Volume 12, Number 3

Printed ISSN: 1533-3604
PDF ISSN: 1533-3590

JOURNAL OF ECONOMICS AND ECONOMIC EDUCATION RESEARCH

Editor:

Grady Perdue

University of Houston-Clear Lake

The *Journal of Economics and Economic Education Research* is owned and published by the DreamCatchers Group, LLC. Editorial Content is controlled by the Allied Academies, a non-profit association of scholars, whose purpose is to support and encourage research and the sharing and exchange of ideas and insights throughout the world.

Authors execute a publication permission agreement and assume all liabilities. Neither the DreamCatchers Group nor Allied Academies is responsible for the content of the individual manuscripts. Any omissions or errors are the sole responsibility of the authors. The Editorial Board is responsible for the selection of manuscripts for publication from among those submitted for consideration. The Publishers accept final manuscripts in digital form and make adjustments solely for the purposes of pagination and organization.

The *Journal of Economics and Economic Education Research* is owned and published by the DreamCatchers Group, LLC, PO Box 1708, Arden, NC 28704, USA. Those interested in communicating with the *Journal,* should contact the Executive Director of the Allied Academies at info@.alliedacademies.org.

EDITORIAL REVIEW BOARD

EDITORIAL REVIEW BOARD

TABLE OF CONTENTS

LETTER FROM THE EDITOR

The *JEEER* is dedicated to the study, research and dissemination of information pertinent to the discipline of economics, and to the improvement of methodologies and effective teaching in economics. The *Journal* bridges the gap between the theoretical discipline of economics and applied excellence relative to the teaching arts. The Academy is an affiliate of the Allied Academies, Inc., a non profit association of scholars whose purpose is to encourage and support the advancement and exchange of knowledge, understanding and teaching throughout the world.

The Editorial Board considers two types of manuscripts: first is theoretical and empirical research related to the discipline of economics. The second area is research oriented toward effective teaching methods and technologies in economics.

These manuscripts have been double blind reviewed by the Editorial Board members. The manuscripts published in this issue conform to our acceptance policy, and represent an acceptance rate of 25% or less.

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

Grady Perdue
University of Houston-Clear Lake

THE IMPACT OF ASSIGNMENTS ON ACADEMIC PERFORMANCE

Ehsan Latif, Thompson Rivers University
Stan Miles, Thompson Rivers University

ABSTRACT

We study the factors affecting the academic performance of economics students at a small Canadian university using the Ordered Probit method, with Ordinary Least Squares and the Propensity Score Matching method used in robustness checks. Graded homework, shown to have ambiguous effects in previous work, here had a positive effect. A major contribution of the study is its analysis for various subgroups: Graded assignments had their strongest effects among male students and those with foreign (non-Canadian) backgrounds. GPA and higher levels of teacher experience also positively affected performance.

INTRODUCTION

In this paper, we examine the impact of graded homework on the test performance of students taking economics courses. Recently, researchers have done extensive amounts of work on how to improve performance of economics students (Anderson, Benjamin & Fuss, 1994; Arias & Walker, 2004; Borg & Shapiro, 1996; Greene, 1997; Jensen & Owen, 2001). These studies focused on factors such as class size, personality type, verbal abilities, gender, and interest in economics. One of the least researched issues is the impact of graded assignments on student performance, even though assigning problem sets is now an important part of teaching strategies employed in economics courses (Geide-Stevenson, 2009). Assignments that are graded, with the score used as part of the final course grade, are expected to improve test performance. The logic is that students will be motivated to work on the graded assignment and will learn from it; consequently, test scores will improve. Graded assignments, however, do impose costs on both instructors and students. Instructors spend time grading the assignments and providing adequate feedback. As for students, they may need to forgo other, more productive learning processes and methods to make the time to work on graded assignments (Geide-Stevenson, 2009). Thus, it is necessary to examine whether and to what extent graded assignments benefit students.

Although many studies have examined the impact of homework assignments on student performance at the elementary and secondary education levels, only a few studies have investigated this important issue in a university-level setting. Cooper (1989) provides an excellent review of the studies on the impact of homework on student performance in elementary and secondary schools. Grove and Wasserman (2006), using data from economics students in a

U.S. university, compared exam performance of students for whom assignments counted toward the final grade with the performance of a control group. Using Ordinary Least Squares regression analysis, the study found that a grade incentive to complete assignments boosted the exam performance of academically average freshman students but not those who were academically above or below average, or of any other class standing. Geide-Stevenson (2009) used data from economics students at another U.S. university and found from Ordinary Least Squares regression analysis that graded assignments had no impact on academic performance.

Thus, not only is there a paucity of studies on the impact of assignment on academic performance of university students, but the results so far also are conflicting. In the present study, we aim to fill the gap in the literature and extend the earlier studies in a number of ways: to the best of our knowledge, this study is the first of its kind using Canadian data; this study uses the Ordered Probit method as well as Ordinary Least Squares and Propensity Score Matching methods; and unlike previous studies, which used data from either lower-level or upper-level economics courses, this study uses data from both levels of economics courses.

A major contribution of this paper is that it examines the impact of assignments on academic performance of various student subgroups: male vs. female and domestic vs. international. International students have been enrolling in Canadian universities in increasing numbers, so it is important to identify factors that influence their academic performance. In this respect also, this study aims to make an important contribution.

The paper has the following format: section 2 deals with data and methodology, section 3 presents results of the study, and section 4 offers conclusions.

DATA AND METHODOLOGY

Data

Data for this study come from 387 students who were taking various levels of economics courses at Thompson Rivers University, a small Canadian primarily undergraduate institution, during the winter term (January-April) of the 2009-2010 academic year. The authors personally collected data from 18 different sections of various courses during the 10th and 11th weeks of the 12-week term. Students appeared to be enthusiastic about the survey administered as part of the study, and the authors encountered virtually no difficulty in data collection. Before administering the survey, the authors explained its purpose to students, and during the survey process, the authors answered queries from students to make sure they understood the survey questions. As shown in the descriptive statistics in Table 1, 60% of the sampled students are male and 40% are female; 61% of the students are of domestic (Canadian) origin, and the rest (39%) are international students. The authors obtained Institutional Ethics Committee approval before conducting the survey.

Model Specification

We focus on the impact of graded homework assignments on the probability of a student receiving a specific grade, from A to F, in an economics course. The model is written in following form:

$$\textbf{Grade} = \beta_0 + \beta_1 \textbf{ Assignment} + \beta_2 \textbf{ Student Gender} + \beta_3 \textbf{ International} + \beta_4 \textbf{ GPA} + \beta_5 \textbf{ Second Year} + \beta_6 \textbf{ Third Year} + \beta_7 \textbf{ Fourth Year} + \beta_8 \textbf{ Experience} + \beta_9 \textbf{ Faculty Gender} + \varepsilon \quad (1)$$

The dependent variable Grade is an index of average grade (F to C–- = 0, C to C+ = 1, B– to B+ = 2, and A– to A+ = 3) that students received in their midterm examinations for a course. In the above formulation, student characteristics are represented by gender, cultural background (whether international or domestic), and cumulative GPA. Course characteristics are represented

Table 1
Descriptive Statistics (Mean Values of Variables)

Variables	Overall	Female Student	Male Student	Domestic Student	International Student
Male Student	.60 (.025)			.57 (.032)	.67 (.038)
Female Student	.40 (.025)			.43 (.032)	.33 (.038)
Domestic Student	.61 (.024)	.43 (.032)	.57 (.032)		
International Student	.39 (.024)	.33 (.038)	.67 (.038)		
Average Midterm Marks	71.390 (.704)	72.701 (1.084)	70.542 (.922)	73.117 (.895)	68.662 (1.109)
Cumulative GPA	3.062 (.030)	3.16 (.049)	2.996 (.038)	3.129 (.037)	2.956 (.050)
Experience (Years)	9.832 (.582)	11.382 (1.012)	8.830 (.694)	10.473 (.782)	8.82 (.850)
Study Hours	2.867 (.907)	3.316 (.158)	2.577 (.118)	2.566 (.108)	3.343 (.176)
First Year Level	.271 (.023)	.237 (.035)	.294 (.030)	.257 (.028)	.293 (.037)
Second Year Level	.338 (.024)	.375 (.039)	.315 (.030)	.338 (.031)	.34 (.039)
Third Year Level	.235 (.022)	.25 (.035)	.226 (.027)	.283 (.029)	.16 (.030)
Fourth Year Level	.085 (.014)	.092 (.024)	.081 (.018)	.114 (.021)	.04 (.016)
Sample Size	387	237	150	237	150
Note: Standard errors are shown in the parentheses.					

by the level of the course, whether first, second, third, or fourth year. Faculty characteristics are represented by teaching experience and gender of the faculty member teaching a particular course.

If graded assignments are a course requirement, students will be motivated to study and work on the assignments, and consequently their grades are expected to improve. Furthermore, if assignments are closely related to test questions, then students who do the assignments are more likely to do well on the test. Finally, students may be more interested in participating in classes if they believe that participation will help them to do well on the assignments, and such class participation may also have a positive independent effect on course grade. In summary, it is expected that graded assignments will positively influence students' course grade. The independent variable Assignment is a dummy variable representing whether the student has a graded assignment as part of the course requirements.

Cumulative GPA serves as a proxy for a student's ability, and it is expected that those with higher cumulative GPAs will have better class performance. GPA is a continuous variable measuring the cumulative GPA attained by the student. Gender may also have an impact on grade. Meit, Borges, Cubic, and Seibel (2007) argued that female students tend, more than males, to have various positive learning attitudes and behaviors; among these, they are self-directed, dutiful, and persevering in their studies and are more disciplined. Learning success has been found to depend on student strategies. Simsek and Balaban (2010) found that appropriate study strategies, including rehearsal, organization, and self-motivation, were more effectively used by females. Thus, it is expected that females would do better than males. The independent variable Student Gender is a dummy variable with male as the base category.

International and domestic students differ with respect to academic background and preparation, and differences in student status may have an impact on the course grade. The School of Business at Thompson Rivers University has many international students enrolled whose first language is not English. They face language barriers, given that courses are conducted in English. Consequently, it is hypothesized that international students would do worse than domestic students, whose first language is English. The variable International also is a dummy variable, with domestic status as the base category.

Course content and difficulty differ among the various levels of courses, and the level of a course is expected to have an impact on grades attained. The course levels are represented by three dummy variables: Second Year, Third Year, and Fourth Year; the base category is First Year.

As for faculty characteristics, more years of experience are likely to make teachers more efficient and productive, and consequently students are expected to do better in classes taught by more experienced teachers. The independent variable Experience is a continuous variable representing the number of years a faculty member has been teaching. It is hypothesized that students would do better in the courses taught by more experienced faculty.

