, we are able to estimate the demand function for the "average" visitor to the beach. This demand function, or demand curve, allows us to quantify the impact that changes in any of the determinants will have on the revenue generated by the local tourism industry.

Due to the weak theoretical foundation of the behavioral patterns in the aggregate demand models, the ZTCM has been often less preferred to the ITCM. Empirical studies provide mixed results (Cook, 2000; Hellerstein, 1995). The ZTCM is considered more appropriate to estimate consumer surplus when origins are uniformly distributed. The ZTCM is relatively more unsuitable for the case of multiple-destination of the recreational areas because of the difficulty of obtaining the site-specific travel cost estimates. Those difficulties can be overcome by adopting the ITCM, which is used in this study to estimate a recreational demand function for the Pensacola recreation area in the Northwest Florida.

DATA

Visitor data were collected between September 1999 and April 2002 at the four visitor information centers4 in the greater Pensacola area of Northwest Florida. These four visitor centers are located in two counties - Escambia and Santa Rosa - in Northwest Florida. Walk-in visitors at each visitor information center filled out surveys in person. There was no respondent-selection procedure. Some people argue that walk-in visitor survey can be age-biased. Younger people are less likely to stop by visitor centers on highways to collect information. However, in the

greater Pensacola area, all four visitor information centers are located in the center of each subdivision. Under- or over-representation of a specific group of population might not be significant. Surveys have been conducted year-round during the regular visitor center operation hours. Frequency varies month-to-month, which reflects the monthly variation of visitors. The questionnaire has been attached (See Attachment 2)

The total number of traveler groups included in this analysis is 8,625. 66.7% of respondents can be classified as vacationers. The others are business travelers (15.4%) and those who visited friends and relatives (17.8%). Almost 90 percent of visitors reside outside the local area. Half of the visitors have made multiple visits over the past five years. Top five reasons to visit the area are (1) beaches, (2) natural beauty of area, (3) climate, (4) quiet and relaxing atmosphere, and (5) cleanliness of area.

Table 1 shows the differences in means for several selected variables by pre- and post-9/11 attack. Vacation trips have significantly decreased from 67.2% to 62.6%. Trips by airplane also have decreased significantly from 12.1% to 10.1% while there is no change in auto trips. Visitors have stayed less nights (from 5.28 to 4.99) and spent less (from $203.55 to $190.68) during their stays. The portion of repeated visitors has increased which was measured by number of visits (from 2.63 to 2.84). It has the negative impact on the international travelers. U.S. citizens increased from 88.7% to 92.0%. The number of children in each travel group has decreased significantly from 0.6 to 0.4 persons.

The distance between origination and destination is calculated by using US Census data, based on the ZIP code information that each respondent provided. ZIP code coordinates, latitude and longitude, were obtained from the US Census STF-3 data sets. Given the latitudes and longitudes of the two points, the great circle distance between them can be calculated by the following formula (Paine, 1981).

$$d = R \times \arccos\left[\sin(\pi_1) \times \sin(\pi_2) + \cos(\pi_1) \times \cos(\pi_2) \times \cos(\gamma_1 - \gamma_2)\right] \qquad (2)$$

where d = distance between the two points in km; R = radius of the earth in km, which is 6378.02km; π_1 = latitude of point 1 in radians; π_2 = latitude of point 2 in radians; γ_1 = longitude of point 1 in radians; and γ_2 = longitude of point 2 in radians.

Table 1:. Mean Difference Tests: Before and After 9/11

	Before 9/11		*After 9/11*				
	N	*Mean*	*N*	*Mean*	*t-stat.*	*p-value*	
Purpose of Trip							
Business	6518	15.1%	1379	16.6%	1.377	0.169	
Vacation	6518	67.2%	1379	62.6%	-3.224	0.001	***
VFR	6518	17.5%	1379	18.9%	1.142	0.254	
Type of Transportation							
Airplane	7048	12.1%	1471	10.1%	-2.268	0.023	***
Auto	7048	82.6%	1471	82.8%	0.219	0.826	
Other Vehicle	7048	5.4%	1471	7.1%	2.414	0.016	**
Visiting Patterns							
Number of Visits	6867	2.63	1399	2.84	2.871	0.004	***
Number of Nights	7142	5.28	1483	4.99	-3.169	0.002	***
Spending Patterns							
Per Day Spending on Lodging	4426	$88.71	671	$96.49	2.300	0.021	**
Per Day Spending on Grocery	3772	$26.87	583	$22.48	-4.273	0.000	***
Per Day Spending on Restaurants	4879	$43.04	833	$42.13	-0.588	0.557	
Per Day Spending on Entertainment	3438	$32.69	513	$32.97	0.135	0.893	
Per Day Spending on Shopping	3767	$44.73	595	$43.09	-0.576	0.565	
Per Day Spending on Others	2439	$37.43	402	$37.26	-0.055	0.956	
Total Per Day Spending	5305	$203.55	894	$190.68	-2.006	0.045	**
Tourism Destinations							
No Other Destinations	7142	42.9%	1483	33.2%	-7.202	0.000	***
Mississippi Casinos	7142	10.7%	1483	11.1%	0.517	0.605	
New Orleans Area	7142	15.3%	1483	15.0%	-0.287	0.774	
Orlando Area	7142	7.7%	1483	5.9%	-2.600	0.009	***
Ft. Walton Beach/Destin Area	7142	18.3%	1483	22.0%	3.138	0.002	***
Mobile Area	7142	12.5%	1483	13.2%	0.726	0.468	
Orange Beach/Gulf Shores Area	7142	10.5%	1483	12.7%	2.343	0.019	**
Panama City Area	7142	13.3%	1483	13.1%	-0.198	0.843	
Other	7142	17.7%	1483	16.2%	-1.419	0.156	
Demographic Information							
Age	6654	47.6	1289	49.3	3.444	0.001	***
Married	7000	71.6%	1441	75.7%	3.272	0.001	***
White	6933	87.9%	1440	83.3%	-4.274	0.000	***
US Citizen	6989	88.7%	1470	92.0%	4.191	0.000	***
Number of Children in the Household	6896	0.64	1421	0.47	-5.373	0.000	***
Number of Children in Travel Group	6826	0.60	1387	0.40	-6.205	0.000	***
Number of Adults in Travel Group	6958	2.53	1432	2.55	0.712	0.477	
Economic Information							
Annual Household Gross Income	5865	$59,531	1167	$62,378	2.311	0.021	*

Source: VISIT System Data, April 2003

Note: Only overnight visitors are included.

*** significant at 99%, ** at 95, and * 90% levels

THEORETICAL MODEL

This analysis assumes that a tourist's utility can be described in the following utility function

$$U=f(V,X) \tag{3}$$

where V is the number of visits to a specific recreation area over a certain period of time, and X is a vector of all other goods and services. Demand for recreation can be expressed in various ways. One measure can be the nights of spent in a specific area or the length of stay, which is represented by V in this model. In order to differentiate outside visitors from local residents, only those who spent at least one night are considered in the estimation. The budget constraint can be specified as follows:

$$Y=pX+\alpha V+\beta T \tag{4}$$

where Y = income; p = a vector of prices of other goods and services; X = a vector of other goods and services; α = price of demand for recreation, which is the actual cost per day; V = number of nights spent in a given period of time; β = total cost per trip; and T = number of trip in a given period. Utility maximization given the budget constraint yields the following demand function for the recreation demand, V.

$$V=f(\alpha,T,Y,X). \tag{5}$$

Assuming that recreational demand is a normal good, it is hypothesized that V is positively related to T and Y while negatively related to . X consists of demand shifters, which are listed in the table shown in the section of the empirical results.

One of the response variables in X is the number of nights staying in the area. The upper open-ended interval of the range of the variable is '10 nights or more'. It is a very common way to define a variable in this type of survey questionnaires. To avoid the right-hand-side truncation bias, the censored regression model is used to provide more accurate results. The regression is obtained by

making the mean in the preceding correspond to a classical ordinary least square model (Greene, 1993).

EMPIRICAL RESULTS

Travel cost is usually assumed to be positively correlated with the length of trip and negatively correlated to the frequency of trips. It has been widely accepted that the length of trip and the frequency of trip are substitutes in a given period of time (Font, 2000). However, for certain destinations or types of travelers in this study, empirical tests show that repeated visitors are likely to spend more days.

Table 2 shows the coefficient estimates and descriptive statistics from the ordinary least estimation for the number of nights for different classes of visitors: business travelers, vacationers, and those visiting friends and relatives (VFR).

Business travelers and vacationers arriving by airplane are more likely to stay longer than visitors using other forms of transportation, reflecting their higher opportunity costs for traveling. The effect of age is also significant, however it is positively related to length of stay for the business traveler, and negatively related to length of stay for the vacationer. U.S. citizenship, on the other hand, increases the length of stay for vacationers, while decreasing it for business travelers.

Distance is another important factor in explaining length of stay for business visitors and vacationers alike. The greater the distance traveled, the longer the stay. The average distance of travel is 1,083.7 km (673.53 miles). The winter dummy variable has significantly positive effects on the length of stay. Many of our winter visitors are known to be "snow birds" who spend their summers in northern states and winters in Florida.

"Total per Day Spending" represents the price of recreational services, and is a significant factor in length of stay. The negative coefficient illustrates that higher daily costs result in shorter visits for both business travelers and vacationers. The business travelers and vacationers that stayed the longest were those who planned the vacation at least a month in advance, and those who had visited the area previously. The greater the number of previous visits, the longer the stay.

Surprisingly, annual gross income does not play an important role in this demand model. It was hypothesized that higher-income individuals would spend more nights, but this was not supported by the results.

Table 2: Coefficient Estimates of Linear Regression Model: Number of Nights

	Overall	Business Only	Vacation Only	Visit Friends or Relatives
Constant	4.1060 ***	3.5256 ***	3.7380 ***	5.5610 ***
Business	0.3164	-	-	-
Vacation	-0.0788 **	-	-	-
Airplane	0.6497 ***	1.3440 ***	0.5072 **	0.1387
Automobile	-0.3319 ***	0.3894	-0.2914 ***	-0.8371 ***
Age	-0.0210 ***	0.0409 ***	-0.0318 ***	-0.0121
Age-squared	0.0003 ***	-0.0007 ***	0.0005 ***	0.0001
US citizen	0.1470	-0.6020 ***	0.4829 ***	-0.1889
Annual Income	-2.63E-06 ***	0.0000 ***	2.01E-07	-3.98E-06 **
Number of Visits	0.2691 ***	0.2266 ***	0.2443 ***	0.2852 ***
Distance	0.0006 ***	6.96E-04 ***	0.0005 ***	0.0005 **
Spring	-0.5176 ***	-0.0910	-0.6386 ***	-0.2137
Summer	-0.2159 **	0.8121 ***	-0.5218 ***	0.1225
Fall	-0.6083 ***	0.4588 *	-0.8170 ***	-0.5328 ***
Planned at least a month ago	1.1346 ***	1.3512 ***	1.1792 ***	0.3832 ***
Pensacola Area Only	0.3137 ***	0.2219	0.4019 ***	0.0633
Total per day spendings	-0.0125 ***	-0.0114 ***	-0.0118 ***	-0.0184 ***
Total spendings	0.0019 ***	0.00162 ***	0.00185 ***	0.00272 ***
Mean of Dependent	5.1475	5.4617	5.0227	5.3868
Number of Observations	5614	823	3833	954
p-value	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Adjusted R-square	0.4482	0.3768	0.5067	0.3948

*** significant at 99%, ** at 95, and * 90% levels

Source: VISIT System Data, April 2003

CONSUMER SURPLUS

Consumer surplus is estimated to measure the changes in welfare according to the changes in value of resources. This is represented graphically as the area under the demand curve and above the market price. When the average individual consumer surplus is multiplied by the total population of beach visitors, an estimate of the total consumer surplus for the beach is obtained. By changing value estimates of the various determinants of the demand function, one can estimate the effect they have on consumer surplus. Changing values generates two different demand curves, one for each level of the determinant. The area between these two curves is the

estimate of the change in consumer surplus caused by a change in one of the determinants. This type of analysis allows us to estimate the change in recreational benefits that result from changes in the determinants of visitor spending behaviors.