Studies suggest that instructor gender also has an impact on student outcomes in higher education (Rask and Bailey, 2002; Ashworth and Evans, 2001). Faculty members become role models for students of their own gender; thus, students are hypothesized to do better in courses taught by instructors who share their gender. It is difficult to hypothesize the overall impact of faculty gender in a particular class, as this depends on the gender composition of the students. Thus, the impact of gender on academic performance is an empirical question. In this study, faculty Gender is a dummy variable, with male as the base category.

Because the dependent variable, Grade, is ordinal in natural, the study will use an Ordered Probit method to estimate the model shown in Equation (1). The ordered probit model is useful to determine a student's probability of receiving a specific grade in an economics course. The model can be expressed in the following form:

$$y_i^* = x_i\beta + \varepsilon_i \qquad (2)$$

where y_i^* is the predicted grade as a function of the independent variables in the model. The x_i's are the independent variables, and the βs are the estimated coefficients. The observed ordinal grades are given by y_i, which takes one of the values 0, 1, 2, or 3. The observed y is of the following forms:

$$y = 0 \text{ (or grade F to C–) if } \mu_{-1} < y^* < \mu_0 \qquad (3a)$$
$$y = 1 \text{ (or grade C to C+) if } \mu_0 < y^* < \mu_1 \qquad (3b)$$
$$y = 2 \text{ (or grade B– to B+) if } \mu_1 < y^* < \mu_2 \qquad (3c)$$
$$y = 3 \text{ (or grade A– to A+) if } \mu_2 < y^* < \mu_3 \qquad (3d)$$

where μ_0, μ_1, μ_2, and μ_3 are threshold variables to be estimated in the ordered probit model using maximum likelihood procedure. The probabilities of receiving particular letter grades based on the slope and threshold estimates are shown in the following equations:

$$P[y = 0] = \Phi(\mu_0 - x_i\beta) - \Phi(\mu_{-1} - x_i\beta) \qquad (4a)$$
$$P[y = 1] = \Phi(\mu_1 - x_i\beta) - \Phi(\mu_0 - x_i\beta) \qquad (4b)$$
$$P[y = 2] = \Phi(\mu_2 - x_i\beta) - \Phi(\mu_1 - x_i\beta) \qquad (4c)$$
$$P[y = 3] = \Phi(\mu_3 - x_i\beta) - \Phi(\mu_2 - x_i\beta) \qquad (4d)$$

where Φ is the standard normal cumulative distribution.

RESULTS

Results of the regressions appear in Tables 2 through 5. The results show that, as expected, the a graded assignment in a course is associated with higher letter grades for students in that course. To check for a possible multicollinearity problem, the study used the step-wise

regression method and did not find any presence of problems. To deal with the possible heteroskedasticity, the study used heteroskedasticity robust standard errors in all of the regressions.

Table 2
Average Midterm Marks

	Overall	Male Student	Female Student	Domestic Student	International Student
With Assignment	74.30* (1.09)	74.09* (1.36)	74.59* (1.83)	74.77* (1.38)	73.10* (1.66)
Without Assignment	69.77 (.895)	68.63 (1.18)	71.59 (1.33)	71.93 (1.16)	67.10 (1.35)

Note: Standard errors are shown in the parentheses; * indicates that the mean difference between "with assignment" and "without assignment" is significant at the 1% level.

Table 2 compares mean midterm grades of students who had, or did not have, assignments included as part of their final grade. The results suggest that students with assignments have significantly higher mean marks than those without assignments. This result holds true for all categories; the difference is most pronounced for male and international students. These mean comparisons do not imply, however, that students with assignments got higher marks because of the assignments. Other confounding factors might lead to such results. In particular, meritorious and hardworking students, who otherwise would be expected to earn high course grades, might also be expected to self-select into courses that are known to have graded assignments. This effect is explored below. A regression method that includes confounding factors is needed to examine whether the graded assignments actually caused the improvements in grade.

Table 3
Results of Ordered Probit Estimations: Dependent Variable-Midterm Grade

Variables	Overall	Domestic Student	International Student	Female Student	Male Student
Male Student	-.032 (.117)	-.044(.157)	.086(.181)		
International Student	-.223**(.113)			-.375(.185)	-.140(.146)
GPA	.636*(.135)	.966*(.207)	.220(.161)	.715*(.251)	.574*(.165)
Second Year	.034(.146)	.244(.217)	-.328(.219)	.008(.253)	.012(.187)
Third Year	-.076(.164)	-.013(.234)	-.133(.246)	-.078(.312)	-.084(.189)
Fourth Year	-.250(.222)	-.153(.297)	-.123(.379)	-.357(.379)	-.204(.282)
Homework Assignment	.350*(.137)	.224(.186)	.508*(.212)	.384(.236)	.350**(.169)
Experience	.010*(.004)	.011**(.006)	.004(.008)	.015*(.006)	.005(.006)
Female Faculty	-.291***(.157)	-.434**(.227)	.025(.195)	-.454(.265)	-.157(.190)
/cut1	.408(.513)	1.60(.676)	-.294(.602)	.578(.885)	.308(.513)
/cut2	1.20(.517)	2.46(.688)	.475(.600)	1.20(.864)	1.199(.526)
/cut3	2.37(.535)	3.63(.716)	1.728(.602)	2.46(.882)	2.33(.536)

Notes: Standard errors are shown in parentheses. Significance levels: * 1%, ** 5%, *** 10%.

Table 3 provides the results of Ordered Probit regression. The first column shows the results of regression using the overall sample. It suggests that the graded assignments had significant positive effects on grade. The model also shows that students with higher GPA earned higher grades, international students earned significantly lower grades than domestic ones, and the teacher's experience had a significant positive effect on grades. Table 4 provides the marginal effects of this regression. The results suggest that having a graded assignment decreased the probability of getting a grade between F and C– and the probability of getting a grade of C to C+ by 5.3 % and 6.3%, respectively, and it increased the probability of getting a grade of A– to A+ by 11.7%.

Table 4
Marginal Effects of Ordered Probit Estimation (Overall Sample)

Variables	Grade (F to C-)	Grade (C, C+)	Grade (B-, B, B+)	Grade (A-, A, A+)
Male Student	.005 (.020)	.005 (.021)	-.0006 (.002)	-.010 (.039)
International Student	.036** (.018)	.040** (.022)	-.004 (.005)	-.073** (.038)
GPA	-.104* (.023)	-.115* (.029)	.011 (.015)	.207* (.044)
Second Year	-.005 (.024)	-.006 (.027)	.0005 (.002)	.011 (.048)
Third Year	.013 (.028)	.012 (.030)	-.001 (.005)	-.022 (.052)
Fourth Year	.046 (.045)	.043 (.038)	-.014 (.022)	-.075 (.063)
Homework Assignment	-.053* (.019)	-.063* (.025)	-.0004 (.008)	.117* (.047)
Experience	-.002** (.0008)	-.002** (.0008)	.0002 (.0002)	.003** (.0015)
Female Faculty	.054 (.033)	(.026)	-.016 (.016)	-.088** (.045)
Notes: Standard errors are shown in parentheses. Significance levels: * 1%, ** 5%, *** 10%.				

Regressions using subgroup samples determined whether the impact of assignment on grade varies among different subgroups of students. Table 3 shows the results of Ordered Probit regressions for different subgroups: male, female, domestic, and international. For the male group, Assignment and GPA had significant positive effects on grade. For the female group, Assignment had a positive but nonsignificant impact, whereas GPA and teacher experience had significant positive effects on student grade. For the domestic subgroup, again Assignment was not a significant variable; however, for this group, GPA and teacher's experience had a significant positive effect. For the international student group, Assignment, with a positive influence on grade was the only variable with a significant effect on grade. The marginal effects of Assignment in these regressions are shown in Table 5. The estimations show that for international students, Assignment reduced the probability of getting a grade from F to C– and C to C+ by 9.3% and 8.55%, respectively, while it increased the probability of getting a grade from A– to A+ by 14.9%. For the male group, Assignment reduced the probability of getting a grade from F to C–- by 5.4%, and from C to C+ by 6.9%, and it increased the probability of getting a

grade from A– to A+ by 11.2%. In sum, the positive impact of Assignment on grade is most pronounced for the international group, followed by the male group.

Table 5
Marginal Effects for Subgroups

Variables	Grade (F to C-)	Grade (C, C+)	Grade (B-, B, B+)	Grade (A-, A, A+)
Domestic Student	-.026 (.021)	-.043 (.037)	-.010 (.013)	.080 (.067)
International Student	-.093* (.037)	-.085** (.039)	.030 (.019)	.149** (.067)
Female Student	-.057*** (.032)	-.055 (.036)	-.022 (.025)	.135 (.085)
Male Student	-.054** (.025)	-.069** (.036)	.010 (.010)	.112** (.057)

Notes: Standard errors are shown in parentheses. Significance levels: * 1%, ** 5%, *** 10%.

ROBUSTNESS CHECK

Two forms of statistical analysis verified the robustness of the results. These were Ordinary Least Squares Regression and the Propensity Score Matching Approach.

Ordinary Least Squares Regression (OLS)

To check the robustness of the results, we used midterm marks as a continuous dependent variable and ran an estimation using the OLS regression method. The results, shown in Table 6, are very similar to those found with the Ordered Probit method. The results suggest that for the overall sample, Assignment, GPA, and teacher's experience had significant positive effects on grades, whereas being an international student had a significant negative effect on grade. The average effects on course marks of presence of a graded assignment, a difference of one point in GPA, and a difference of one year in the instructor's experience were 3.53, 7.13, and 0.11 points, respectively. International students received marks that were on average 2.64 points lower than those of domestic students. The subgroup analyses suggest that Assignment positively influences grade for international and male students but has no impact on the grades of domestic and female students. Assignment, on average, increases marks of international students and male students by 3.53 and 4.17 points, respectively. In sum, the OLS analyses confirm the findings of the Ordered Probit method.

Propensity Score Matching Approach (PSM)

It is possible that meritorious and hardworking students self-select to the courses that have graded assignments. If this is the case, these students do well on the midterms not because of the graded assignments but because of their merit. If that is the case, the results of a study such as this one would be more meaningful if it were possible to have each student take two courses, one with a graded assignment and another without, and then compare relative

performances. The current project, however, did not allow for such an experiment. Instead, we use a propensity score matching (PSM) approach to tackle this kind of problem. The PSM approach answers the counterfactual question as to what would have happened to those students who, in fact, attended classes with a graded assignment, if they had not attended classes with an assignment (or the converse). The PSM approach employs a predicted probability of group membership (e.g., students with assignment vs. those without assignment), based on observed predictors and usually obtained from logistic regression, to create a counterfactual group.

Table 6: OLS Regression Results: Dependent Variable- Midterm Marks

Variables	Overall	Domestic Student	International Student	Female Student	Male Student
Male Student	-.484 (1.367)	-.310 (1.70)	.192 (2.22)		
International Student	-2.64** (1.43)			-3.64** (2.11)	-2.01 (1.83)
GPA	7.13* (1.48)	9.89* (1.72)	3.35 (2.57)	7.86* (2.62)	6.53* (1.78)
Second Year	1.98 (1.78)	4.20 (2.62)	-1.93 (2.65)	1.54 (2.83)	1.79 (2.37)
Third Year	1.24 (1.86)	2.44 (2.69)	-.456 (2.57)	1.40 (3.35)	1.11 (2.29)
Fourth Year	-1.04 (2.42)	.583 (3.25)	1.73 (3.36)	-2.35 (4.43)	-.276 (2.84)
Homework Assignment	3.53* (1.42)	1.37 (1.89)	6.58* (2.14)	2.60 (2.29)	4.17** (1.88)
Experience	.113* (.045)	.110*** (.061)	.065 (.078)	.124** (.060)	.085 (.069)
Female Faculty	-4.04* (1.59)	-5.94* (2.14)	1.33 (2.20)	-5.87** (2.84)	-2.41 (1.83)
_constant	51.44* (6.304)	39.92* (6.43)	56.62* (9.96)	50.81* (9.71)	51.16* (6.17)
Notes: Standard errors are shown in parentheses. Significance levels: * 1%, ** 5%, *** 10%.					

To examine the impact of Assignment on grade, we use three different PSM methods: Nearest Neighborhood Matching, Radius Caliper Matching, and Kernel Matching. The results of the PSM analyses are shown in Table 7. The results suggest that for the overall sample, the impact of Assignment on midterm grade was significantly positive for all three PSM methods. The results further show that Assignment had a significant positive effect on grade for international and male students. These findings confirm the earlier results from the Ordered Probit and OLS approaches.

Table 7: PSM Average Treatment Effect Under Alternative Specifications

Variables	Nearest Neighbor	Kernel	Radius Caliper (.05)
Overall	4.07** (2.01)	3.55** (1.81)	3.57** (1.82)
Domestic Student	-.730 (2.59)	1.30 (2.41)	1.32 (2.44)
International Student	9.36* (4.03)	5.48** (2.70)	5.24** (2.66)
Male Student	4.41*** (2.91)	4.59*** (2.88)	4.93*** (2.88)
Female Student	1.88 (3.35)	1.92 (2.53)	2.30 (2.52)
Notes: Standard errors are shown in parentheses. Significance levels: * 1%, ** 5%, *** 10%.			

CONCLUSION

Using data from economics students at a small, primarily undergraduate university in Canada, we examined the impact of graded assignments on academic performance, as measured by average midterm grades. We used the Ordered Probit method; as a robustness check, we also utilized Ordinary Least Squares and the Propensity Score Matching method. We found that for the overall sample, Assignment had a significant positive impact on grade. We examined the impact of Assignment for different subgroups of students and found that it positively influenced the grades of male and international students. Other results suggest that GPA had a significant positive effect on grade and that students with more experienced teachers earned higher grades. The results further suggest that domestic students do better than international ones.

The results clearly suggest that graded assignments can be used to improve academic performance, especially that of males and international students. Descriptive statistics suggest that compared to other subgroups, male students on average study less (see the row titled "Study Hours" in Table 1). It appears that graded assignments motivate male students to study and thus have a beneficial impact on their grades. Descriptive statistics further suggest that international students, on average, study relatively more than other groups. However, international students have a different educational background as well as possibly a different language from domestic ones, and consequently they may face barriers in pursuing studies in Canada. It seems that graded assignments and subsequent feedback may give international students an opportunity to improve their understanding of the course material and that this enables them to do better on exams.

The major policy recommendation of the study is to include one or more graded assignments as integral components of university courses. It is also recommended that more emphasis be given to improving language proficiency of international students.

Like other studies related to education, this study suffers from selection bias, in that meritorious and hardworking students may gravitate to the courses with more graded coursework, such as assignments. To control for this bias, we employed two strategies: first, we included as many relevant independent variables as possible, and second, we used the Propensity Score Matching approach as a robustness check. The Propensity Score Matching approach can solve the problem of selection bias if the bias arises from differences in the observable factors, but not if the bias is due to unobservable factors such as ability or interest in the subject. Thus, the strategies adopted in this study may have reduced selection bias but could not fully eliminate it.

Future studies on the relationship between graded assignments and academic performance could employ panel data to utilize fixed effect regression methods that can control for unobserved individual-specific fixed effects.

ACKNOWLEDGMENTS

We gratefully acknowledge financial support from the School of Business and Economics at Thompson Rivers University, in the form of a School of Business and Economics Project Award. We also thank all of the participants in our study—the students surveyed and the faculty who allowed us to distribute our survey to their classes.

REFERENCES

Anderson, G., Benjamin, D., & M. Fuss (1994). The determinants of success in university introductory economicscourses. *Journal of Economic Education 25*(2), 99-119.

Arias, J.J., & D. Walker (2004). Additional evidence on the relationship between class size and studentperformance. *Journal of Economic Education 35*(4), 311-329.

Ashworth, J., & J.L. Evans (2001). Modeling student subject choice at secondary and tertiary level: A cross-section study. *Journal of Economic Education 32*(4), 311-320.

Borg, M., & S. Shapiro (1996). Personality type and student performance in principles of economics. *Journal of Economic Education 27*(1), 3-25.

Cooper, H. (1989). Synthesis of research on homework. *Educational Leadership 47*, 85-91.

Geide-Stevenson, D. (2009). Does collecting and grading homework assignments impact student achievement in an introductory economics course? *Journal of Economics and Economic Education Research 10*(3), 3-14.

Greene, B. (1997). Verbal abilities, gender, and the introductory economics course: A new look at an old assumption. *Journal of Economic Education 28*(1), 13-30.

Grove, W.A., & T. Wasserman (2006). Incentives and student learning: A natural experiment with economics problem sets. *American Economic Review 96*(2), 447-452.

Jensen, E., & A. Owen (2001). Pedagogy, gender, and interest in economics. *Journal of Economic Education 32*(4),323-343.

Meit, S., Borges, N., Cubic, B., & H. Seibel (2007). Personality differences in incoming male and female medical students. Retrieved August 15, 2010 from http://www.med-ed-online.net

Rask, K.N., & E.M. Bailey (2002). Are faculty role models? Evidence from major choice in an undergraduate institution. *Journal of Economic Education 33*(2), 99-124.

Simsek, A., & J. Balaban (2010). Learning strategies of successful and unsuccessful university students. *Contemporary Educational Technology 1*(1), 36-45.

A MATHEMATICAL MODEL OF PAY-FOR-PERFORMANCE FOR A HIGHER EDUCATION INSTITUTION

Matthew Hathorn, Weill Cornell Medical College
John Hathorn, Metropolitan State College of Denver
Lesley Hathorn, Metropolitan State College of Denver

ABSTRACT

This paper develops a mathematical model of the proposed pay-for-performance award system for an institution of higher education. Two constraints are imposed to ensure the fairness of the system. The model is general enough so that the payouts for the three performance levels (excellent, exceptional, and extraordinary) are clearly distinguished. Thus, the greater effort and performance that is required to achieve the highest level is rewarded with significantly higher monetary benefits. This outcome reinforces outstanding performance and should motivate faculty to perform at high levels in the future.

INTRODUCTION

The payoff for exceptional productivity must be substantial to make the increased effort of the performance, as well as the evaluation of this productivity, worthwhile (Baker, Jensen, & Murphy, 1988). Pay-for-performance (PFP) is a program that offers such an incentive in that it has been designed to improve the productivity of individuals by offering financial incentives for exemplary outcomes. That is, it is a one-off bonus associated with exceptional work.

The Board of Trustees of a college of two of the authors set aside an annual PFP budget line item equal to eight percent of the total faculty compensation, both salary and benefits, to reward those who perform at an exemplary level.

This paper develops a mathematical model of the PFP awards system and introduces two constraints to ensure the fairness of the proposed system. After the literature review the paper discusses a numerical example, develops the mathematical model and then discusses it before offering a conclusion in the final section.

BRIEF LITERATURE REVIEW

Despite the findings of a meta-analysis of 39 studies over 30 years that showed that there is a positive correlation between performance and financial incentives (Jenkins, Mitra, Gupta, & Shaw, 1998), not all studies have supported PFP. Some researchers have found little evidence of

the effectiveness of PFP in, for example, health care settings (Rosenthal & Frank, 2006). The lack of evidence in this sector, however, has done nothing to stem the enthusiasm for the program as more than half of a sample of health management organizations (HMOs) use PFP (Rosenthal, Landon, Normand, Frank, & Epstein, 2006). It is important to note that one of the reasons given for the lack of effectiveness in health care PFP systems was attributed to a low bonus size (Rosenthal & Frank, 2006). In business, the demand for PFP continues to be very strong, despite a weak economy, according to Mercer's 2010 U.S. Executive Compensation and Performance Survey (2010).

For the purpose of this paper, PFP is distinguished from other types of incentives such as reinforcement on a ratio scale (e.g., piece work) and merit pay increase. It has been well-established that piece work increases productivity over reinforcement on an interval scale (e.g., fixed salary) in a number of domains (Skinner, 1974). For example, a ratio reinforcement strategy has been found to increase productivity in tree planters (Shearer, 2004) and logging (Haley, 2003). Ratio scale reinforcement is obviously out of place in all areas of higher education beyond the experimental laboratories. Merit pay increase is a system that is used by some colleges in which faculty receive a percentage increase of their current salaries when they meet or exceed minimum outcomes. This percentage is then added to their base salaries.

PFP is an alternative mechanism that has been proposed as a method of providing a one-off reward for exceptional work by faculty. However, evaluation and implementation can lead to disastrous outcomes (Terpstra & Honoree, 2008). Hence, it is necessary to present PFP in a tightly constrained mathematical model that gives structure to the implementation and consequent reinforcement process.

A mathematical model of a complex concept provides an objective abstract representation of that concept. Mathematical models allow for systematic adaptation to the assumptions by holding the variables in a constant ratio. By creating mathematical models, wordy verbal descriptions are coded into precise mathematical equations without unnecessary details. Issues identified by faculty as concerns in the criteria for earning the financial incentives can be systematically modeled and resolved without sacrificing the integrity of the model as a whole.

In a study conducted by Terpstra and Honoree (2008) in which almost 500 faculty members were surveyed on problems undermining the effectiveness of pay based on performance, the most salient problem identified by faculty was that "the merit pay increases that are given out are too small to motivate faculty" (p. 48). This echoes the findings in the health care sector settings (Rosenthal & Frank, 2006). The impact of this problem on the PFP model will be demonstrated. By using a realistic mathematical model to describe PFP, weights can be manipulated and the consequences can be evaluated before any costly mistakes are made in terms of money, time, and goodwill.