Consumer surplus is widely accepted as a method to measure the changes in welfare according to the changes in value of resources (Hausman, 1981). However, there is relatively less agreement on how to calculate it (Bell and Leeworthy, 1990). From the above discussion, the demand function can be re-written as follows:

$$V = \Sigma - \gamma P + \delta Y \tag{6}$$

where N = number of nights, P = price of recreational services, Y = income, $\sum$ = sum of all demand shift factors except for Y, multiplied by their corresponding rates of returns, and γ and δ are estimated parameters for price and income, respectively. Then the consumer surplus (CS) can be estimated as follows:

$$CS = \frac{1}{2}\left(P^* - \overline{P}\right)\overline{V} \tag{7}$$

where P* = intercept, and $\overline{P}$ = the corresponding price with mean value of dependent variable, $\overline{V}$. To estimate CS, mean values of demand shifters except for P are plugged into the demand function. This yields

$$V = 6.5512 - 0.0118\ P \tag{8}$$

Then, the demand equation is obtained as

$$P = 555.19 - 84.75\ V \tag{9}$$

Plugging the mean value of V, which is 5.0227, into the above equation, then .

The consumer surplus is estimated

$$CS = (\$555.19 - \$129.52)\quad (5.0227)\quad (0.5) = \$1{,}069.01. \tag{10}$$

Then, we can estimate the value of one day spent in the recreation area, which would be $69.9 [= 1069.01 (5.0227 3.0449)] per person when the average size of a travel group is 3.0449. Similarly, we could estimate the value of one day spent in the area for the business travelers and VFR, which are $78.58 and $49.84, respectively.

Using bed tax data for the local area we estimate that approximately 1.8 million tourists visit the Pensacola area each year. Survey responses tell us that our beaches draw tourists to the Pensacola area. Multiplying the number of visitors by the consumer surplus of $69.9 experienced by the average tourist, we estimate the total consumer surplus, or excess recreational value of the area beaches, at $125,820,000.

CONCLUSIONS

A recreation demand function is estimated for tourist areas in northwest Florida. Visitor behavior patterns, broken down by the purpose of trip, such as business, vacation, and visits to friends and relatives (VFR), are examined. Policymakers who need to know that the benefits of beach protection programs are greater than the cost to taxpayers have been provided with calculations of the consumer surplus, or recreational value, of the beaches in the Pensacola area of Northwest Florida. Tourism directors who need to allocate advertising expenditures have been provided with a description of important determinants of visitor length of stay, which is directly related to total visitor spending.

Determinants that are shown to have statistically significant positive impact on length of stay for vacationers include air mode of travel, U.S. citizenship, distance traveled, number of visits in the past five years, and length of time spent planning the vacation. Age was shown to have statistically significant negative impact on length of stay for vacationers. Annual income was found not to play an important role in vacationer's length of stay. Business travelers were shown to differ from vacationers in that older business travelers stayed longer, and non-U.S. citizens here on business had a shorter length of stay. Income has a significant positive impact on length of stay for business travelers.

ENDNOTES

[1] In the estimation of non-market valuation, as a third category, a discrete-choice modeling approach has been recently recognized and used extensively, which is based on the Random Utility Model (RUM) theory. For more details, see Feather,

et al (1995), Parsons and Kealy (1995), Pendleton and Mendelsohn (2000), and Woodward (2001).

[2] For critiques of TCM and CVM, see Eberle and Hayden (1991), and Randall (1994).

[3] In the estimation, the visit rate, i.e., participation rate of each zone, is estimated in the ZTCM while the actual number of visits is estimated in the ITCM.

[4] Four visitor information centers (VIC's) are (1) Pensacola VIC, (2) Perdido Key VIC, (3) Pensacola Beach VIC, and (4) Navarre VIC.

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Area Visitor Survey

This survey was developed and the data will be collected and analyzed by the Haas Center for Business Research and Economic Development at the University of West Florida. Additional Information: call (850) 474-2657, or visit our website at: http://www.haas.uwf.edu

MARKING INSTRUCTIONS

- **Use a No. 2 pencil or a blue or black ink pen only.**
- **Do not use pens with ink that soaks through the paper.**
- **Make solid marks that fill the response completely.**
- **Make no stray marks on this form.**

CORRECT: ● **INCORRECT:** ✓ ✗ ◒ ◔

1. At this time, are you:

   ○ just arriving in our area
   ○ in the midst of your visit
   ○ departing from our area

2. How did you travel to our area?

   ○ airplane ○ automobile ○ other

3. Over the last five years, counting this trip, how many times have you visited our area?

   ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ or more

4. Please tell us who made the decision to visit our area and who did the majority of the planning for this visit.

	Decided	Planned
male head of household	○	○
female head of household	○	○
both male and female head of household	○	○
travel agent	○	○
tour operator	○	○
other	○	○

Approximately how far in advance did the trip planner(s) begin planning your current visit to our area?

○ less than 1 week
○ 1 to 2 weeks
○ 3 to 4 weeks
○ 1 to 2 months
○ 3 to 4 months
○ 5 to 6 months
○ more than 6 months

6. Please indicate whether your travel party **used** or **did not use** the following information sources about our area when planning your current visit.

	Did Not Use	Used
Area Visitor Information Center	○	○
Area Chamber of Commerce	○	○
State of Florida Tourism Office	○	○
Area lodging providers	○	○
Travel Agent	○	○
Reunion/convention/meeting planner	○	○
Auto Club	○	○
Friends or relatives	○	○
WWW site	○	○

7. Which of these best describes the main purpose of your **current** trip? Please read all choices carefully before marking only one.

   ○ business (company, government, or personal)
   ○ search for retirement location
   ○ weekend getaway
   ○ longer vacation
   ○ Brownsville revival
   ○ convention or reunion
   ○ visit friends or relatives
   ○ sports event
   ○ group tour

8. Please rate the influence of each of the following factors on your decision to visit our area.

	Extensive Influence	Moderate Influence	Slight Influence	No Influence
activities for children	○	○	○	○
area night life	○	○	○	○
artistic/cultural atmosphere	○	○	○	○
beaches	○	○	○	○
cleanliness of area	○	○	○	○
climate	○	○	○	○
fishing	○	○	○	○
golf courses	○	○	○	○
good value for your money	○	○	○	○
historical sites	○	○	○	○
natural beauty of area	○	○	○	○
quality of restaurants	○	○	○	○
quality of lodgings	○	○	○	○
quiet, relaxing atmosphere	○	○	○	○
safety of area	○	○	○	○
shopping	○	○	○	○

Which of the following attractions have you visited or do you plan to visit during your stay in the area? **(Mark all that apply)**

○ Malls
○ Historic District and Museums
○ The Zoo at Gulf Breeze
○ Greyhound track
○ State Park(s)/ National Park(s)
○ Beaches
○ Golf Courses
○ Historic Forts
○ The Wall South
○ National Museum of Naval Aviation
○ Art Galleries and Museums
○ Sam's Fun City

10. How many nights are you staying in our area?

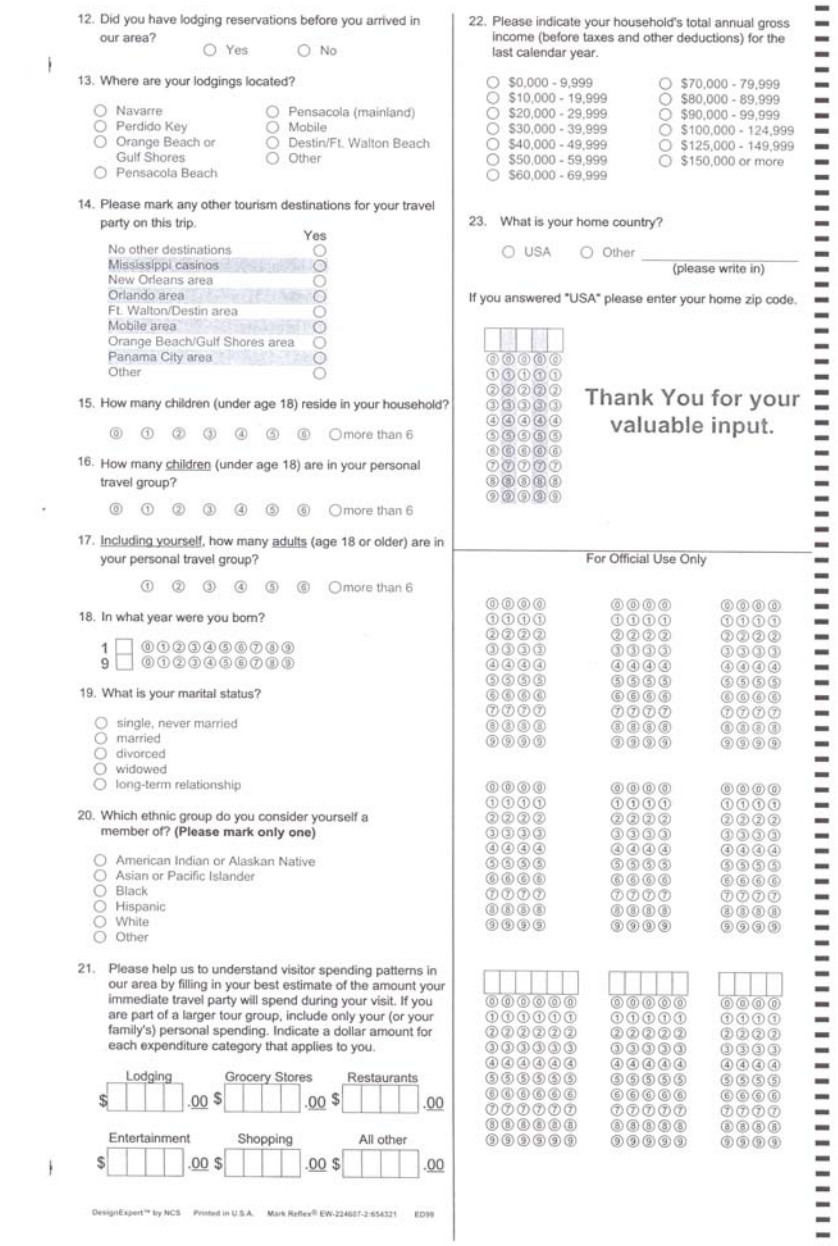
⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨
○ 10 or more

If you answered "0" to Question 10, please skip to Question 14 on the back of this sheet.

11. What type of lodgings are you staying in?

○ home of friends or relatives
○ condo/apartment/house
○ hotel or motel
○ campground or RV park

Please continue on the back of this sheet.



12. Did you have lodging reservations before you arrived in our area?
○ Yes ○ No

13. Where are your lodgings located?
○ Navarre ○ Pensacola (mainland)
○ Perdido Key ○ Mobile
○ Orange Beach or Gulf Shores ○ Destin/Ft. Walton Beach
○ Pensacola Beach ○ Other

14. Please mark any other tourism destinations for your travel party on this trip.

	Yes
No other destinations	○
Mississippi casinos	○
New Orleans area	○
Orlando area	○
Ft. Walton/Destin area	○
Mobile area	○
Orange Beach/Gulf Shores area	○
Panama City area	○
Other	○

15. How many children (under age 18) reside in your household?
⓪ ① ② ③ ④ ⑤ ⑥ ○more than 6

16. How many children (under age 18) are in your personal travel group?
⓪ ① ② ③ ④ ⑤ ⑥ ○more than 6

17. Including yourself, how many adults (age 18 or older) are in your personal travel group?
① ② ③ ④ ⑤ ⑥ ○more than 6

18. In what year were you born?
1 ☐ ⓪①②③④⑤⑥⑦⑧⑨
9 ☐ ⓪①②③④⑤⑥⑦⑧⑨

19. What is your marital status?
○ single, never married
○ married
○ divorced
○ widowed
○ long-term relationship

20. Which ethnic group do you consider yourself a member of? **(Please mark only one)**
○ American Indian or Alaskan Native
○ Asian or Pacific Islander
○ Black
○ Hispanic
○ White
○ Other

21. Please help us to understand visitor spending patterns in our area by filling in your best estimate of the amount your immediate travel party will spend during your visit. If you are part of a larger tour group, include only your (or your family's) personal spending. Indicate a dollar amount for each expenditure category that applies to you.

Lodging $ ☐☐☐☐ .00
Grocery Stores $ ☐☐☐☐ .00
Restaurants $ ☐☐☐☐ .00
Entertainment $ ☐☐☐☐ .00
Shopping $ ☐☐☐☐ .00
All other $ ☐☐☐☐ .00

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22. Please indicate your household's total annual gross income (before taxes and other deductions) for the last calendar year.
○ $0,000 - 9,999
○ $10,000 - 19,999
○ $20,000 - 29,999
○ $30,000 - 39,999
○ $40,000 - 49,999
○ $50,000 - 59,999
○ $60,000 - 69,999
○ $70,000 - 79,999
○ $80,000 - 89,999
○ $90,000 - 99,999
○ $100,000 - 124,999
○ $125,000 - 149,999
○ $150,000 or more

23. What is your home country?
○ USA ○ Other _____ (please write in)

If you answered "USA" please enter your home zip code.
☐☐☐☐☐

Thank You for your valuable input.