BACKGROUND

The Board of Trustees of a college of two of the authors has proposed a PFP model to reward faculty who perform at a high level. The process to be used to determine the awards will be the department evaluation guidelines. These guidelines identify the evaluation parameters for the four areas of (i) teaching, (ii) advising and student support, (iii) college and community service, and (iv) scholarship. These areas are assessed annually with reference to three categories: (i) "needs improvement," (ii) "meets standards," and (iii) "exceeds standards." Faculty who achieve the "exceed standards" category in one or more of the four evaluation areas and who "meet standards" in the remaining areas, will be considered for a PFP award in the category where they "exceed standards."

The performance categories for the PFP model are "excellent" (Level I), "exceptional" (Level II), and "extraordinary" (Level III), with increasingly higher standards and payouts for each level.

NUMERICAL EXAMPLE

For expository purposes, assume that the total number of PFP awards for a particular year is 330 and that the total funds available in that year are two million dollars. In this example the highest evaluation weight of six is given to teaching area since the college is a teaching institution. The next most important evaluation area is assumed to be scholarship with a weight of four. The remaining two evaluation areas are ranked as equally important with weights of one each. The weights assigned to the performance categories in this example are two for excellent, four for exceptional and eight for extraordinary.

One perceived problem with PFP is that the amount of the award is not viewed by the recipient as reflective of the effort and performance required to receive the honor (Terpstra & Honoree, 2008). Thus in this example the weights for the three performance categories are an attempt to overcome this drawback.

Table 1 details the information for the numerical example. The awards matrix gives the breakdown of the 330 honorees. The weights matrix is the product of the loads assigned to the evaluation area and the performance criteria for each element of the matrix. For example the weight of two-sevenths assigned to the extraordinary performance area for teaching is the product of the teaching weight of one-half (6/[6+4+1+1]) and the weight for extraordinary performance of four sevenths (8/[8+4+2]). The matrix for the fraction of funds to be paid out is the proportion of the total funds for each element. This is the product of the relevant fraction from the weights matrix and the ratio of the number of awards for that category as a function of the total number of awards. For the extraordinary teaching element the fraction of 0.051948 is the weight of two-sevenths multiplied by ratio of the number of extraordinary teaching awards to the total number of awards or .181818 (60/330). The payout matrix converts the fraction of funds

matrix into the actual dollar amount of each award. Thus each recipient of an extraordinary teaching award in that year would receive a one-off payment of $14,828.54.

Table 1
Matrix Elements for the Numerical Example

Matrix	Performance criteria	Evaluation area			
		Teaching	Advising	Service	Scholarship
Awards	Excellent	80	30	5	12
	Exceptional	70	15	10	8
	Extraordinary	60	10	20	10
Weights	Excellent	1/14	1/84	1/84	1/21
	Exceptional	1/7	1/42	1/42	2/21
	Extraordinary	2/7	1/21	1/21	4/21
Fraction of funds	Excellent	0.017316	0.001082	0.00018	0.001732
	Exceptional	0.030303	0.001082	0.000722	0.002309
	Extraordinary	0.051948	0.001443	0.002886	0.005772
Payout	Excellent	$ 3,707.13	$ 617.85	$ 617.85	$ 2,471.42
	Exceptional	$ 7,414.27	$ 1,235.71	$ 1,235.71	$ 4,942.84
	Extraordinary	$ 14,828.54	$ 2,471.42	$ 2,471.42	$ 9,885.69

Note. The mathematical model denotes the awards matrix as N, the weights matrix as W, the fraction of funds matrix as P, and the payout matrix as O. Given this scenario, in the mathematical model parlance $N_T = 330$, $P_T = 0.116774892$, $f_T = \$ 2{,}000{,}000$, and $f_A = \$ 17{,}126{,}969.42$.

The model was developed with two constraints to ensure the fairness of the system. The first constraint is that the payments be the same if the weights are the same. In the example the weights for the advising and service evaluation areas were the same. In order to reflect their equal importance it is paramount that the payouts be the same for all three performance levels for these two evaluation areas. It can be seen from the payout matrix that this is the case thus the model does ensure compliance with the first constraint.

It can be seen from the payout matrix that across all three performance categories, regardless of the evaluation area, the dollar amount of the award is in the ratio of the weights assigned to the performance categories of two (excellent), four (exceptional) and eight (extraordinary). Likewise, for the four evaluation areas, regardless of the performance category, the payout is in the ratio of the weights assigned of: six for teaching, four for scholarship, and one each for advising as well as service. This meets the requirement of the second constraint that if the weight for one category is higher than another category then the amount of the award for the higher weighted category be no less than the award for the lower weighted category.

THE MATHEMATICAL MODEL

In this model, we seek a 3×4 matrix P such that the ij^{th} entry of P gives the fraction of total funds available allocated to the i^{th} performance criterion of the j^{th} evaluation area. In this

case, i = 1, 2, 3, where 1 represents excellent, 2 represents exceptional, and 3 represents extraordinary. The evaluation areas are j = 1, 2, 3, 4 where 1 represents teaching, 2 represents advising, 3 represents service, and 4 represents scholarship. Each performance criterion and evaluation area is weighted by the elements from a matrix W of the normalized weights of the performance criteria and the evaluation areas. The independent variable is the number of awards, or population, in each performance criterion of each evaluation area, given by the elements of the matrix N.

Now, consider the matrix P, whose elements are:

$$p_{ij} = \frac{w_{ij}}{N_T} n_{ij} \quad (1)$$

where n_{ij} = the population in each performance criterion, i, of each evaluation area, j,

$N_T = \sum_{i,j} n_{ij}$ is the total aggregate population over all categories, and

w_{ij} = the weight for the i^{th} performance criterion of the j^{th} evaluation area.

DERIVATION OF *W*

We can consider W to be the matrix product of two vectors, $\vec{w}_i$ and $\vec{w}_j$ where $\vec{w}_i$ is the column vector of normalized weights of performance criteria. Thus, if we have weights of two, three, and four:

$$\vec{w}_i = \begin{bmatrix} 2/9 \\ 3/9 \\ 4/9 \end{bmatrix} \quad (2)$$

For example, $\vec{w}_{i_e}$ is the weight of the excellent performance criterion divided by the sum of the weights of all performance criteria, or 2/9 in this case.

Similarly, $\vec{w}_j$ is the row vector of normalized weights of the evaluation areas. Thus, if we have weights of 10, four, three, and three:

$$\vec{w}_j = \begin{bmatrix} \frac{10}{20} & \frac{4}{20} & \frac{3}{20} & \frac{3}{20} \end{bmatrix} \quad (3)$$

For example, $\vec{w}_{j_t}$ is the weight of the teaching evaluation area divided by the sum of the weights of all the evaluation areas, or 10/20 in this case.

Thus, $W = \vec{w}_i \, \vec{w}_j$.

MODEL CONSTRAINTS

To ensure the fairness of the model, it is necessary to impose two constraints. First, if the evaluation weights are the same then the payouts must be the same. Second, if the evaluation weight in one area is greater than that for any other area then the payout for the higher weighted area cannot be less than that with the lower weight.

The model must satisfy the following constraints:

1. If the weights for any evaluation areas are the same then the payouts to each member of the population in those evaluation areas must be the same. That is, if $w_{ia} = w_{ib}$ for some $a \neq b$ and for all i, then $\frac{p_{ia}}{n_{ia}} = \frac{p_{ib}}{n_{ib}}$ for all i.

2. If the weight for one evaluation area is greater than that of another evaluation area, the payout to each member of the higher weighted evaluation area must not be lower than the payout to each member of the lower weighted evaluation area. That is, if $w_{ia} \geq w_{ib}$ for some $a \neq b$ and for all i, then $\frac{p_{ia}}{n_{ia}} \geq \frac{p_{ib}}{n_{ib}}$ for all i.

First, we check constraint 1. Take a and b such that $w_{ia} = w_{ib}$ for all i. From the definition of the model, this implies that

$$\frac{p_{ia}}{n_{ia}} = \frac{w_{ia}}{N_T} = \frac{w_{ib}}{N_T} = \frac{p_{ib}}{n_{ib}} \tag{4}$$

for all i. Thus, the first constraint is satisfied for all w_{ij}.

Next, we check constraint 2. Take a and b such that $w_{ia} > w_{ib}$ for all i. Then

$$\frac{p_{ia}}{n_{ia}} = \frac{w_{ia}}{N_T} > \frac{w_{ib}}{N_T} = \frac{p_{ib}}{n_{ib}} \tag{5}$$

Thus, the second constraint is satisfied for all w_{ij}. In fact, a stronger condition is also met. That is, having an evaluation area a weighted higher than another area b means that the payout to each member of the population of n_{ia} is *greater than* the payout to each member of the population of n_{ib}.

DETERMINATION OF PAYOUTS

Unfortunately, it is not possible to multiply matrix P by the total amount of funds available in order to determine the funds allocated to each category, because $\sum_{i,j} p_{ij} \leq 1$ with equality only in the case of $i = j = 1$. For example, take $n_{ij} = a$, for a a positive constant. That is, assume that the population of each category is the same. Further, assume that $\vec{w}_i$ has i_n elements and $\vec{w}_j$ has j_n elements. Then

$$\sum_{i=1}^{i_n} \sum_{j=1}^{j_n} p_{ij} = \sum_{i=1}^{i_n} \sum_{j=1}^{j_n} \frac{n_{ij} w_{ij}}{N_T} \tag{6}$$

Since each $n_{ij} = a$ and $N_T = i_n j_n a$, substituting both of these expressions into the above equation gives

$$\sum_{i=1}^{i_n} \sum_{j=1}^{j_n} p_{ij} = \sum_{i=1}^{i_n} \sum_{j=1}^{j_n} \frac{w_{ij}}{i_n j_n} \tag{7}$$

Because $i_n j_n$ is a constant, it can be taken out of the summation. This gives

$$\sum_{i=1}^{i_n} \sum_{j=1}^{j_n} p_{ij} = \frac{1}{i_n j_n} \sum_{i=1}^{i_n} \sum_{j=1}^{j_n} w_{ij} \tag{8}$$

By definition, each w_{ij} is equal to the product of the i^{th} component of $\vec{w}_i$ (denoted w_{i_i}) and the j^{th} component of $\vec{w}_j$ (similarly denoted w_{j_j}). Thus,

$$\frac{1}{i_n j_n} \sum_{i=1}^{i_n} \sum_{j=1}^{j_n} w_{ij} = \frac{1}{i_n j_n} \sum_{i=1}^{i_n} \sum_{j=1}^{j_n} w_{i_i} w_{j_j} \tag{9}$$

As w_{i_i} does not depend on j, it can be taken out of the inside summation. This gives

$$\frac{1}{i_n j_n}\sum_{i=1}^{i_n}\sum_{j=1}^{j_n} w_{i_i} w_{j_j} = \frac{1}{i_n j_n}\sum_{i=1}^{i_n} w_{i_i}\sum_{j=1}^{j_n} w_{j_j} \quad (10)$$

But $\vec{w}_i$ and $\vec{w}_j$ are normalized, so

$$\sum_{j=1}^{j_n} w_{j_j} = 1 = \sum_{i=1}^{i_n} w_{i_i} \quad (11)$$

Therefore, in this case, we get

$$\frac{1}{i_n j_n}\sum_{i=1}^{i_n} w_{i_i}\sum_{j=1}^{j_n} w_{j_j} = \frac{1}{i_n j_n}\sum_{i=1}^{i_n} w_{i_i} = \frac{1}{i_n j_n} \quad (12)$$

Since i_n and j_n are positive integers, this equation is less than or equal to 1. It can be shown that the sum of the entries of the matrix P is always less than or equal to 1 (see the appendix). Thus, there is an easy solution to determine the payout for each member.