For Official Use Only

THE EFFECTS OF FIRM SIZE ON PROFIT RATES IN THE FINANCIAL SERVICES

Louis H. Amato, University of North Carolina-Charlotte
Timothy E. Burson, Queens University of Charlotte

ABSTRACT

The impact of firm size on firm profit rates has been of interest to economists for several decades. However, this extensive literature deals almost exclusively with manufacturing industries. Empirical consideration of the firm size-profits for firms outside manufacturing, including financial services, is almost non-existent. The purpose of this study is to empirically test the relationship between firm size and profitability for the financial services sector using a data set that covers a broad range of firm sizes. The topic is an important one because recent changes in the legal framework have facilitated a level of merger activity that is unprecedented in the history of the financial services sector. Questions related to the profitability of financial services firms operating at various sizes are integral to an analysis of financial service sector practices and ultimately to an evaluation of overall performance within this important sector. An important contribution of this paper is the testing of both linear and non-linear specifications for the firm size-profitability relationship.

INTRODUCTION

The impact of firm size on firm profit rates has been of interest to economists for several decades. Economies of scale provide one theoretical basis for arguing that firm size is related to profitability. The scale economy justification for a positive relationship between firm size and profitability is prominent in the works of Alexander (1949), Stekler (1964), Hall and Weiss (1967) and Scherer (1973). Scale economies may be related to profit by virtue of their propensity to serve as entry barriers and the implied cost disadvantages imposed on smaller firms operating at sub-optimal scale (Scherer, 1990). Doubts over this justification for a

relationship between firm size and profitability arise when one examines evidence regarding MES plant sizes relative to total market demand. Empirical studies suggest that most U.S. industries could support numerous firms operating at minimum efficient scale (Waldman and Jensen, 2001), raising questions as to why firms continue to operate at sub-optimal scale. The lack of satisfactory answers to these questions cast doubt on scale economies as a source of size related differences in profit.

Demsetz (1973) offers an alternative explanation for the relationship between firm size and profitability, arguing that the greater profits of large firms have little or nothing to do with conventional scale economies. Demsetz argues that some firms are inherently more efficient than others due to superior management. Over time, the more efficient firms are rewarded with both growth and elevated profit. Cross sectional studies that provide a mere snapshot of the firm size-profitability relationship suggest that profitability is a function of firm size, but in Demsetz' model, both increased firm size and higher profits are merely the consequences of the firm's superior efficiency. Using Internal Revenue Service data, Demsetz observes that large firms earn higher profits in highly concentrated markets while smaller firms earn a normal return. Demsetz interprets these findings as supporting evidence for his premise regarding the superior efficiency of large firms. However, Demsetz' findings are not supported by more rigorous empirical testing (Amato and Wilder, 1988).

Capital market imperfections provide yet another conceptual argument to support size related differences in profitability. The basis for this argument is that financial markets may overstate the risks associated with small firms and charge interest rates that more than compensate the lender for any actual risk differential. Reinganum and Smith (1983) found that lenders charge risk premiums of small firms that exceed what is justified by increased risk of default. Moreover, there is evidence that large firms borrow in a national credit market whereas the credit market faced by smaller borrowers is local or regional (Meyer, 1967). Meyer cites these differences in borrowing patterns between large and small borrowers as a source of increased borrowing cost for small firms.

The final theoretical justification relating firm size and profitability comes from the strategic groups concept developed by Caves and Porter (1977) and Porter (1979). Caves and Porter describe strategic groups as consisting of clusters of firms within each industry who confront similar operating conditions. Strategic groups are related to profitability because the firms in higher strategic groups have considerable market power, while firms in lower strategic groups have little or no

market power. Caves and Porter (1977) introduce the concept of mobility barriers to explain the inability of firms from lower strategic groups to move into the higher strategic groups that afford the greatest profit opportunities. Mobility barriers are similar to entry barriers, but refer to the ability to restrict intra-industry movements as well as to the more traditional restriction to new firms implied by entry barriers. Caves and Porter imply that differences in profitability for firms within the same industry are ultimately the result of the network of strategic groups. Because firm size is one factor that determines a firm's strategic group, there is an observed relationship between firm size and profitability (Porter, 1979).

The theoretical arguments presented above suggest a positive relationship between firm size and profitability. Empirical studies have frequently found a positive relationship, including studies by Shepherd (1972), Marcus (1969), Hall and Weiss (1967) and Smyth, Boyes and Peseau (1975). The main difficulty with the aforementioned studies is their focus exclusively on large firms. Amato and Wilder (1985) used IRS data that covers diverse firm sizes ranging from very small firms to the largest multinationals. The most important finding of Amato and Wilder is that once the sample is broadened beyond the very largest firms, the effect of firm size on profitability is small and perhaps negative. Schmalensee (1985) finds that profitability is not closely related to any attribute of the firm, concluding instead that profits are more closely tied to the market in which the firm operates. He summarizes his findings by stating that industry effects dominate firm effects in explaining cross sectional profit rate variation.

The biggest difficulty with the literature cited above is an almost exclusive focus on manufacturing industries. Empirical consideration of the firm size-profits for firms outside manufacturing, including financial services, is almost non-existent. The purpose of this study is to empirically test the relationship between firm size and profitability for the financial services sector using a data set that covers a broad range of firm sizes. The topic is an important one because recent changes in the legal framework have facilitated a level of merger activity that is unprecedented in the history of the financial services sector. Questions related to the profitability of financial services firms operating at various sizes are integral to an analysis of financial service sector practices and ultimately to an evaluation of overall performance within this important sector. An important contribution of this paper is the testing of both linear and non-linear specifications for the firm size-profitability relationship.

PREVIOUS LITERATURE AND CONCEPTUAL FRAMEWORK

No previous literature deals directly with the relationship between firm size and profitability for financial services. Much of the prior literature related to firm size within the financial services deals with the survival prospects and lending procedures for various size banks. Elyasiani and Mehdian (1995) express concern regarding the survival prospects for small banks. The issue of small bank survival is potentially important because small banks generally loan more to small businesses as compared to larger banks (Jayaratne and Wolken, 1999).

Small banks may have a comparative advantage in loaning to small business. Nakamura (1994) contends that small banks do a better job of processing information and assessing risks relative to small business loans. Some of this advantage may accrue as a result of the daily contacts that small banks have with their small business loan customers (Nakamura, 1993). Moreover, DeYoung, Hunter, and Udell (2004) maintain that much of the advantage that small banks possess in making small business loans relates to their ability to process "soft information" that is either not available or underutilized by larger lenders. Carter, McNulty, and Verbrugge (2004) examined the small business lending procedures of both small and large lenders. Their conclusion, that small lenders make better small business loan decisions as compared to large lenders, is consistent with the hypothesis that small lenders have a comparative advantage in dealing with small business.

The effect of firm size on competition is another prominent theme in the literature. Hanweck and Rhoades (1984) found that the presence of large banks reduces competition in local banking markets. Rhoades (1995) found a positive and statistically significant relationship between overall bank profitability and the presence of at least one large bank in the local market. Several researchers (Heggestad and Rhoades, 1978; Feinberg, 1984; Bernheim and Winston, 1990, and Scott, 1993) conclude that profits are increased when banks confront one another in multiple markets. Finally, Philloff (1999) found that overall profitability is higher in markets where there is at least one large bank as compared to markets without a large bank presence. The general consensus of this literature is that large banks have an impact on overall profitability that is disproportionate to the banks absolute size or size relative to the market.

Both of the existing strands of literature cited above have important public policy implications. The literature relating small business loans to the presence of small banks suggests that there may be social benefits from having small banks

operating in a market. Similarly, the literature dealing with profitability and the presence of at least one large bank in a market may indicate the propensity for reduced competition when large banks enter a market. While the prior literature undoubtedly contributes to our understanding of the role that large banks play in the financial services sector, questions related to the impact of firm size on profitability within the sector remain unanswered. Empirical work dealing with the effects of firm size in sectors other than financial services provides the theoretical framework for analyzing the financial services sector.

Michael Porter (1985 and 1998) offers arguments to suggest that the relationship between firm size and profitability may be non-linear. Porter's argument focuses on his "stuck in the middle" hypothesis, which suggests that profitable niches are available to both very small and very large firms, but mid sized firms may find it difficult to develop an effective and profitable strategy. According to Porter's hypothesis, there are profitable opportunities available to small firms serving localized niche markets and profitable opportunities available to large firms following a market wide strategy. Medium size firms, on the other hand, are too large to pursue niche markets but too small to compete against national or international companies whose focus is on serving the entire market. The stuck in the middle hypothesis suggests that the relationship between firm size and profitability is a non-linear cubic function. Moreover, the cubic function could be expected to exhibit a positive, negative, positive sign pattern as the profits for both small and large firms are higher than those of medium sized firms. There have been few empirical tests for Porter's stuck in the middle hypothesis. Amato and Amato (2004) found that a cubic model with a positive, negative, positive sign pattern best describes the relationship between profitability and firm size in the U.S. retailing sector.

DATA AND METHODOLOGY

The data for this study are drawn from the Internal Revenue Service: Sourcebook for Corporation Income Tax returns. The IRS data do not include data for individual firms, but rather contain data grouped into twelve asset size classes. The asset size classes range from firm with zero assets up to the largest firms in the world, an open ended size class of firms with $250 million or more in assets. By convention, the smallest size class is omitted from the analysis to avoid difficulties regarding profit rates for firm with no assets. The industry classification is based on the NAICS system with the level of aggregation at the six digit NAICS industry.

For readers more familiar with the SIC industrial classification, six digit NAICS are slightly less aggregated than four digit SIC industries.

These data are widely familiar to industrial organization economists, having been used for previous research by Stigler (1963), Demsetz (1973), and Porter (1979). The aforementioned empirical studies using the same IRS data source used for this research are considered seminal works in the field of empirical industrial organization. Moreover, all of these authors used the grouped IRS data to test firm level hypotheses. Our data were gathered from the IRS Corporate Sourcebook for financial services sector and covers the years 2000 and 2001. The specific industries covered by the data set are listed in appendix A, along with the IRS asset size classes.

The basic model relating return on assets to firm size and a set of control variables is found in equation 1.

$$ROA_{ij} = \beta_0 + \beta_1 FSIZ_{ij} + \beta_2 ADIN_{ij} + \beta_3 CLASSSHAR_{ij} + \beta_4 CYCLE_t + \sum_{j=1}^{M-1} \beta_{5+j} IND_j + \mu$$

Where:

ROA_{ij} is the return on assets for firms in the ith size class of the jth industry. Return on assets is measured as net income plus interest paid divided by total assets.

$FSIZ_{ij}$ is the average firm size for firms in the ith size class of the jth industry. Firm size is measured by dividing the total assets for the size class by the number of firms (returns) for the size class.

$ADIN_{ij}$ is the average advertising intensity for firms in the ith size class of the jth industry. Advertising intensity is computed by dividing the total advertising expenditure for the size class by the total receipts for the size class.

$CLASSSHAR_{ij}$ is the size class market share or proportion of total receipts by the industry contributed by the size class. Class share

is computed by dividing the total receipts for the size class by the total receipts for the industry.

$CYCLE_t$ is a dummy variable denoting the year for each observation (2000 or 2001). The yearly dummy variable is included to capture the business cycle with 2001 as the deleted category.

IND_j is a set of M-1 industry dummy variables where M is the number of industries. The dummy variable takes on a value of 1 if the observation falls within a particular industry and 0 otherwise. The omitted category for the dummy variable grouping is industry 522300, Activities Related to Credit Intermediation.

Benston (1985) and Fisher and McGowan (1983) offer strong criticism regarding the use of accounting profit rates to measure profitability. However, the criticism levied by Benston and Fisher and McGowan is based upon extreme scenarios and analysis of worst case outcomes. Moreover, much of their criticism refers to weakness in the ability of accounting return to measure economic profit for an individual investment project, whereas accounting return used in this study is for the entire firm. We agree with Martin (1993) who argues that while there are weaknesses in accounting profit measures, there are few alternatives. Ending the use of accounting return would thus likely imply the end of much empirical research in economics and business, an outcome whose consequences are most likely greater than the costs associated with using measures that are slightly flawed.

The model is estimated in both linear and cubic form (to conserve space, only the linear model is presented in equation form). The structure performance relationship from industrial economics provides the theoretical basis for the variables included on the right hand side of equation 1. Firm size is included based upon the arguments presented above. For the linear model, the hypothesized sign is positive due to economies of scale and other efficiencies that accompany large size. Porter's stuck in the middle hypothesis predicts a positive, negative, positive sign pattern for the linear, squared and cubed terms respectively. That sign pattern suggests that profits are positively related to firm size for small and large firms but negatively related to firm size in the middle. As indicated above, the basis for Porter's argument is that small firms serve niche markets, while large firms fill a market wide strategy. Medium sized firms are too large to serve niche markets, but

too small to realize the scale economies required for a market wide strategy. The arguments presented above regarding small business lending by small banks would be consistent with the opportunity for small financial service firms to fill niche markets. While the cubic function does not directly test whether small banks have advantages in loaning to small business, a finding that the underlying firm size function is a cubic is consistent with such an hypothesis.

Advertising intensity is included based upon the works of Schmalensee (1978), Spence (1980) and others. Based upon theoretical arguments and prior empirical work, a positive sign is hypothesized for advertising intensity. Relative market share is included to the capture the proportion of total industry sales contributed by firms in each size class. George Stigler's (1958) survivor theory provides a justification for including class share as a regressor. The size classes that provide relatively large proportions of total sales could be expected to be the most efficient. Relative market share thus serves as a proxy for scale economies. The expected sign is positive. Cycle is a dummy variable for the business cycle, with 2001 as the omitted category. Given that the recession began in 2001, we would expect a positive coefficient for the cycle dummy. Finally, the industry dummy variables are included based on the works of Schmalensee (1985) and numerous subsequent works which found that industry effects dominate firm effects in explaining cross sectional profit rate variation.

EMPIRICAL RESULTS

The estimated coefficients for the model represented by equation 1 are found in Table 1. Four models are presented in Table 1. The columns of Table 1 contain various iterations of the model estimated with firm size entered in both linear and cubic forms and with industry fixed effects both excluded and included. White's test revealed heteroskedasticity for the two models that deleted the industry fixed effects. Accordingly, the t-statistics for these two models were computed using White's robust standard errors. There was no evidence of heteroskedasticity in the models that included industry fixed effects as regressors.

The first column of Table 1 contains the model estimated with the linear specification and industry fixed effects deleted. The R^2 for the model is 0.52, a reasonably good fit for a model estimated using pooled cross sectional-time series data. The only statistically significant coefficient among the regressors is advertising, whose coefficient is negative and significant. A negative and statistically significant coefficient for advertising is contrary to our *a priori* hypothesis regarding the effects of advertising on profitability. Coefficients for none of the other regressors are statistically different from zero.

The second column of Table 2 contains the model that is cubic in firm size, but with the industry fixed effects excluded. Comparing the estimated coefficients between the linear and cubic models, there is little change. R^2 remains 0.52 (the only change is in the third decimal place). As in the case of the linear model with industry fixed effects excluded, the only statistically significant coefficient in the cubic model is the negative and significant coefficient for advertising intensity.

The estimated coefficients for the linear model with industry effects included are found in column 3 of Table 1. Comparing the R^2 from the linear model with industry effects excluded to the linear fixed effects model, we see that R^2 increases from 0.52 to 0.62. The increase in R^2 indicates that industry fixed effects explain ten percent of the total variation in return on assets. While ten percent explained variation from industry fixed effects does not rise to the eighteen percent variation explained by industry effects in Schmalensee's original model, ten percent of variation explained by the fixed effects is nevertheless an important result. Strong industry fixed effects indicate that there are sufficient similarities between firms operating in the same industry to cause their profit rates to be similar.

Finding strong industry effects in the financial services is an important finding. Since the early 1980s, the financial services sector has undergone periods of de-regulation. An important focus of this de-regulation movement has been to relax rules that limit financial services firms to operating within a particular market. In short, current law allows firms from the financial services to compete across markets more easily than at any time. One would expect this de-regulatory trend to equalize profit rates across industries as firms seek to operate in those markets that offer the greatest profit opportunities. Although present data do not allow us to analyze what has happened to industry profit rate differences over time, the industry fixed effects reported in this study suggest that industry level profit rate differences continued to persist through 2001. The continued existence of profit rate differences would suggest that, at least to some degree, profit opportunities are greater in some financial services industries as compared to others. We recognize that these differences could reflect nothing more than risk premiums and that risk adjusted rates of return may be more equal across the various financial services industries. The greatest contribution of our findings regarding industry effects is, therefore, to point to the need for ongoing research using risk adjusted profit rates.

Examining the coefficients for the continuously measured variables from the linear/fixed effects model, advertising intensity is the only continuous regressor whose coefficient is statistically different from zero. As in the previous cases, the coefficient for advertising intensity is negative and statistically significant. The coefficients for three of the dummy variables were statistically significant, all negative. The industries in question are: commercial banks; savings institutions and credit unions; and international secondary financing. All three of these industries

are devoted to broad depository activities, in contrast to the omitted category that includes firms dealing in credit intermediation. The negative profit rate for depository institutions as compared to credit intermediation is an interesting result worthy of additional research using firm level data.

The estimated coefficients for the cubic model with industry effects included are found in column 3 of Table 1. The most interesting result from the cubic model is the positive, negative, positive sign pattern for the linear, squared and cubed terms from the cubic specification. Moreover, the coefficients for each of these terms (linear, squared, cubed) are all statistically different from zero. A positive, negative, positive sign pattern indicates that profits are elevated for small firms and for firms at the upper end of the size distribution, but profit rates are lower for mid size firms. The cubic model with industry effects thus provides support for Porter's (1985, 1998) stuck in the middle hypothesis. While the data and models presented here cannot directly test the hypothesis that small banks fill a niche making loans to small business presented by Carter, McNulty, and Verbrugge (2004) and others, the results do suggest that there are likely niche markets available to small financial service firms. Our results are thus consistent with arguments regarding the advantages that small banks have in dealing with small business firms.

As in previous cases, the coefficient for advertising intensity is negative and significant in the cubic/fixed effects specification. Our finding that the advertising intensity coefficient is negative and significant is thus robust to variations in the specification including the inclusion or exclusion of industry fixed effects, as well as to changes in the specification of the firm size variable as either linear or cubic in form. We can offer no explanation for the consistently negative and significant coefficient for advertising intensity other than to suggest that it is an interesting finding worthy of additional research. The same dummy variable coefficients that were negative and significant in the linear model are negative and significant in the cubic model. As stated above, detailed investigation of this finding requires firm level data that is beyond the scope of these data.

CONCLUSION

The purpose of this paper was to examine the relationship between profitability, measured as return on assets, and firm size. There are two important findings. First, there is evidence of a cubic relationship between return on assets and firm size. Moreover, the cubic function displays a positive, negative, positive sign pattern that indicates greater profit opportunities for small and large firms as compared to medium sized companies. This finding is consistent with Porter's (1985 and 1998) stuck in the middle hypothesis that suggests that there are profit opportunities for both small and large firms, but that medium sized firms are stuck

in the middle. The basis for Porter's view is that small firms serve niche markets, large firms follow a market wide strategy, but medium sized firms are not well positioned for either approach. Medium sized firms are too large for niche markets but too small to pursue a market wide strategy. Moreover, the cubic function is consistent with the arguments of Carter, McNulty, and Verbrugge (2004) and others suggesting that among the profit opportunities available to small banks are superior performance servicing small business customers.

The second major finding relates to the importance of industry effects in explaining cross sectional variation in financial services profit rates. We find that industry effects explain approximately ten percent of the total variation in profit rate. While ten percent is less than the industry effects observed by Schmalensee (1985) and others, industry effects that explain ten percent of total variation document the importance of industry. This result suggests that although deregulation during the 1980s and 1990s may have allowed financial service firms to operate across markets, these changes may not have completely eliminated the importance of industry.

Table 1: Estimated Regression Coefficients Return On Assets-Dependent Variable

Variable	Linear, industry effects excluded	Cubic, industry effects excluded	Linear, industry effects included	Cubic, industry effects included
Intercept	9.35 (1.99)*	9.31 (2.01)*	18.20 (5.85)*	19.05 (6.15)*
$FSIZ_{ij}$	-.0000017 (-1.25)	.0000072 (0.59)	-.0000019 (-1.54)	.000022 (2.06)*
$FSIZ_{ij}^2$	--	-1.69 E-12 (-0.75)	--	-4.31 E-1 (-2.39)*
$FSIZ_{ij}^3$	--	8.64 E-20 (0.80)	--	2.14 E-19 (2.42)*
$ADIN_{ij}$	-529.09 (-2.01)*	-532.37 (-10.95)*	-579.57 (-12.70)*	-591.50 (-13.11)*
$CLASSSHAR_{ij}$	15.52 (1.08)	2.55 (0.14)	15.28 (1.49)	-22.16 (-1.04)
$CYCLE_t$	-1.44 (-0.81)	-1.50 (-.84)	-1.51 (-0.71)	-1.61 (-0.77)
IND_j	Excluded	Excluded	Included	Included
R^2	0.52	0.52	0.62	0.64
	30.67*	20.37*	20.27	17.70*

t-statistics in parentheses
* significant at the 0.05 level

The results reported here provide interesting insight regarding the sources of profit rate variation within the financial services sector. One benefit to our use of IRS data is the extremely broad range of firm sizes covered by our sample. The next logical step in the research sequence is to test our findings using similarly broad data gathered at the firm level. That research project will undoubtedly involve the use of survey data.

APPENDIX A

Size Classes

Size Classes	Asset Range (in Thousands)
1	0
2	$1 - 100
3	$100 -250
4	$250 - 500
5	$500 - 1,000
6	$1,000 - 5,000
7	$5,000 - 10,000
8	$10,000 - 25,000
9	$25,000 - 50,000
10	$50,000 - 100,000
11	$100,000 - 250,000
12	$250,000 or more

Industries

Industry Code	Description
522110	Commercial Banking
522125	Savings Institutions, Credit Unions and Other Depository Institutions
522215	Credit Card Issuing
522292	Real Estate Credit
522295	International Secondary Financing and Other Depository Credit Intermediation
522300	Activities Related to Credit Intermediation

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DERIVING DEMAND CURVES FOR SPECIFIC TYPES OF OUTDOOR RECREATION

Jerry L. Crawford, Arkansas State University

GENERAL STATEMENT

Demand theory can be related to outdoor recreation by considering outdoor recreation like any other good or service for which there is demand. Outdoor recreation opportunities may be considered to be used to the extent that people believe their satisfactions are exactly equal to the cost involved. Of course, ignorance and uncertainty about the process may cause a divergence of satisfactions from costs, but this is a circumstance not uncommon in any market.

The major difference between the market for outdoor recreation and the market for the goods usually used in illustrations of demand theory is that the small entrance or user fee, which is the direct cost of using recreation facilities, does not constitute a correct measurement of total cost or price paid to partake of a recreation opportunity. The people who use any particular area for outdoor recreation will incur various costs in doing so—some in cash, some in time, and some of an even more subjective nature. If they continue to use an area, then it is logical to assume that their satisfactions are as great or greater than the total costs. It is the marginal user or the marginal trip by a habitual user who equates his marginal trip costs to his estimate of marginal trip satisfactions. Thus, if entrance or user fees, or for that matter, any of the costs incurred are increased, then this would tend to affect the amount of use made of an area.

The early economists considered certain commodities as "free goods." They recognized that such goods as air, sunshine, and water had very great utility for man, but were free of costs. People, acting through their governments, can artificially place a zero price on a product, and thus make it a free good. Thus, if outdoor recreation is provided is provided in as great a quantity is wanted, at no charge, the recreation opportunity at the point of supply becomes valueless in monetary terms. It is simply a matter of people using it until the marginal utility falls to zero.

Taking all the above into consideration, it is suggested that the total outdoor recreation experience is, to a large extent, a package deal. This means that it must be viewed as a whole, in terms of costs, satisfactions, and time, for all members of the family as a group. In the calculation of consumers by total costs, and

comparisons of costs with expected satisfactions, the price of entrance into or use of a recreation area certainly are taken into consideration by users and potential users.

The demand curve for the total recreation experience, like the demand curve for other types of goods or services, is applicable to large numbers of people, rather than to individuals. With large numbers of people, the extreme values, which might characterize some person taken individually, are averaged out so that there is a predictable and measurable reaction to some outdoor recreation opportunity. Therefore, if a demand curve can be established for a large group of people, then it is probable that another similarly characterized large group would respond in similar fashion to prices and other characteristics of a reaction opportunity. That there is a predictability of reaction to similar factors of price and value is an assumption of rationality basic to all demand curve analysis.