Let P_T equal the sum of the entries of the matrix P. That is, let

$$P_T = \sum_{i,j} p_{ij} = \sum_{i,j} \frac{n_{ij}}{N_T} w_{ij} \quad (13)$$

Then, dividing each entry in P by P_T,

$$\sum_{i,j} \frac{p_{ij}}{P_T} = \sum_{i,j} \frac{n_{ij} w_{ij}}{N_T P_T} = \frac{1}{P_T}\left[\sum_{i,j} \frac{n_{ij} w_{ij}}{N_T}\right] \quad (14)$$

However, the term in the brackets is P_T by definition, so this reduces to

$$\sum_{i,j} \frac{p_{ij}}{P_T} = \frac{1}{P_T} P_T = 1 \quad (15)$$

Thus, multiplying the matrix P by the scalar $\frac{1}{P_T}$ forces the elements of P to sum to 1. This matrix can then be multiplied by the total amount of funds available, denoted by f_T. Then the quantity in each element of the matrix $\frac{f_T}{P_T} P$ is the total amount awarded to that category. More simply, since $\frac{1}{P_T}$ is a scalar, we can think of multiplying P by an adjusted amount of funds, denoted f_A, where $f_A = \frac{f_T}{P_T}$. Thus, the total amount awarded to each category would be given by $f_A P$. To determine how much each member of the population of element ij receives, divide the ij^{th} element of $f_A P$ by the ij^{th} element of N. Thus, each award recipient's payout for a particular evaluation area would be given by the elements of the matrix O

$$o_{ij} = \frac{f_A}{n_{ij}} p_{ij} \quad (16)$$

This model fulfills both constraints and uses all the funds allocated for the PFP awards.

DISCUSSION

It can be seen that the payouts to each faculty member (p_{ij}) are independent of the number of other faculty who have achieved the same award. This will discourage attempts by faculty to concentrate on achieving a high performance level in a sparsely populated evaluation area in an attempt to maximize their returns. This follows from the fact that the individual payouts depend

only on the weight matrix W and in fact are an exact multiple of the smallest payout in O. The multiple is equal to the ratio of the element of w_{ij} to w_{min}, where w_{min} is the smallest value of W.

CONCLUSION

The proposed model develops a PFP system that satisfies the constraints imposed to ensure that the system is fair. The model is flexible enough to allow the performance weights to be adjusted to ensure that the amount of the award at each performance level is sufficiently differentiated to be perceived to reward the effort required to attain the level of performance necessary for the honor.

Although the weak economy has hindered expectations of any increases (merit or cost-of-living), and even resulted in hiring freezes or layoffs, it is in these lean times that colleges can prepare to implement financial incentives to reward the most productive faculty when the economy improves. By developing a plan and creating a model that will support it, future faculty development can be maximized.

REFERENCES

Baker, G. P., Jensen, M.C., & Murphy, K. J. (1988). Compensation and incentives: Practice vs. theory. *Journal of Finance*, *43*(3), 593-616.

Haley, M. R. (2003). The response of worker effort to piece rates. Evidence from the Midwest logging industry. *Journal of Human Resources*, *38*(4), 881-890.

Jenkins, G. D., Mitra, A., Gupta, N., & Shaw, J. D. (1998). Are financial incentives related to performance? A meta-analytic review of empirical research. *Journal of Applied Psychology*, *83*(5), 777-787.

Mercer's 2010 U.S. Executive Compensation and Performance Survey. (2010). *Mercer*. Retrieved May 21, 2010, from http://www.mercer.com/summary.htm?idContent=1375180.

Rosenthal, M. B., & Frank, R. G. (2006). What is the empirical basis for paying for quality in health care? *Medical Care Research and Review*, *63*(2), 135-157. doi: 10.1177/1077558705285291.

Rosenthal, M. B., Landon, B. E., Normand, S.L., Frank, R. G., & Epstein, A. M. (2006). Pay for performance in commercial HMOs. *The New England Journal of Medicine, 355*(18), 1895-1902.

Shearer, B. (2004). Piece rates, fixed wages and incentives: Evidence from a field experiment. *Review of Economic Studies, 71*(2), 513-534.

Skinner, B. F. (1974). *About behaviorism*. New York, NY: Knopf.

Terpstra, D. E., & Honoree, A. L. (2008). Faculty perceptions of problems with merit pay plans in institutions of higher education. *Journal of Business and Management, 14*(1), 43-59.

APPENDIX

Proof

To prove that the sum of the entries of the matrix *P* is always less than or equal to 1 (that is, $\sum_{i,j} p_{ij} \leq 1$), first consider *P* to be the Hadamard (element-wise) product of *W* and a matrix N', where $N' = \frac{1}{Np} N$. Thus,

$$p_{ij} = w_{ij} n'_{ij} \quad \text{(A1)}$$

Now recall that the Frobenius inner product on the space of all matrices is defined as

$$\langle A, B \rangle_F = \sum_i \sum_j a_{ij} b_{ij} \quad \text{(A2)}$$

Thus, we can write the sum of all the entries in *P* as the Frobenius inner product of W and N',

$$\sum_i \sum_j p_{ij} = \langle W, N' \rangle_F = \sum_i \sum_j w_{ij} n'_{ij} \quad \text{(A3)}$$

The Frobenius inner product admits the Frobenius norm, $\|A\|_F$, defined for real numbers as

$$\|A\|_F = \sqrt{\langle A, A \rangle_F} = \sqrt{\sum_i \sum_j a_{ij}^2} \quad \text{(A4)}$$

Recall the Cauchy-Schwarz inequality, which will be central to our proof, is

$$|\langle A, B \rangle| \leq \|A\| \cdot \|B\| \quad \text{(A5)}$$

for any inner product and the corresponding norm. Here, we use the Frobenius inner product and Frobenius norm. Notice that, in that case, the left-hand side of the Cauchy-Schwarz inequality can be written as the sum of all the entries in the matrix P, $\langle W, N' \rangle_F$, as we have already shown above. This implies that

$$|\langle W, N' \rangle_F| \leq \|W\|_F \|N'\|_F \quad \text{(A6)}$$

In the case of our model, the absolute value is redundant because all entries of W and N' are positive, so the Frobenius inner product must be positive. Thus, we can discard the absolute value around the left-hand side. The result is

$$\langle W, N' \rangle_F \leq \|W\|_F \|N'\|_F \quad \text{(A7)}$$

Now consider the right-hand side. Since both W and N' are matrices in which every element is less than one, we can consider just one matrix and generalize our result to the other. Hence, without loss of generality, we consider W. By definition of the Frobenius norm, $\|W\|_F$ is

$$\|W\|_F = \sqrt{\sum_i \sum_j w_{ij}^2} \quad \text{(A8)}$$

We can show that the values of W sum to 1. Notice that the ij^{th} element of W can be written $w_{i_i} w_{j_j}$. Thus, the sum of all the elements of W can be written

$$\sum_{i=1}^{m} \sum_{j=1}^{n} w_{i_i} w_{j_j} \quad \text{(A9)}$$

where m is the number of elements in $\vec{w}_i$ and n is the number of elements in $\vec{w}_j$. But w_{i_i} does not depend on j, so we can take it out of the first summation. The resulting equation is

$$\sum_{i=1}^{m} w_{i_i} \sum_{j=1}^{n} w_{j_j} = \sum_{i=1}^{m} w_{i_i} = 1 \quad \text{(A10)}$$

The equalities follow because $\vec{w}_i$ and $\vec{w}_j$ are normalized, and therefore their elements sum to 1. Therefore

$$\sum_{i=1}^{m} \sum_{j=1}^{n} w_{i_i} w_{j_j} = \sum_{i=1}^{m} \sum_{j=1}^{n} w_{ij} = 1 \quad \text{(A11)}$$

Squaring both sides gives

$$\left(\sum_{i=1}^{m} \sum_{j=1}^{n} w_{ij}\right)^2 = 1 \quad \text{(A12)}$$

Now let us order the elements of $\boldsymbol{W}$ so that w_k is the k^{th} element of $\boldsymbol{W}$, where $k = i + m(j-1)$, and where, as before, m is the number of elements in $\vec{w}_i$. Let w_{-k} denote the sum of all the elements of $\boldsymbol{W}$ except for the k^{th}. Then we can write the above expression as

$$w_1^2 + w_1 w_{-1} + w_2^2 + w_2 w_{-2} + \cdots + w_p^2 + w_p w_{-p} = 1 \quad \text{(A13)}$$

where p is the number of elements in $\boldsymbol{W}$.

Since all of the elements of $\boldsymbol{W}$ are positive, each term $w_k w_{-k}$ is positive. Therefore

$$w_1^2 + w_2^2 + \cdots + w_p^2 \leq w_1^2 + w_1 w_{-1} + w_2^2 + w_2 w_{-2} + \cdots + w_p^2 + w_p w_{-p} \quad \text{(A14)}$$

In fact, the two sides of this expression are only equal if all but one of the w_k are 0, in other words, $\boldsymbol{W}$ has only one element. The above equation implies that

$$w_1^2 + w_2^2 + \cdots + w_p^2 \leq 1 \quad \text{(A15)}$$

Recalling the definition of w_{kl} we can see that this is equivalent to

$$\sum_i \sum_j w_{ij}^2 \leq 1 \quad \text{(A16)}$$

Taking the (positive) square root of both sides gives

$$\sqrt{\sum_i \sum_j w_{ij}^2} \leq 1 \quad \text{(A17)}$$

Recall that the Frobenius norm of $\|\boldsymbol{W}\|_F$ is defined as the left-hand side of the above equation. Therefore,

$$\|\boldsymbol{W}\|_F \leq 1 \quad \text{(A18)}$$

A similar argument suffices to demonstrate that

$$\|\boldsymbol{N}'\|_F \leq 1 \quad \text{(A19)}$$

Therefore, by the Cauchy-Schwarz inequality

$$\sum_i \sum_j p_{ij} = \langle \boldsymbol{W}, \boldsymbol{N}' \rangle_F \leq \|\boldsymbol{W}\|_F \|\boldsymbol{N}'\|_F \leq 1 \quad \text{(A20)}$$

Thus, we prove that the sum of $\boldsymbol{P}$ is less than or equal to 1. In addition, if there is more than one element in $\boldsymbol{W}$ a strict inequality holds. Therefore the sum of the elements of $\boldsymbol{P}$ cannot possibly be 1 unless $i = j = 1$; that is, there is only one element in $\boldsymbol{W}$.