DATA AND METHODOLOGY

The procedure suggested for deriving a demand curve for outdoor recreation involves two steps. The first step is to determine the demand for the total recreational experience. The second is to use the demand for the total recreational experience as the basis for a demand curve for a unique recreational opportunity.

The demand for the total recreational experience involves (a) measuring price by the total spending necessary to participate in a visit to some particular recreation site, and (b) measuring quantity in terms of proportions of total population in various tributary distance zones which actually participated. For example, the latter can be expressed in terms of the number of visits per 1,000 population in each distance zone. This is roughly analogous to per capital consumption data for some product. It is assumed that the visit to the particular recreation site was the chief purpose for the trip. Otherwise, it would not be very meaningful to attempt to relate the cost incurred in making the trip to a particular recreation site.

The demand curve for the recreational opportunity per se is derived from the above. This provides a basis for computing the degree to which the rate of visitation per 1,000 population in each distance zone will change for given changes in the cost of making a trip. More specifically, mean family trip expenditures and visitation rates for each zone provide a basis for estimating change in quantity demanded within each zone for assumed changes in price (family trip expenditures or costs).

The procedure for achieving the above rests upon two basic assumptions: (1) users will view an increase in entrance or user fees (or other costs) rationally, and (2) the experience of users in one location zone is a proper measure of what people in other location zones would do if the costs were the same. Therefore, the

difference in mean expenditures and visitation rates between adjoining zones is the basis for calculating the reaction to assumed cost (price) increases in each zone. Then, after totaling the change in all zones and subtracting this from the original visitation figure, a quantity demanded is ascertained for each cost rise (price) assumption. In this respect the demand curve for outdoor recreation is no different from that for other products. Demand curve analysis almost always requires a transfer of experience from one group of people to another or from one time to another.

Estimates can be made for various increases in user fees (or costs) of the new number of visits per 1,000 population in each distance zone. Each new member must be multiplied by the base population of each distance zone to get the new number of visits. For example, an increase of $1 in costs per person would tend to reduce total visits to a recreation area by some percent, and an increase of $2 would tend to reduce total visits by a larger percent. The contention here is that from the data on estimated numbers of visits at each level of increased costs it is possible to construct a demand curve.

The price axis is a reflection of various assumed increases in average family expenditure on a trip (cost of trip). When it is recognized that the costs incurred on a trip are, in effect, the price paid for the recreation experience as a whole, and that because of the "free good" feature of the recreation site per se, each assumed increase in costs of trip becomes potential prices which might be charged for the use of the recreation site. As such, price is equivalent to entrance of user fees. The quantity axis is the quantity demanded at each assumed price and is calculated as explained above.

It is important clearly to recognize that such demand curves apply to a single point in time since the basic factors underlying them may change rather considerably. Population shifts, change in real income levels, improvement in access roads, and increase in leisure time are just a few of the changes occurring in a dynamic and changeful economy.

It is the contention of this study that the demand approach can be applied not only to analyzing demand for outdoor recreation at some specific site, but it can also be usefully applied to an analysis of demand for specific types of outdoor recreation such as camping, pleasure boating, and fishing at some particular site. In order to demonstrate this approach to deriving demand curves, data from a specific recreation site will be analyzed.

THE DEMAND CURVE FOR CAMPING

The data in Exhibit 1 is the basic data for a demand schedule or curve for outdoor recreation trips to a recreation site where camping is the primary purpose

for the trip. Each zone is defined in terms of counties so that each zone is approximately 50 miles wide. The starting point for the establishment of 50 mile zones was the recreation itself, and each zone is a concentric circle encompassing about 50 miles. Consideration was given to the accessibility of each county as reflected by the availability of direct highway routes.

The reason for establishing concentric rings of counties is that Census data is available by county, and this was essential to the determination of population contained in each concentric zone. The number of families in each concentric zone of counties is shown in column two of Exhibit 1. The percent visitation from each zone is based upon a survey taken by the author and are the sample percents for each visitation zone. Since 94.1 percent of the sample was from the first four distance zones and the other 5.9 percent spread very thinly over farther distances, only four zones are used in this demand analysis. It would have been preferred that the analysis involve more distance zones. However, in view of the above, and since establishing smaller zones (such as 25 miles) tends to cloud the pattern of different expenditures for various zones, only four zones are considered. The demand curve for camping is constructed on the basis of this consideration. This is a product of visitation being drawn so heavily from the immediate area. Other recreational sites could conceivably draw from a wider area and make possible the use of more distance zones.

The number of visits at current costs is simply the result of an application of the percent family visitation from each zone to the total visitation figures for families having camping as their primary purpose for visiting the recreation site. This figure was derived from Corps of Engineers data.

Visits per 1,000 families are computed using the data in columns one and three in Exhibit 1. In order to estimate a demand curve, some measure of volume is needed and this is expressed in terms of the proportions of a total population which make use of a recreational opportunity. What is established is the proportion of each 1,000 families in each tributary zone who visited the recreation site with camping as the primary purpose. Therefore, if 10,213 families visited the recreation site from a zone containing 46,242 families, then the rate of visitation per 1,000 families is 220.8.

Cost per visit is considered to be the price paid by a family for a camping recreational experience, and visits per 1,000 families are considered to be the quantity demanded. This is roughly analogous to expressions of per capita consumption, and in this case reflects the variation in visitation due to the cost of time necessary to get to the recreation site. This data is shown graphically in Exhibit 2. Because of the very great variation in quantity and a somewhat less variation in price, this data is more clearly presented on a semi-log scale that on a simple arithmetic scale. Since costs incurred relate to the entire trip and not just the site

itself, the schedule being presented is the demand for a total recreation experience and not the demand for camping recreation at the site as much.

In order to construct a demand schedule for the latter, it was necessary to analyze the effect of changes in the cost of visiting the site in order to participate in camping. Estimates were made for various increases in costs of a new rate of visitation per 1,000 population in each distance zone. Each new rate was multiplied by the base population of each distance zone to get the new number of visits. Then, by summing the number of visits from all zones for each assumption of cost increase, a schedule of quantities demanded was ascertained.

This is presented in Exhibit 4. Each column reflects the change in quantity of camping trips to the recreation site demanded for each dollar of increase in cost. This approach to demand curve analysis required a transfer of experience from the people of one zone to the people of another. This is subject to the limitation that the people from different regions may react differently to a change in the accessibility or price of a recreation trip. Since 94.1 percent of the visitation to the site is from an area within 200 miles of the lake, it is unlikely that any significant degree of regional differences can be found.

The calculations of the change in visits per 1,000 families for each assumed cost rise of $1 involves using the rate of visitation per 1,000 families for each zone from Exhibit 1. The process of determining the rate of visitation per 1,000 families for each zone for each assumption of cost increase involves a transfer of experience from the people of zone to the people of another. This means that the people of Zone "B," where costs are higher, are used to provide an indication of what will happen to the rate of visitation per 1,000 families in Zone "A" when cost increases. Similarly, the people of Zone "C" are used to indicate the degree of change in rate of visitation in Zone "B."

The data from Exhibit 4 is presented graphically as a demand curve in Exhibit 3. It is contended that this curve approximates the true demand curve for camping at the recreation site because it shows the relationship between number of family visits and different changes in cost or price paid to engage in such an outdoor recreation experience in a given period of time. Since outdoor recreation is virtually free at the recreation site in that only a minimal fee is charged for entrance at some but not all sites, the increase in costs treated previously can be thought of in terms of being various prices which might be charged for a camping recreational visit. Thus, the various cost increases from $1 on through $15, respectively, can each be regarded as a potential market price payable for a camping visit and the quantities demanded from Exhibit 4 complete the picture as far as a demand curve is concerned. Alternatively, the increases in costs can be thought of as being increases in entrance fees, and serve as a useful guide to the reaction by camping families to increases in entrance fees.

In a computation of arc elasticity, it is shown that the demand for camping at the recreational site was relatively inelastic. Further, the indicated tendency is for inelasticity to be greater for the initial increase in price and for demand to become more elastic as further price increases occur. It is recognized that this will always be the result when demand curves are linear, and the demand curves of this study are nearly so. However, since the rate of visitation and average expenditures change from zone to zone, the methodology does not result in a linear curve. The indication is that campers forego camping trips at a site to an increasing degree as price is increased. This is to be expected, especially since it is assumed that the price of alternative camping opportunities remain unchanged.

DEMAND CURVES FOR CAMPING, PLEASURE BOATING, AND FISHING COMPARED

The same methodology can be applied to data for families having pleasure boating or fishing as their primary purpose. The same assumptions and considerations apply in all cases. Exhibit 5 shows the demand for a total recreational experience by families having camping, pleasure boating, or fishing as their primary purpose; and, Exhibit 6 shows the demand curves for camping, pleasure boating, and fishing per se at the recreation site.

It is shown that the demand for pleasure boating at the recreation site was relatively inelastic for the initial assumed price increases of one dollar, but tends to become more elastic as subsequent one dollar price increases are assumed. Finally, demand becomes relatively elastic. This would indicate a strong tendency on the part of pleasure boaters to seek alternatives or to forego the pleasure of boating as costs (price) increase. In view of the rather large investment necessary for pleasure boating, it is more likely that the change is primarily a matter of seeking alternative boating sites.

In a computation of arc elasticity, the demand for fishing at the site was very inelastic. Consequently, fishing families tend to change their quantity demanded relatively less than the change in price. There seems to be no marked pattern of increasing or decreasing degree of elasticity. In any case, the degree of inelasticity is greater for fishing families than for the other two recreation types.

In conclusion, this paper has attempted to provide a methodology for deriving demand curves in the Neoclassical sense for specific types of outdoor recreation activity. These demand curves, like any demand curve, face the usual limitations. They apply to a given time and place *ceteris paribus*. The basic factors influencing them may change with new highways, etc. These are illustrative of shifts that can occur for any demand curve, and are not unique to outdoor recreation demand.

As a final point, there is very little to be found in the literature where empirical data has been used to derive demand curves for specific types of outdoor recreation. It is hoped these efforts help make a beginning where much more research needs to be done—developing precise demand curves for specific types of outdoor recreation, as well as for other service-type economic activities.

Exhibit 1: Number of families visiting a site in relation to total population and expenditure per visit, by distance, zones, and where camping is the primary purpose.

Distance Zones	Number of Families in Group of Counties	Per Cent Visitation From Each Zone	Number Of Visits At Current Cost	Visits Per 1000 Families	Cost Per Visit
A	46,242	22.685	10,213	220.85	$ 39.68
B	281,106	55.239	24,869	88.46	43.16
C	647,166	15.361	6,916	10.68	77.39
D	633,607	0.813	366	.57	78.25
E	977,091	0.305	137	.14	86.00
Other	60,864,535	5.595	2,519	.04	151.33

Exhibit 2: Demand for recreation experience in which camping is the primary purpose.

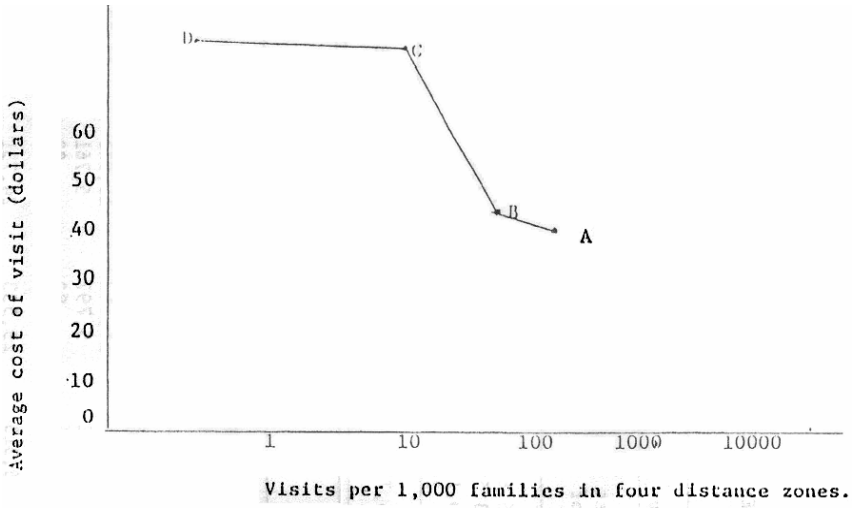


Exhibit 3: Demand for camping.