AN EMERGING TREND IN RETAILING: INNOVATIVE USE OF GIFT CARDS

Ismet Anitsal, Tennessee Tech University
Amanda Brown, Tennessee Tech University
M. Meral Anitsal, Tennessee Tech University

ABSTRACT

Over the last two decades, an increasing number of shoppers have started using gift cards for their retail purchases. In response to this emerging trend in shopping, more and more merchants are offering unique gift cards to accommodate a variety of customers' needs and wants. While some retailers offer quite plain gift cards, others, such as Target, have created colorful, multipurpose gift cards. These newly designed gift cards are three-dimensional, voice recordable, reloadable and online-redeemable. Other special features include graphics, holograms, scents, mood sensors, textured or glittered finishes, personal statements, and pictures. Some of these gift cards can be used as toys, including finger puppets and games, or worn as ornaments. Retailers are using these increasingly popular cards not only to increase sales, but also to communicate their marketing mix (product, place, promotion, and price).The purpose of this study is to analyze the physical characteristics of gift cards issued by entrepreneurial retailers to help other retailers better design the next generation of gift cards.

INTRODUCTION

An emerging trend in the marketplace, "Gift cards are a saving grace to holiday shoppers struggling to find that perfect item" (Canadian Business 2006/2007, p. 17). Americans now use more than 840 million credit cards and annually charge one-trillion dollars, which is more than what they spend in cash (Toffler and Toffler 2006, p.278). Indeed, besides the use of credit cards, Gift cards actually began as paper gift certificates; but during the 1990s evolved into plastic cards with magnetic strips (Hudson 2005). In the late 1990s, major retailers initiated "closed-loop" or "retailer-specific" gift cards (Horne 2007). Then major credit-card companies followed suit (Acohido and Swartz 2007) by issuing "open-loop" or "network-branded" gift cards (e.g., Visa gift card or Master Card gift card) (Horne 2007; Fest 2010). Gaining popularity as holiday gifts, gift cards were ranked as the "second-most-popular item after clothing" in 2005 (Yang and Lewis 2006). Now, nearly three-fourths of consumers in the United States either purchase or receive at least one gift card annually (Promo 2006). Consumers spent $100 billion on gift cards in 2010, up 22 percent from $82 billion in 2006 (Acohido and Swartz 2007; Byrnes 2008; Steiner 2011) in contrast to $45 billion in 2003 (Harris 2005). An estimated 5.1 billion

merchant gift cards (issued by retailers) and bank gift cards (issued by Visa, Master Card and American Express) are used worldwide (Acohido and Swartz 2007).

With their growing popularity, gift cards are becoming more personalized. For example, with increasing shopping options, including self and home improvement, gasoline, air travel, and tattoos, gift cards are providing consumers opportunities to give "more personalized presents" (Petrecca 2006; p. 1B). In addition, the cards' features are becoming more personalized. For example, Wal-Mart allows consumers to put their photo or a text on gift cards (Jacobson 2005). Visa also provides options to personalize Visa gift cards with personal photos or stock images and engraved messages by visiting GiftCardLab.com at a cost of $5.95 per card (Edwards 2007). Furthermore, the widespread use of smart phones and iPads will likely increase the number and variety of digital gift cards (virtual gift cards) (Murphy 2010). As consumers start using more digital gift cards, retailers will probably provide even more personalization options and use social media to promote and sell gift cards (Murphy 2010).

Gift cards benefit not only the gift givers and recipients but also, most importantly, the merchants. For example, most shoppers tend to spend more when they are given gift cards (Shambora 2010). Therefore, revenue is generated not only by consumers purchasing the cards but also, in turn, by recipients who spend more than the gift card's face value (Horne 2007). Retailers also benefit from float, card fees, and totally/partially unclaimed gift cards (Bernstein 2006, Young and Lewis 2006, Horne 2007).

Retailers can use information about currently available gift cards and the emerging trends among them as a competitive advantage by becoming more innovative with their own cards to promote their business, recruit increasing numbers of customers, and generate additional revenue. Therefore, this study's purpose is to analyze the characteristics of gift cards retailers issue.

METHODOLOGY

This study's sample of 559 cards came from a gift-card collection which one of the authors gathered over several years. The majority of the cards were from Wal-Mart, while the rest were issued by various other retailers.

The sample of gift cards was content analyzed by number and frequencies. Specifically, gift cards were categorized by their major titles (e.g., gift card, shopping card, wish card and cash card); company-related features (e.g., company logo and contact information); physical characteristics (e.g., graphics, hologram, and scent); functionality (e.g., reloadable, redeemable online, voice recordable, and usable as a toy); holidays and season (e.g., Christmas, Halloween, Valentine's Day, and autumn); special occasions (e.g., birthday, wedding. and graduation); personal statements (e.g., "You're Incredible," "Best Wishes," and "You Rock"); special characteristics (e.g., glitter finish, textured finish, writable surface, ornament, finger puppet, mood sensor, game, assembly toy, and key chain); promotional messages (e.g., "3 Cents Off,"

"Rolling Back Prices" and "88 Cent Songs); licensed brands (e.g., Disney/Pixar, Dr. Seuss, Harry Potter and Nickelodeon); characters (e.g., cartoon, animal, and sports team); and product endorsements (e.g., endorsing general product, endorsing specific product, and not endorsing). Furthermore, retailers' communication with shoppers was content analyzed (e.g., "Shop Till You Drop," "Your Wish Has Been Granted," "Teachers Rule," Brand Names, Closeout Prices, Great Gifts," "Safety, Prevention First," "A Gift For You," "A Gift to Fit Your Taste").

RESULTS AND DISCUSSION

This research study of retail gift cards covered several categories, measured by frequency and as a percentage of the total gift cards surveyed. The following categories were measured: issuer, title, company- related characteristics, physical characteristics, functionality, holidays and season, special occasions, personal messages, characteristics of promotional messages, licensed brands and brand endorsements, and communication messages.

Retailers issued all of the 559 cards surveyed. Wal-Mart issued nearly 40 percent of those cards. Other issuers included Target, Waldenbooks, Sam's Club, Barnes & Noble, Toys-R-Us, and TJ Maxx. Fourteen percent of the issuers were classified as "Other" and were not among the merchants above. (The fact that Wal-Mart has a heavy volume of customers daily might indicate that customers purchase gift cards because of convenience rather than retailer preference.) Table 1 details the findings related to issuers.

Table 1
SAMPLE CHARACTERISTICS

Gift Cards Issued By	Frequency	%
Wal-Mart	220	39.4
Target	174	31.1
Waldenbooks	29	5.2
Sam's Club	18	3.2
Barnes & Noble	17	3.0
Toys-R-Us	13	2.3
TJ Maxx	10	1.8
Other	78	14.0
Total Sample	559	100.0

Also analyzed was the title printed on gift cards. Approximately 50 percent were titled "Gift Card," while forty percent had no title. The remaining 10 percent had varied titles including "Shopping Card," "Wish Card," "Merchandise Credit," and "Cash Card." A small percentage of the cards' titles contained the issuer's name; examples included Panera, Starbucks, and Max Money. While these findings might indicate that a title is not necessary to increase

purchases, some indication that the card is, in fact, a gift card may be needed. Table 2 details the findings regarding titles.

Table 2
GIFT CARD TITLES

Title	Frequency	%
Gift Card	281	50.3
No Title	231	41.3
Shopping Card	20	3.6
Wish Card	8	1.4
Panera Card	6	1.1
Student Shopping	3	0.5
Starbucks Card	3	0.5
Merchandise Credit	2	0.4
Cash Card	1	0.2
Max Money	1	0.2
Rewards	1	0.2
Everything Card	1	0.2
Pet Perks	1	0.2
Total Sample	559	100.0

In addition, company-related features printed on the gift card were considered. Of the cards surveyed, the most common characteristics were the company logo (98.4%), company phone number (95.3%), company website (81.2%), and pin number (97.1%). A fewer percentage contained a scratch-off number and detachable upper portion. Based on these findings, contact information is clearly essential to a gift card's design and is likely to make the customer feel more at ease when purchasing a gift card. Table 3 details the findings regarding company-related features.

Table 3
COMPANY-RELATED FEATURE OF GIFT CARDS

Company-Related Feature	Available		Not Available	
	Frequency	%	Frequency	%
Company Logo	550	98.4	9	1.6
Phone Number	533	95.3	26	4.7
Website Address	454	81.2	105	18.8
Pin Number	543	97.1	16	2.9
Scratch off Number	243	43.5	316	56.5
Detachable Upper Portion	35	6.3	524	93.7

Physical characteristics of the gift cards' were also analyzed, including those related to touch and smell. Ninety percent of the gift cards had some type of visible graphic, including a logo, illustration, or other detail. Other traits included raised graphics, holograms, two-piece designs, scents, and three-dimensionality. Of the gift cards analyzed, several contained two or more of these physical characteristics. These results indicate that a gift card's appearance is important to a customer and that a gift card with some type of graphics or color scheme is preferable to a gift card without these characteristics. Table 4 details the total findings regarding physical characteristics.

Table 4
PHYSICAL CHARACTERISTICS OF GIFT CARDS

Physical Characteristic	Available		Not Available	
	Frequency	%	Frequency	%
Graphics	503	90	56	10
Raised Graphics	1	0.2	558	99.8
Hologram	68	12.2	491	87.8
Two-piece Design	5	0.9	554	99.1
Scents	9	1.6	550	98.4
Three Dimensional	18	3.2	541	96.8

Functionality included space for the user to designate "To" and "From" (35.1%), reloadable capability (1.3%), reloadable capability restricted to parents (7.9%), redeemable online option (69.2%), voice recordable option (2.0%), and toy functionality (2.1%). Several of the cards included two or more of these functionality characteristics. These findings show that the most important functionality characteristics are a place to indicate the recipient's and the giver's name along with the option to use the gift card online. Table 5 details the total findings about functionality.