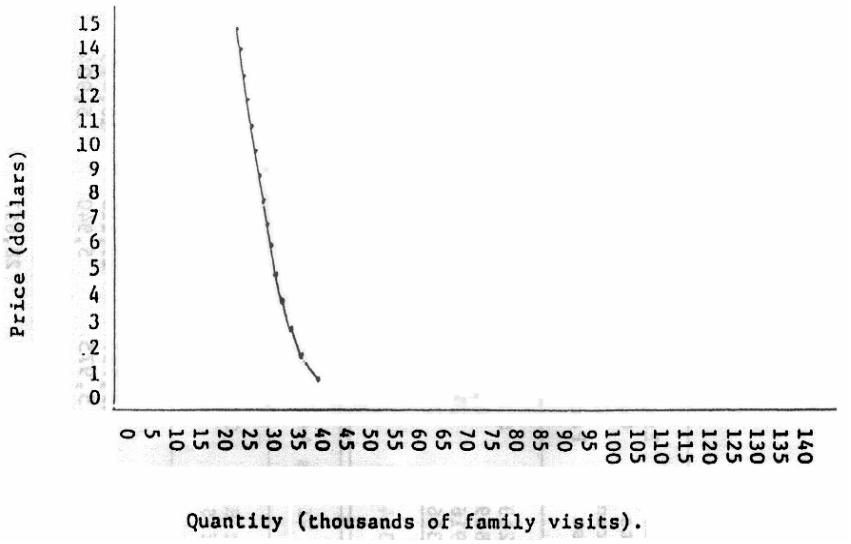


Exhibit 4: Estimated effect of increasing costs and/or entrance fees for a family visit by campers.

Distance Zones	Number of Visits at Current Cost	Estimated Current Cost Per Visit	Change in Visits Per 1000 Families For Each Cost Rise of $1	Estimated Total Visits Assuming: Cost Rise of $1	Cost Rise of $2	Cost Rise of $3	Cost Rise of $4	Cost Rise of $5
A	10,213	$39.68	38.04	8,454	6,695	4,936	4,037	3,932
B	24,869	43.16	2.27	24,230	23,591	22,952	22,313	21,67[illegible]
C	6,916	77.39	1.18	6,225	6,190	6,154	6,118	6,083
D	366	78.25	.06	330	294	259	223	187
Total	42,364			39,239	36,770	34,301	32,691	31,876

Estimated Total Visits Assuming:

Cost Rise of $6	Cost Rise of $7	Cost Rise of $8	Cost Rise of $9	Cost Rise of $10	Cost Rise of $11	Cost Rise of $12	Cost Rise of $13	Cost Rise of $14	Cost Rise of $15
3,826	3,721	3,616	3,511	3,406	3,301	3,196	3,091	2,985	2,880
21,035	20,396	19,757	19,118	18,479	17,840	17,201	16,562	15,923	15,284
6,047	6,011	5,975	5,940	5,904	5,868	5,832	5,797	5,761	5,725
152	116	89	88	87	85	84	83	82	81
31,060	30,244	29,437	28,657	27,876	27,094	26,313	25,533	24,751	23,970

Exhibit 5: Demand for a recreation experience in which camping, pleasure boating, or fishing is the primary purpose.

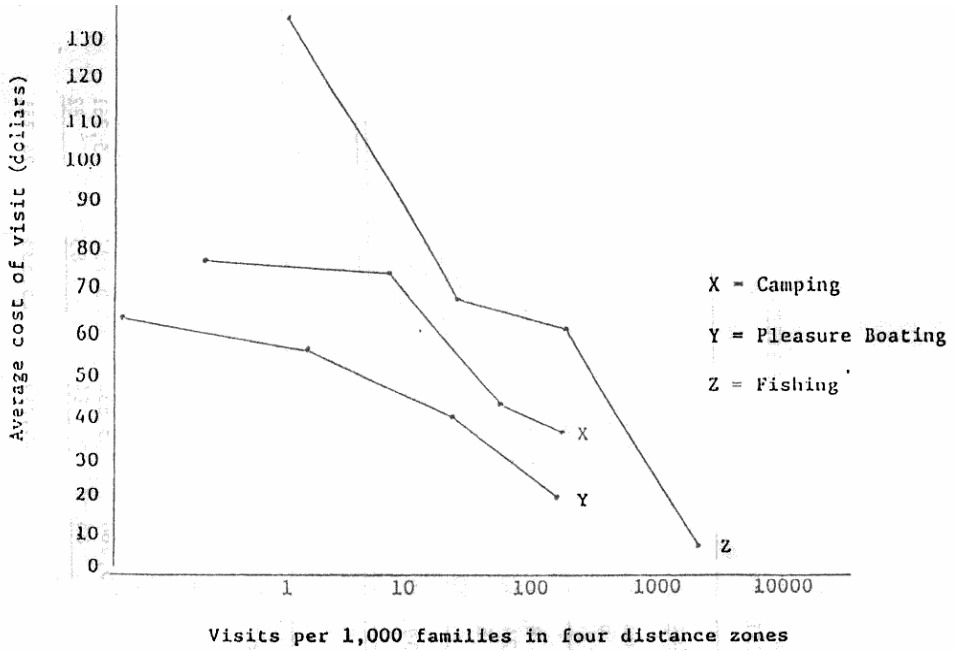
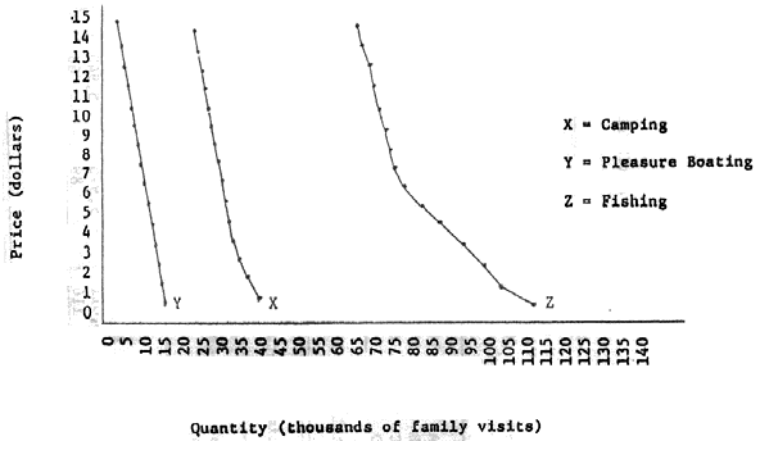


Exhibit 6: Demand for camping, pleasure boating, or fishing.



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THE RELATIONSHIP BETWEEN GOVERNMENT EXPENDITURES AND ECONOMIC GROWTH IN THAILAND

Komain Jiranyakul, National Institute of Development Administration, Thailand
Tantatape Brahmasrene, Purdue University North Central

ABSTRACT

The notion that more government expenditures can stimulate growth is still controversial. Some researchers found positive relationship between government expenditures and growth with bi-directional causation, while others indicated that growth caused government spending to expand. The causation between government expenditures and economic growth in Thailand was examined using the Granger causality test. There was no cointegration between government expenditures and economic growth. A unidirectional causality from government expenditures to economic growth existed. However, the causality from economic growth to government expenditures was not observed. Furthermore, estimation results from the ordinary least square confirmed the strong positive impact of government spending on economic growth during the period of investigation.

INTRODUCTION

According to the macroeconomic literature, budget deficits are expansionary to the economy while budget surpluses are contractionary. However, the notion that more government expenditures can stimulate growth is controversial. When considering the appropriate policy measures that stimulate growth, policymakers are usually interested in demand management policies and supply side policies. Demand management policies concentrate on the management of money supply and government expenditures. Controlling money supply will affect the level of liquidity in the financial market, and thus alters private spending. A change in level of government spending directly affects aggregate demand in the economy. Besides the role of export on economic growth, the economic success of the Newly Industrialized countries (NICs) in East Asia has been often attributed to the role of

government. Thailand has strived to achieve an NIC status. However, that goal has not yet been attained.

Economic growth rate reached its peak in 1995 at 15.34 percent (Table 1). Then, it increased at a slower rate until reaching the lower turning point in 1998. This recession registered a negative growth of 2.24 percent as a result of the Asian financial crisis. The sagging economy eventually recovered at a remarkable pace approaching 9.69 percent in 2004 and 10 percent in 2006.

Table 1: Selected Macroeconomic Variables

Year	Economic Growth (Percent)	Government Expenditure (trillions, Baht)	Money Supply (trillions, Baht)
1993	11.81	0.316	2.507
1994	14.66	0.354	2.829
1995	15.34	0.414	3.311
1996	10.15	0.470	3.727
1997	2.64	0.477	4.339
1998	-2.24	0.512	4.753
1999	0.23	0.533	4.855
2000	6.16	0.558	5.033
2001	4.28	0.581	5.244
2002	6.18	0.604	5.379
2003	8.78	0.635	5.642
2004	9.69	0.721	5.948
2005	9.22	0.839	6.439
2006	10.00	0.907	6.824

Source International Monetary Fund's International Financial Statistics

The Thai government realized that fiscal stimulation is deemed necessary in stabilization policy and economic development. As a result, chronic budget deficits were observed from the past up to 1987. The policy has been revised in response to changing economic conditions. From 1988 to 1996, the budget showed a surplus. A budget deficit occurred in 1997, the year of financial crisis, and continued through 2000. While the government has recently monitored its budget deficits, the nominal government expenditures have been steadily increased until the present time. Government expenditures grew at a fast pace of 12.77 percent in

1993, but the rate of increase had gradually declined to 1.53 percent in 1997. Spending increased steadily to 8.08 percent in 2006.

A similar pattern can be seen in money supply (M2). From 1993 to 1999, M2 grew at a decreasing rate from 18.38 to 2.13 percent. The economic slow down prompted the Bank of Thailand to increase money supply at an increasing rate from 3.67 percent in 2000 to 8.25 in 2005 and 5.98 percent in 2006.

During 1993 and 2006, the average annual growth rates of GDP, government expenditures and money supply were 7.63, 8.86 and 8.85 percent, respectively. Overall, government expenditures and money supply increased steadily every year while economic growth rate presented more dramatic ups and downs.

LITERATURE REVIEW

In earlier empirical studies, Ram (1986), Holmes & Hutton (1990) and Aschauer (1989) found positive relationship between government expenditures and growth. On the contrary, Grier & Tullock (1989) used pooled regression on five-year averaged data in 113 countries to analyze the relationship between cross-country growth and various macroeconomic variables. They found that the mean growth of government share of GDP generally had a negative impact on economic growth. This finding implies that an increase in the government size as measured by a share of government expenditures to GDP hampers economic growth. Barro (1990) also discovered the negative relationship between the size of government and economic growth. Miller & Russek (1997) indicated that debt-financed increases in government expenditure retarded growth. Using the data from 43 developing countries over 20 years, Devarajan, et. al. (1996) found the positive relationship between current government expenditure and economic growth. In addition, the negative relationship between capital expenditure and per-capita growth was also observed.

Recent studies employed cointegration and error correction models to study the relationship between government size and growth. Islam & Nazemzadeh (2001) examined the causal relationship between government size and economic growth using long annual data of the United States. They indicated that the causal linkage was running from economic growth to relative government size. However, Dahurah & Sampath (2001) found no common causal relationship between military spending and growth in 62 countries. Abu-Bader & Abu-Qarn (2003) investigated the causal relationship between government expenditures and economic growth for Egypt, Israel, and Syria. They found that overall government expenditures and growth exhibit bidirectional causality with a negative long-run relationship in Israel and Syria. A unidirectional negative short-run causality from economic growth to

government spending was discovered in Egypt. These findings might stem from a military burden in these countries. Kalyoncu & Yucel (2006) used cointegration and casuality test to investigate the relationship between defense and economic growth in Turkey and Greece. The results showed unidirectional causality from economic growth to defense expenditure in Turkey, but not in Greece. However, cointegration between defense expenditure and growth existed in both countries.

The next two sections present methodology and empirical results. The last section provides summary and policy implications.

DATA AND METHODOLOGY

The quarterly data on aggregate real output or real GDP (Y), real government expenditures (G), real money supply by broad definition (M2) during 1993 to 2006 are retrieved from the International Monetary Fund's International Financial Statistics and Thailand National Economic and Social Development Board. M2 is the sum of M1 and quasi-money. The data are analyzed according to the following estimation procedures:

Unit Root Test

The unit root test for stationarity of time series, so called PP test, proposed by Phillips and Perron (1988) is employed prior to cointegration and causality tests. This test determines the existence of a unit root in each series.