Table 5
FUNCTIONALITY OF GIFT CARDS

Functionality	Available		Not Available	
	Frequency	%	Frequency	%
To: … From: …	196	35.1	363	64.9
Reloadable	7	1.3	552	98.7
Reloadable by Parent	44	7.9	515	92.1
Redeemable Online	387	69.2	172	30.8
Voice Recordable	11	2.0	548	98.0
Usable as a Toy	12	2.1	547	97.9

Seasonal and personal characteristics included text or graphics on the gift card specific to a holiday, special occasion, or personal statement. Seventy-three percent were not identified by season. Those that were included Christmas, Halloween, Valentine's Day, autumn, and 4th of July. Eighty-seven percent were not identified by special occasion. Those that were included Birthday, Wedding, Congratulations, Graduation, and Mother's Day. Lastly, 98 percent did not include personal statements. Those that did contained phrases like "You're Incredible," "Thank You," or "Best Wishes." While several gift cards were purchased for a particular season or special occasion, not all of them contained a personal statement, indicating that the season or special occasion was communicated in another way. Table 6 details the total findings.

Table 6
SEASONAL AND PERSONAL CHARACTERISTICS

Holiday/Season	**Frequency**	**%**
Regular	410	73.3
Christmas	126	22.5
Valentine's Day	12	2.1
Halloween	5	0.9
Autumn	4	0.7
July 4th	2	0.4
Special Occasion	**Frequency**	**%**
General Use	491	87.8
Birthday	39	7.0
Wedding	17	3.0
Congratulations	6	1.1
Graduation	3	0.5
Mothers Day	3	0.5
Personal Statement	**Frequency**	**%**
No Statement	548	98.0
Thank You or Thanks	6	1.1
Best Wishes	2	0.4
You're Incredible	1	0.2
You're the Best	1	0.2
You Rock	1	0.2

Special characteristics observed included physical and functionality traits as well as characteristics that did not fall into the other categories. While eighty percent were classified as "regular," the rest included features like special finishes, light-up and sound functionality, and additional features like stickers and coloring books. These findings indicate that gift cards with

features above and beyond graphics are not as popular as those with just graphics. Table 7 details the total findings about special characteristics.

Table 7
SPECIAL CHARACTERISTICS OF GIFT CARDS

Special Characteristics	Frequency	%	Special Characteristics	Frequency	%
Regular	450	80.5	Spin game	1	0.2
Shiny/glossy finish	39	7.0	Ruler	1	0.2
Glitter in finish	15	2.7	Fly binoculars	1	0.2
Textured finish	9	1.6	Toy inside	1	0.2
Writable surface	7	1.3	Whistle	1	0.2
Transparent	7	1.3	Flexible	1	0.2
Glow in the dark	4	0.7	Bubbles	1	0.2
Light up	3	0.5	Product sample	1	0.2
Light up/sound	3	0.5	Assembly toy	1	0.2
3 pack	3	0.5	Coloring book	1	0.2
Ornament	2	0.4	Tin	1	0.2
Key chain/stickers	2	0.4	Piano function	1	0.2
Finger puppet	1	0.2	Sliding card message	1	0.2
Mood sensor	1	0.2	Total	559	100.0

Promotional messages on the cards indicated special sales (“3 cents off”), ease of use (“Just a click away”), and retailer slogans (“Rolling back prices”). Ninety-seven percent of the cards surveyed contained no promotional message. This finding could indicate that a promotional message on a gift card does not increase the likelihood of purchase. Table 8 details the total findings about promotional messages.

Table 8
PROMOTIONAL MESSAGES OF GIFT CARDS

Promotional Messages	Frequency	%
No Message	543	97.1
3 cents off	3	0.5
Video Games	3	0.5
Rolling back prices	2	0.4
Give the gift of music	2	0.4
Music	2	0.4
Just a click away	1	0.2
Great Books! Great Gifts!	1	0.2
88 Cent Songs	1	0.2
Product Sample	1	0.2
Total Sample	559	100.0

Licensed brands and brand endorsements on gift cards had some type of text or visual representing a company other than the retailer, such as Disney/Pixar, Dreamworks, and Sony. Eighty-eight percent contained no endorsement. The cards containing an endorsement seemed to be child-oriented by including movie themes and animated characters. These findings indicate that licensed brands and brand endorsements on a gift card are more popular with customers purchasing gift cards for children. Table 9 details the total findings about licensed brands and brand endorsements.

Table 9
LICENSED BRANDS AND BRAND ENDORSEMENTS

Licensed Brands	Frequency	%	Characters	Frequency	%
None	489	87.5	Regular	330	59.1
Disney/ Pixar	15	2.7	Cartoon	116	20.8
Dreamworks	5	0.9	Animal	72	12.9
Sony	5	0.9	Movies	21	3.8
Peanuts	4	0.7	Children	6	1.1
Marvel, Inc	4	0.7	Toy	5	0.9
Star Wars	4	0.7	Sports Team	3	0.5
Dr. Seuss	4	0.7	Music	2	0.4
Xbox	3	0.5	TV	2	0.4
Thomas Kincade	3	0.5	Nativity	2	0.4
Mattel	3	0.5	Total	559	100.0
Harry Potter	3	0.5	**Product Endorsement**	**Frequency**	**%**
DC Comics	2	0.4	Not Endorsing a Product	502	89.8
Nintendo	2	0.4	Endorsing General Product	30	5.4
Nickelodeon	2	0.4	Endorsing Specific Product	27	4.8
Twentieth Century Fox	2	0.4	Total	559	100.0
AT&T	2	0.4			
Hasbro	1	0.2			
Bratz	1	0.2			
Universal Studios	1	0.2			
Chronicles of Narnia	1	0.2			
Sanrio Co. Ltd	1	0.2			
Tokyopop	1	0.2			
Lord of the Rings	1	0.2			
Total	559	100.0			

Messages on the outside of the gift card included those detailing how the card could be used ("Use it to shop at any R'us store" and "Great for rentals and more"), why the card was given ("Appreciation"; "Thank You"; and "Achievement, Great Job"), and to whom the card was given ("#1 Teacher" and "Happy Mother's Day"). Eighty-five percent of the gift cards contained no message. This finding indicates that among those cards surveyed, a textual message does not necessarily increase the likelihood of purchase. Table 10 details the total findings about messages on the outside of the gift card.

Table 10
COMMUNICATION MESSAGES

Communication Messages	Frequency	Percent	Communication Messages	Frequency	Percent
No Message	439	84.9	Feliz Cumpleanos	1	0.2
Use it to shop at any R'us store	12	2.3	Poof	1	0.2
Happy Holidays	9	1.7	Whatever your little heart desires	1	0.2
Merry Christmas	6	1.2	In the mood	1	0.2
Great for rentals and more	4	0.8	n toys we play	1	0.2
Congratulations or Way to Go	3	0.6	Teachers Rule	1	0.2
Love	3	0.6	Treat yourself	1	0.2
After the party, go shopping	2	0.4	Enjoy	1	0.2
Happy Mother's Day	2	0.4	Favorite things	1	0.2
Sweet	2	0.4	A grand sort of gift	1	0.2
Parents load with cash, students spend at Wal-Mart	2	0.4	Joker	1	0.2
Club Wedd	2	0.4	Feather your nest	1	0.2
Shop till you drop	1	0.2	Rain, Shine, Anytime	1	0.2
Making Season Bright	1	0.2	For Very Fine Things Indeed	1	0.2
Its About Doggone time….	1	0.2	Fill with your favorite bubble soap	1	0.2
You're how old? That's gotta hurt.	1	0.2	Say something, anything	1	0.2
Forever	1	0.2	HI QT	1	0.2
A little shomething for a lucky duck	1	0.2	The stuff of life	1	0.2
Go bananas this holiday	1	0.2	Love to give	1	0.2
Bah Humbug	1	0.2	Good as Cash in any R'us store	1	0.2
Seasons Greetings	1	0.2	Make a difference	1	0.2
Attendance, great record	1	0.2	Escape, dream, read	1	0.2
Achievement, Great job	1	0.2	Play, dream, read	1	0.2
Appreciation, Thank you	1	0.2	Discover, explore, read	1	0.2
Saftey, prevention first	1	0.2	Read	1	0.2
Fast Forward	1	0.2	Oh the places you'll go	1	0.2
#1 Dad	1	0.2	Convenient, shop without cash	1	0.2
You deserve a diva day	1	0.2	Same at cash, use at any Pilot	1	0.2
Que delicia!	1	0.2	Gift of Convenience	1	0.2
Step Out	1	0.2	Brand names, closeout prices, great gifts	1	0.2
Hi	1	0.2	A really good gift	1	0.2
Just Because	1	0.2	Make the Season Bright	1	0.2
Hey parents, snap off this top card…	1	0.2	A gift to fit your taste	1	0.2
Freeloader	1	0.2	Peace on Earth	1	0.2
Spend it	1	0.2	For every wish	1	0.2
#1 Teacher	1	0.2	Celebrate	1	0.2
Wow, That's Cool	1	0.2	Wish	1	0.2
From here to happily	1	0.2	Naughty or Nice Meter	1	0.2
What you really want	1	0.2	Ho, Ho, Ho	1	0.2
Your wish has been granted	1	0.2	A gift for you	1	0.2
Spot your kids some cash	1	0.2	Enjoy a movie night	1	0.2
Star	1	0.2	Turn on the fun	1	0.2
Your wish is my command	1	0.2	Total	517	100.0

CONCLUSION

Over the last two decades, gift cards have become widespread in U.S. retail shopping. Entrepreneurial retailers are offering attractive and functional gift cards to satisfy customers' gift-giving rituals. Gift cards reinforce brand awareness and logo recognition and enhance customer relationship. Furthermore, they are an attractive venue for generating additional revenue based on existing and new customers as illustrated by the fact that recipients often spend more than the face value of the cards they receive.

This study explored the physical characteristics of gift cards issued by entrepreneurial retailers. The findings provide a better understanding of gift cards' features and, in turn, could help retailers design the next generation of cards. In terms of research, literature is limited in terms of gift cards in general and gift-card features in particular. Future research can fill certain gaps. Here are some future research avenues: Most retailers, specifically national chains, offer gift cards. Local entrepreneurial retail shops have followed suit. On a larger scale, other retailers are expected to start offering gift cards. Future research may cover similarities and differences in consumers' needs for gift cards in different contexts (e.g., variety of retail, service and manufacturing formats including, but not limited to, groceries, big-ticket items, restaurants, hotels, airlines, services in car dealers), in different scales (e.g., national versus local; or chain versus single store), and in different cultures and geographic regions. In addition, future research may investigate consumer behavior, specifically how consumers' gift giving rituals are influenced by the rapidly emerging trend of gift cards.