The series are examined whether they are stationary or integrated in the same order. If the two variables are non-stationary in level, but stationary in first difference i.e. I(1), cointegration test can be performed. Engle & Granger (1987) discussed the theory of cointegration in details. In brief, cointegration determines if the linear combination of these variables is stationary. When a linear combination of these series exists, the series are cointegrated or have a long-run relationship. Davidson & MacKinnon (1993) provide the critical values for unit root and cointegration tests. When there are more than two variables in the equation, Johansen cointegration test proposed by Johansen & Juselius (1990) is utilized. Even if cointegration does not exist, unit root tests are still helpful in further causality test. Hafer & Kutan (1977) indicated that to appropriately perform the standard Granger causality test, the variables that entered into the system should be stationary even though they were integrated in different order. Furthermore, using the ordinary least square (OLS) method also requires stationary variables in the estimated equation as generally described in the literature of time series model.

Standard Causality Test

The Granger causality tests are performed by the following two equations:

$$x_t = \alpha_0 + \sum_{i=1}^{k} \alpha_i y_{t-i} + \sum_{i=1}^{k} \beta_i x_{t-i} + \varepsilon_t \qquad (1)$$

and

$$y_t = \gamma_0 + \sum_{i=1}^{k} \gamma_i x_{t-i} + \sum_{i=1}^{k} \delta_i y_{t-i} + \nu_t \qquad (2)$$

In (1), $H_O : \alpha_i = 0 \; for \; i = 1,.....,k$ *and* $H_a : \alpha_i \neq 0 \; for \; at \; least \; one \; i$*, and in (2),* $H_O : \gamma_i = 0 \; for \; i = 1,.....,k$ *and* $H_a : \gamma_i \neq 0 \; for \; at \; least \; one \; i.$

The variable 'x' Granger causes variable 'y' if the null hypothesis (H_o) in equation (1) is rejected. Similarly, the variable 'y' Granger causes variable 'x' if the null hypothesis in equation (2) is rejected. The variable 'x' can be either real government expenditures or real money supply while 'y' is economic growth.

The standard Granger causality test developed by Granger (1969 & 1980) is popularly used to test whether past changes in one variable help explain current changes in other variables. Equation (1) is used to test whether 'y' Granger causes 'x' while equation (2) is used to test whether 'x' Granger causes 'y.' The bivariate Granger causality test requires that two variables used in the test must be stationary even though they are not integrated in the same order. However, various economic variables are non-stationary in level. The causality test can be applied even when one variable is stationary in level while the other is stationary in different order. For example, 'x' is stationary in level while 'y' is stationary in first difference. The more sophisticated test of causality is the test within the framework of cointegration and error-correction mechanism. This framework considers the possibility that the long-run relationship of the two variables exists when the lags of one variable affect another variable (see Islam & Nazemzadeh, 2001).

Ordinary Least Square Method

The ordinary least square (OLS) method was employed in the simple lag-adjustment equation with distributed lags of independent variables. The equation below determines the impacts of government expenditures and money supply on output growth.

$$y_t = a_0 + a_1 y_{t-1} + \sum_{i=0}^{k} \alpha_i G_{t-i} + \sum_{i=0}^{k} \beta_i M_{t-i} + e_t \qquad (3)$$

where

- y, growth rate, is the first difference of log of real GDP,
- G is log of real government expenditures,
- M is log of real money supply by broad definition (M2) and
- e is the error term.

EMPIRICAL RESULTS

Unit Root Test

In Table 2, the PP test for unit root reveals that the null hypothesis of unit root in level, with and without trend, is rejected for government expenditures (G) at the 1 percent level of significance. Therefore, the variable G is stationary at level. With respect to real GDP (Y), the probability of accepting the null hypothesis of unit root implies that real GDP is non-stationary in level. However, the first difference of log real GDP (?Y) is stationary at the 1 percent level of significance. Real money supply (M2) without a linear trend is stationary. As a result, M2 and G are I(0) while Y is I(1). All three series are plotted in Figure 1. The two-step Engle and Granger cointegration test between the two variables i.e. G and Y, can be performed only when two variables are integrated in the same order or I(1). That is they are nonstationary in level but stationary in first difference. Thus, a standard Granger causality test is employed instead.

Figure 1
Movement in Economic Growth, Government Expenditures (G) and Money Supply (M)

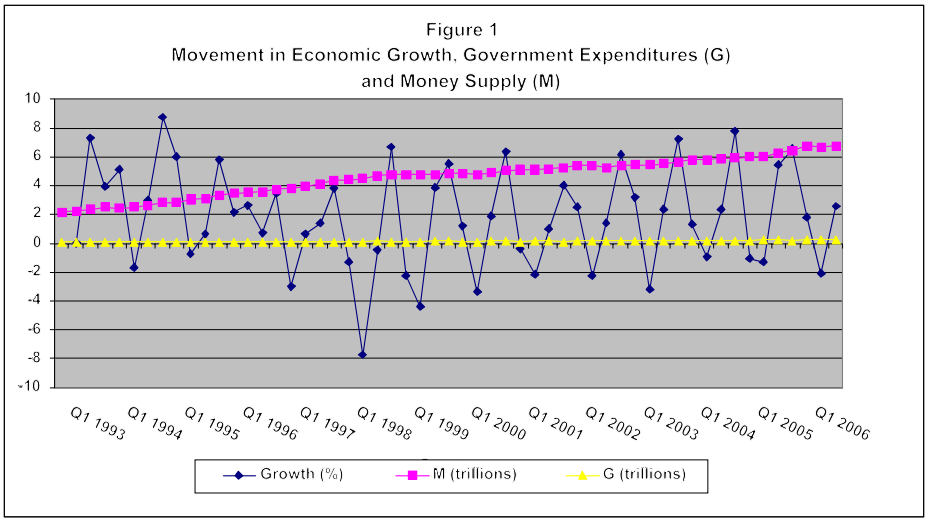

Table 2: Test for Unit Root		
Variables	PP Statistic	
	Without Trend	With Trend
Real Government Expenditures (G)	-4.357 [2] (0.001)	-9.267 [28] (0.000)
Real Money Supply (M2)	-5.513 [17] (0.022)	-1.015 [46] (0.917)
Real GDP (Y)	-1.509 [28] (0.520)	-2.424 [10] (0.363)
Growth Rate (DY)	-6.054 [23] (0.000)	-5.911 [23] (0.000)
Note: The number in bracket is the optimal bandwidth determined by Newey-West using Bartlett Kernel. The number in parenthesis is the probability of accepting the null hypothesis of unit root provided by MacKinnon (1996).		

Causality Test

With no long-run relationship between government expenditures and economic growth, the standard Granger causality test is performed using G variable at level and the first difference of log real GDP or DY. The optimal lag length for the causality test is determined by a vector autoregressive (VAR) form. When government expenditures and economic growth are endogenous variables in an unrestricted VAR, the optimal lag length using Akaike information criterion (AIC, see standard econometrics textbook for detail) is the lowest number which is four in this case. The standard Granger causality test results between government expenditure and growth rate are reported in Table 3.

The null hypothesis of government spending does not Granger cause economic growth is rejected at the 1 percent level of significance. Thus, unidirectional causality from government expenditures to economic growth exists. On the contrary, the null hypothesis of economic growth does not Granger cause government expenditures is accepted. Therefore, the causality from economic growth to government expenditures is not observed. This result supports the Keynesian view which stipulates that causation runs from government expenditures to growth.

Table 3: Standard Causality Test Results		
Direction of Causation	F Statistic	P-value
From Government Expenditures to Economic Growth	4.867	0.004
From Economic Growth to Government Expenditures	0.244	0.911
From Real Money Supply to Economic Growth	1.107	0.369
From Economic Growth to Real Money Supply	2.696	0.047

The PP test shows that log of real money supply (M2) is stationary without trend (-5.135, p=0.000), but is non-stationary with trend (-1.015, p=0.917). It can be concluded that real money supply is stationary around its level or I(0). Taking into account of stationarity property of economic growth, government expenditures and real money supply, cointegration will not exist because the three variables are integrated in different order. Recall that only economic growth is I(1). Therefore, a standard Granger causality test between real money supply and economic growth is performed. The result from Granger causality test shows that real money supply does not Granger cause economic growth with F statistics of 1.107. The probability of accepting the null hypothesis of no causality (p-value) is 0.369. However, economic growth Granger causes real money supply to increase at the 5 percent level of significance or p-value of 0.047 and F statistics of 2.696. In effect, economic growth influences the central bank to accommodate the liquidity in the economy.

Ordinary Least Square Estimation

The estimated results from equation (3) are shown in Table 4. The results show that real economic growth is affected by its lag value, real government expenditures and lag real money supply. All are significant at one percent level. However, one period lag of real money supply imposes a strong negative effect on economic growth. The significant positive effect of real government expenditures on growth is obvious. From over all observation of their coefficient, the negative impact of lag real money supply is offset by the positive impact of lag output growth and real government expenditures and perhaps real money supply itself.

Table 4: OLS Coefficient Estimates						
Dependent	Independent Variables					
y_t	Constant	y_{t-1}	G_t	G_{t-1}	M_t	M_{t-1}
Coefficient	0.081	0.314***	0.143***	0.264***	0.324	-0.549***
t-values	0.420	2.584	2.797	5.129	1.694	-3.221
$R^2 = 0.599$			F = 11.934		D-W = 1.853	
Notes *** denotes significance at 1 percent.						

It may not be unreasonable to say that contemporaneous money (M_t) has an insignificant positive effect on economic growth because it is significant only at the 10 percent level. Normally, this would be considered to be only marginally significant or insignificant.

Although it is difficult to say with certainty about the negative impact of lag real money supply. Is it because of money supply shocks or uncertainty? The inflation rate is relatively low even in the presence of an oil crisis because the Bank of Thailand has set up an inflation target for a long time. Bear in mind that money supply does not Granger cause economic growth, but economic growth Granger causes money supply. When the international investment funds were interested in Thai investments, those foreign flows could overwhelm domestic monetary policy in a small open economy with a relatively small reserves position. Past money supply, particularly unanticipated changes in money supply such as capital inflows, creates uncertainty. Uncertainty increases risk which, in turn, reduces economic activity.

SUMMARY AND POLICY IMPLICATIONS

Even though money supply is included as part of demand management policies, the focus of this study is to examine the relationship between government expenditures and economic growth. Several researchers use Granger causality test to determine whether government expenditures cause economic growth or economic growth causes government expenditures. Previous empirical studies give different conclusions. The results from Thailand show that aggregate government expenditures cause economic growth, but economic growth does not cause government expenditures to expand. In other words, there is a unidirectional causality between government expenditures and economic growth. Further investigation using the ordinary least square method shows that government spending and its one-period lag variable impose a highly significant impact on economic growth, which confirms the results from causality test.

Further research might include the disaggregate data of military spending and non-military spending to compare the impacts of military and non-military expenditures. These data from 1993 to 2006 are not available for this paper. Even without disaggregated data, the positive impact of government expenditures on economic growth is confirmed. The findings here support the Keynesian approach which stipulates that causality runs from government spending to economic growth. In essence, this paper provides relevant information for policy makers to pursue appropriate demand management policies and to develop action plans in response to the change in economy and political climates.

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GROWTH DETERMINANTS FOR COLOMBIA: NATIONAL AND REGIONAL PANEL DATA EVIDENCE 1964-2002

Joshua J. Lewer, Bradley University
Mariana Sáenz, University of Nebraska-Lincoln

ABSTRACT

The purpose of this paper is to empirically test the growth factors for the Latin American country of Colombia over the last half century. Fixed effects panel data estimation for all thirty-three Colombian states indicate a significantly positive relationship between labor growth and international trade on income growth. However, crimes against private property rights and capital significantly reduce income growth over the time-series, indicating that protection of property rights are an important determinant of economic growth and prosperity as discussed by North and Thomas (1973) and De Soto (1990, 2000). The results also show that institutional instability reduces economic growth.

INTRODUCTION

Nobel Laurete Douglas North and Robert Thomas (1973) were one of the initial researchers to argue that institutions are prerequisites for economic growth. Institutions are considered social norms, educational and political systems, religion(s) of a country, and openness to trade and outside ideas among other things. De Soto (1990, 2000) argues that property rights are a particularly important economic institution because of their role as an engine of economic growth. Property rights include: ownership of resources, including titles and deeds, intellectual property rights, including patents, copyrights, and trademarks and independent and impartial legal systems. Proper institutions and secure property rights give individuals incentives to innovate and produce something of value rather than trying to enrich themselves by some other inefficient method (i.e. rent-seeking activity, theft, arbitrary confiscation and/or taxation). Continuous economic growth through innovation and human capital formation is conditional on the existence of enforceable property rights.

De Soto (1990, 2000) observes great disparity in formal private property protection between developed and developing countries, and believes this to be the main determinant of divergence over the last 100 years. That is, property rights are secure in successful countries and unsecure and/or unclear in developing countries.

The De Soto hypothesis suggests that economic growth is significantly related to the security of property rights in a country. For example, he argues that in developing countries most property is unproductive and "dead" because ownership rights are not adequately recorded or trusted. He states, "Because the rights to these possessions are not adequately documented, these assets cannot readily be turned into capital, can not be traded outside of narrow circles where people know and trust each other, can not be used as collateral for a loan, and cannot be used as a share against investment" (De Soto, 2000, p. 6). But developed countries have been able through agreed upon legal frameworks to secure private property so that it can be productive and provide a source of funding to entrepreneurs and other business activities. He argues, "In the West, by contrast, every parcel of land, every building, every piece of equipment, or store of inventories is represented in a property document that is the visible sign of a vast hidden process that connects all these assets to the rest of the economy. Thanks to this representational process, assets can lead an invisible, parallel life alongside their material existence. They can be used as collateral for credit. The single most important source of funds for new businesses in the United States is a mortgage on the entrepreneur's house…By this process the West injects life into assets and makes them generate capital" (De Soto, 2000, p. 6). Essentially, what De Soto is saying is that property is more productive in developed countries because it serves as collateral to capital, investment, and other business activities. This secure and dual serving property is the primary reason why some countries have grown quickly, and the lack of secure property is one primary reason why some countries have lagged behind.

The purpose of this paper is to test state specific economic growth determinants for Colombia. The paper also tests the validity of De Soto's property rights hypothesis. By applying fixed effects panel data methodology to annual data from 1964-2002 for all thirty-three Colombian states, the property rights hypothesis is tested and confirmed; high security of property rights is positively associated with higher real economic growth rates. Other significant growth determinants are also found, such as labor force and international trade.

The remainder of this paper proceeds as follows: section II reports a brief history of Colomibia's property rights struggles, section III presents the regression model to be tested, section IV reports the empirical findings, and section V concludes with implications from the findings.

A BRIEF HISTORY OF PROPERTY RIGHTS IN COLOMBIA

The establishment of the Spanish Empire and its government in South America resulted in the conquest of what is now Colombia. Spain used its military supremacy to generate economic rent to the crown and in part to impose Catholicism on the natives. The Spanish also generated a new concept, private property. In his seminal book, *Manual de Historia Colombiana*, Fernando Ayala (2005) states, "Europeans transferred to America its race, its language and its religion…Equally, they transmitted…sciences, technology, civil freedom and critical solutions to face problems distinctive to the Conquest and the Colony. …the colonial society then organized lordly land concentration over time..." (Ayala, 2005, p. 20).

Towards the end of 1858, Colombia's name was changed to "Cofederación Granadina" (1858 -1863). Officially, the stately confederation followed a general free market policy called "librecambio." During this period land owned and administrated by the church was reassign to laity, although ownership was not. Essentially, natives could farm the land reassigned to them, but they could not own it. Colombia's name again changed to "Estados Unidos de Colombia" from 1863-1885. With a new constitution and economic system based on capitalism, several new freedoms where granted, including private property laws, see Kalmanovitz (2001) for details.

In 1886, with the creation of a new Constitution, the country took its actual name of "República de Colombia". Over the next 120 years the initial property laws of the librecambio have been weakened by several laws and executive orders. For example, when the conservative party took over power (i.e. 1886 -1930), they denied democratic guarantees including some ownership liberties. They also refused to pass additional private property reforms. Rincón (1973) argues that laws in Colombia are made without any specific principle except to protect vested interests that cause much of the corruption and inefficiencies with the State. Montenegro and Posada (2001) cite different analysts that observed higher violence in distant regions where economic growth is based on exploitation of cocaine, petroleum, emeralds and gold. They also show that the increase in violence and illegal activity within the country are associated with the justice system collapse and otherwise weakness within institutions, namely property rights.

Today, Colombian private property rights remain fairly weak relative to most developed countries. When examining Gwartney and Lawson's (2004) property right index, Colombia ranks near the bottom one-forth in securing property rights for its citizens in a scale where ten in the most secure. Moreover as with many Latin American countries, its ten-year average has been declining.

PER CAPITA INCOME GROWTH REGRESSION

The regression equation in this article is an extension of Mankiw, Romer and Weil's (1992) augmented Solow equation that allows for conditional convergence. Specifically, the equation of interest is in per capita terms, shown below as:

$$(1)\quad GPCY_{it} = a_0 + a_1(PCY60_{it}) + a_2(GLABOR_{it}) + a_3(HUMAN_{it}) + a_4(GTRADE_{it}) + a_5(PROPCRIME_{it}) + a_6(POLITICAL_{it}) + u_{it}$$

where $GPCY_{it}$ is the growth of real gross state product per capita for state i in time t, $PCY60_{,it}$, the conditional convergence term, is the log of state i's real income in 1960, $GLABOR_{it}$ is the growth of state i's labor force for time t, $HUMAN_{it}$, a proxy for human capital, is the level of secondary attainment for state i, $GTRADE_{it}$ is the sum of the growth of real exports plus real imports for state i at time t, $PROPCRIME_{it}$ is the is the level of criminal acts against property, capital, and general property rights for state i during time t, POLITICAL is a dummy variable representing political instability, and u_{it} is the error term.

Annual data for all thirty-three of Colombia's states were collected from 1964-2002 to test which of the growth determinants were significant to its overall development process. The data was tempered by the fact that several cities/villages within each state did not report official data over the last half-century.

Panel data methodology in this paper follows the pooling technique described by Kmenta (1986). Estimation procedures allow for heteroskedasticity over cross-sections (i.e. allows for the error terms for each cross section to differ as one might expect from very large to smaller states) and timewise autocorrelation over time within cross-sections. This approach allows for country-specific differences through dummy variables (D), as it is implicitly assumed that the coefficient estimates for the included variables are identical across all countries. The following rules are applied to the dummies. When the cross-sectional unit is a part of the variable that is being estimated D is one, but equals zero all other times. Formally written as:

$$(2)\quad \begin{cases} D_{jt} = 1 & \text{if } i = j \\ 0 & \text{if } i \neq j \end{cases} \quad \text{for } j = 2,\ldots,33,$$

where i is the index of a cross-section unit. Equation (3) becomes the model of interest:

$$GPCY_{it} = a_0 + \sum_{j=2}^{33} \gamma_j D_{jt} + a_1(PCY60_{it}) + a_2(GLABOR_{it}) + a_3(HUMAN_{it}) + a_4(GTRADE_{it}) + a_5(PROPCRIME_{it}) + a_6(POLITICAL_{it}) + u_{it} \quad (3)$$

EMPIRICAL RESULTS AND ASSESSMENT

The national results from equation (3) are presented in Table 1 below. Notice that the results are as theoretically expected. Conditional convergence is found for the thirty-three states, meaning that low-income states (i.e. Amazonas and Guainía) experience faster income growth than high-income states (i.e. Valle del Cauca and Antioquia). Labor growth and the growth of trade are positive and significantly associated with income growth. Because the data for these two variables are in growth rates, the coefficients can be interpreted with constant elasticities. For example, the coefficient on the growth of real trade, GTRADE, is 0.011, suggesting that for every 10 percent increase in capital stock is associated with a 0.11 percent increase in income growth. Interestingly, human capital is not a significant growth variable, indicating that other institutional variables, including property rights, may be more important in the long run. As expected, however, the coefficient on crime against property rights and political instability are negative and significant at the 95 percent level for the national results.

Table 1: The Growth of Per Capita Income: National Results

TEST	a_0	PCY60	GLABOR	HUMAN	GTRADE	PROPCRIME	POLITICAL	BUSE R^2
Fixed Effects	2.883 (15.06)**	-0.918 (-57.42)**	0.324 (18.46)**	0.001 (0.40)	0.011 (7.23)**	-13.308 (-4.22)**	-0.028 (-2.83)**	0.944

Notes: There are 1254 data points per variable. Figures in parentheses are *t*-statistics.
**Significant at the 95% level.
*Significant at 90% level.
The joint hypothesis of the cross-section units having a common intercept is rejected
(Ho: $g_2 = g_3 = \ldots = g_{33} = 0$, Fcalc = 431.01 > Fcrit = 1.88)

Next, states are grouped into their respective region: Atlantica, Central, Pacifica, Oriental, and Territorios. This paper uses the regional methodology of Colombia's Departamento Administrativo Nacional de Estadística when assigning regions. There are substantial regional differences in the rate of private property violations within region. These state differences do not necessarily correlate with

state income differences as some higher income states have high levels of property violations and some low income states have low property violations. The Pacifica region of Colombia, which includes Bogotá, has the highest per capita income of any region, but it also has the highest incidence of private property violations. Table 2 presents the regional results from equation (3). The coefficient for the PROPCRIME is significantly negative for all regions. One explanation of why property rights crimes are particularly significant in the Pacifica and Atlantica regions are that these two regions have seen the greatest changes (general upward trend) in property violations among the five geographic regions. The lack of variable fluctuation in Territorios Nacionales may have dampened the coefficient's significance. The political instability dummy, POLITICAL, is only significant for the Territorios region. This result can be partially explained by the fact that several departments within this region have experienced large scale guerilla and black market activity. In general, the regional findings serve to reinforce national estimates from Table 1.

Table 2: The Growth of Per Capita Income: Regional Results

REGION	a_0	PCY60	GLABOR	HUMAN	GTRADE	PROPCRIME	POLITICAL	BUSE R^2
Atlantica[1]	6.986 (14.25)**	-1.041 (-35.11)**	0.484 (14.46)**	0.0001 (1.55)	0.005 (2.16)**	-73.188 (-7.42)**	-0.006 (-0.40)	0.964
Central[2]	6.604 (8.50)**	-1.004 (-38.25)**	0.451 (10.67)**	0.0001 (0.90)	0.005 (2.02)**	-15.556 (-2.71)**	-0.009 (-0.54)	0.931
Pacifica[3]	6.594 (12.05)**	-1.051 (-35.72)**	0.452 (12.50)**	0.0001 (0.26)	0.003 (1.06)	-27.153 (-5.03)**	-0.004 (-0.24)	0.96
Oriental[4]	7.137 (13.36)**	-1.015 (-35.42)**	0.498 (14.20)**	-0.0001 (-1.18)	0.005 (2.39)**	-35.438 (-6.89)**	-0.002 (-0.07)	0.913
Territorios[5]	-1.183 (-2.22)**	-0.136 (-2.98)**	0.423 (8.43)**	-0.00002 (-0.36)	0.028 (3.85)**	-23.019 (-3.24)**	-0.065 (-1.71)*	0.894

Notes: Figures in parentheses are *t*-statistics.
**Significant at the 95% level.
*Significant at 90% level.
The joint hypothesis of the cross-section units having a common intercept is rejected for all regions.
[1] Atlantica states include: Atlántico, Bolívar, Cesar, Córdoba, La Guajira, Magdalena, and Sucre.
[2] Central states include: Antioquia, Caldas, Caquetá, Huila, Quindio, Risaralda, and Tolima.
[3] Pacifica states include: Cauca, Chocó, Nariño, Valle del Cauca, and Santa fe de Bogotá
[4] Oriental states include: Boyacá, Cundinamarca, Meta, Norte de Santander, and Santander.
[5] Territorios Nacionales states include: Amazonas, Arauca, Casanare, Guainía, Guaviare, Putumayo, San Andrés y Providencia, Vaupés, and Vichada.

CONCLUSION

The purpose of this paper is to test the growth determinants of Colombia on a state specific basis. Using fixed-effects panel data for Colombia's thirty-three states from 1964 to 2002, support for a negative and significant relationship between property rights crimes and economic growth is found. The results of this paper indicate that institutional conditions play a significant role in the continuance of the cycle of poverty. The combination of high levels of corruption are positively associated with weak property right protection and political instability in Colombia, see Ayala (2005).

Although the determinants of property rights, instability and corruption are complex and no single solution to this problem exists, the results of this paper indicate several areas for policy makers to focus on. However, further research is needed on this topic, especially around possible educational and democratic solutions.

DATA APPENDIX

The source for the growth of real per capita income (GPCY) is real Gross State Product, which comes from the Departmento Administrativo Nacional de Estadística, divided by state population, Las Estadisticas Sociales en Colombia. Colombia Estadística was the source for state specific labor force (GLABOR) and crimes against property and capital (PROPCRIME). (HUMAN) is calculated by the enrollment in public secondary schools by state, which comes from various years of the Colombia Estadística. Lastly, the state specific export and import data (GTRADE) comes from Anuario de Comercio Exterior.

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