REFERENCES

Anonymous (2006/2007), The Gift of Gift Cards, *Canadian Business*, Vol. 79, No. 24, Winter, 17-18.

Acohido, Byron and Jon Swartz (2007), Online Resale of Gift Cards Raises Fraud Alarms, in *USA Today*.

Bernstein, Leonard A. (2006), New Jersey Regulates Gift Cards, *New Jersey Law Journal*.

Byrnes, Nanette (2008), The Scramble For Gift-Card Cash, *Business Week*, 60-61.

Edwards, Cliff (2007), Gift Cards With A Personal Touch, *Business Week,* 26.

Fest, Glen (2010), Gift Card Gap?, *U S Banker,* Vol. 120, No. 6, January, 32-33.

Harris, Rebecca (2005), Card Party, *Marketing*, April 18, No.14, 15-17.

Horne, Daniel R. (2007),"Gift Cards: Disclosure One Step Removed, *Journal of Consumer Affairs*, Vol.41, No.2 (Winter 2007), 341-350.

Hudson, Kris (2005), Beyond Bland: Gift Cards Now Play Music, Record Messages, *Wall Street Journal.*

Jacobson, Leo (2005), Gift Cards Grow Up, *Sales&Marketing Management*, 157 (10), 18.

Liao, Shuling and Yu-Huang Huang (2006), The Effects of Individual and Joint Gift Giving on Receipt Emotions, *Journal of American Academy of Business,*" September, Vol. 10, No. 1, 160-166.

Murphy, Samantha (2010), Reinventing the Gift Card, *Chain Store Age,* Vol. 86, No. 6, August/September, p. 34.

Petrecca, Laura (2006), Tattoos to Strip Clubs, Holiday Gift Cards Go Offbeat, in *USA Today.*

Promo (2006), Best Western Puts Gift Card in Wal-Mart, Kroger, Other Stores, *Promo* (Online Exclusive).

Shambora, Jessica (2010), Plastic Presents *Fortune*. December 6, 2010. p. 33

Steiner, Christopher (2011), Taming the Spread, *Forbes,* February 28, http://www.forbes.com/forbes/2011/0228/entrepreneurs-david-leeds-retail-gift-cards-taming-spread.html

Toffler, Alvin and Heidi Toffler (2006), Revolutionary Wealth. New York, NY: Alfred A. Knopf.

Yang, Jae and Adrienne Lewis (2006), Gift of Shopping is Appealing, *USA Today*.

THE INFLUENCE OF SIMULATION PERFORMANCE ON STUDENT INTEREST

Steven D. Dolvin, Butler University
Mark K. Pyles, College of Charleston

ABSTRACT

Previous studies examine the potential benefits of using classroom games and simulations, finding that their use generally increases knowledge and interest level. However, few (if any) of these studies examine whether performance in such simulations is relevant to these outcomes. Particularly in investments, where trading simulations are common, the performance relative to peers and the market can be objectively determined based on portfolio return. Thus, we extend the existing literature by studying the impact of portfolio performance on knowledge level and interest in the profession. We find that simulation performance has no significant influence on the students' feelings with regard to their knowledge attainment or their level of interest in the discipline. This "non-result" is actually particularly meaningful, as some professors have either not used simulations or have avoided in-class performance comparisons for fear that a poor performance will persuade students to avoid a career in the field. Our results suggest that such fear is unwarranted.

INTRODUCTION

Traditional classroom instruction (i.e., lecturing) is generally considered to be highly effective in terms of transferring knowledge and, as such, has steadfastly remained the dominant method in higher education, particularly for those areas that are considered more quantitative. For example, studies have shown that the "chalk and talk" method of instruction is still most popular in finance courses (e.g., Saunders, 2001; Farooqi & Saunders, 2004; Iqbal, Farooqi & Saunders, 2006), as well as courses in related disciplines such as economics (Becker & Watts, 1996; Becker & Watts, 2001).

An argument could be made that one of the primary objectives of higher education is preparation for a professional career upon graduation. There is naturally more to this preparation than knowledge attainment. The application of this knowledge to "real world" situations is a skill that has historically been largely left to the students' own devices, and often insufficiently. However, in recent years, there has been much discussion on the use of classroom games and simulations as a way to fill this gap.

The use of games in instruction is far from a new concept, as there is evidence as early as the 1940s (e.g., Chamberlain, 1948) of their use in Economics courses. However, Holt (1999)

shows there has been much more emphasis over the last couple of decades, due in large part to the rapid rise in technology, which allows easier integration into the classroom. In addition, part of the reasoning behind the low levels of use was there was little research documenting a benefit in student learning from classroom simulations; however, recent works, including Cebula & Toma (2002), have addressed this latter issue, finding a positive influence from "bringing course material to life." More generally, Harter & Harter (2010) find that stock market simulations can significantly increase financial literacy among high school students, and Moffit, Skull & McKinney (2010) find that students completing an equity trading game believe their knowledge levels have improved, as has their interest in the topic.

However, to our knowledge, none of the existing studies document whether performance in such games (beyond just their simple use) impacts these outcomes. In particular, do students who perform well (i.e., earn an above average return) in such portfolio simulations have a greater interest in the field than those whose performance lags either their peers or the market? This question is particularly relevant, as anecdotal evidence suggests that some professors have been reluctant to implement such games for fear that a poor performance will dissuade students from pursuing a career in the field. Recent research (e.g., Waggle & Moon, 2011) finds that only approximately 30% of all undergraduate investment analysis courses use some type of stock market simulation as an aide in understanding the material being taught. Although this is the particular issue on which we focus, we believe our study provides other contributions as well.

First, there is surprisingly little research done on the use of classroom games in finance courses, whereas there is abundance in the area of economics and other disciplines. This is particularly interesting given the nature of finance, in that it lends itself readily to the real world application these games are designed to provide. Second, several previous studies examine games in general and in often very short-term (a single class period, for example) situations. The simulation examined in this study is a very realistic setting that covers an entire semester and should therefore provide more accurate real-world exposure.

The final contribution of the study revolves around the students' perspective of such games. From the instructor's perspective, the increased entertainment value could result in more favorable instructor evaluations as the games enhance student learning and make the class more enjoyable. However, we examine an alternative option for benefit-- the clarification of student perception of the discipline. In addition to questioning the student on knowledge increase as a result of the course, they are also queried on their interest levels in working in the profession. While both of these overlap with previous studies, we also survey students on their interest in managing their own money later in life. Since courses are often taken as electives by students with different majors, we believe this question gets more at the heart of the impact of the use of games.

We find that the experience of taking the course had a positive influence on student interest, knowledge, and experience; however, in contrast, we find no consistent relation between simulation returns, market returns, or market volatility and changes in interest, likelihood of

future management of money, or knowledge levels. Thus, the prevalence of benefits documented in prior literature, combined with the lack of negative side effects from poor student performance on such simulations, suggests that the use of such investment simulations is warranted.

In ancillary results, we do find that males experience a larger increase in interest in the material than females. The same is true for graduate students relative to undergraduate students. Finance majors experience a larger increase in their likelihood of continuing to manage their own (real) money in the future, and students with higher course grades are likely to have higher changes in experience levels and knowledge attainment.

LITERATURE REVIEW

The literature relevant to the history of games in the business classroom is large and developed, particularly with respect to economics courses. Chamberlain (1948) is credited with the first application of games in a classroom setting. Specifically, Chamberlain, using doctoral students at Harvard, allowed the students to circle the room and negotiate trades with others. Some individuals were designated buyers, while some where sellers; the interaction of the two groups led to further understanding of how markets work. Others, including Smith (1962), quickly built upon this, and the use of games in economics courses became relatively widespread. Davis & Holt (1993) and Kagel & Roth (1995) survey the work done on the topic to that point. Brauer & Delemester (2001) extend the survey by completing a more comprehensive review of the existing games for Economics courses.

Fels (1993) brings to light the fact that, although not unusual, the use of games prior to the mid 1990s never became common-place. The two reasons suggested by Fels (1993) were high costs of creation and relatively low documentation of significant student benefit in terms of increased knowledge attainment. The first issue has been largely overcome due to the rapid rise in technology and related computer-based simulations available at reasonable costs. The implementation of easy-to-use simulations such as the Stock Market Game (SMG) has led to the more evolved and involved electronic simulations available today. Also, the ease of use of such programs make the opportunity cost for the instructor minimal. See Wood, O'Hare & Andrews (1992) and Bell (1993) for early examinations of SMG. Complete information on the program can be found at www.stockmarketgame.com.

The second issue is more involved, but it too has been largely resolved, with the dominant conclusion that classroom games do provide benefit for the students. Frank (1997) found that students who experienced a classroom environment using games performed better on multiple choice tests than did counterparts in classrooms without games. Dickie (2006) finds evidence that also supports this contention. Gremmen & Potters (1997) and Biel & Delemeester (1999) find that students that experienced games learned more about the economic model than those who did not. Mullin & Sohan (1999) and Yandell (2004) find no significant difference in

test results dependent upon the use of games; however, they find that students generally are more satisfied with the course if there is a game involved.

Fraas (1980) finds that the student's pre-course level of knowledge was a significant contributing factor in the effectiveness of the games. Students that had little prior knowledge received more benefit from the games than those students with higher starting knowledge levels. Tsigaris (2008) suggests there is a double dividend from experimental games. The instructor, assuming they are utility maximizers, should perhaps incorporate games in order to increase their course evaluations. In addition, the students may benefit from increased knowledge the real-world application of material provides. Tsigaris (2008) also states that the intensity of the simulation is an important element in the effectiveness of the classroom game. Cebula & Toma (2002) find empirical support for both of these notions.

While evidence on experimental games in economics courses is abundant, the same is not true in finance. Unfortunately, until recently the use of such games in finance courses has been much less examined, due in part to the slow acclimation of the discipline to computer-based simulations. In fact, Clinebell & Clinebell (1995) show finance courses were often slow to use computers in their instruction despite being available, yet Devasagayam & Hyat (2007) find evidence that supports the use of computer simulations as a pedagogical device in a cross-disciplinary study of finance and marketing courses. Foster et al. (2004) and Helliar et al. (2000) find more specific evidence that a market-share game can improve student learning in undergraduate finance courses.

Some examples of past literature in the area are only peripherally related to the finance classroom. For example, Breen & Boyd (1976) present an early programming guide for creating simulations that would be applicable in money and banking classes. Also, Bell's (1993) version of the uncomputerized SMG was primarily designed for investment analysis, as stated by the author. There is also very little evidence on the effectiveness of these experimental games in helping students clarify their opinions on disciplines as a whole, perhaps as a viable career option. An exception is Sherman, Sebora & Digman (2008) who find that the use of experimental methods generally increase the impact of the course on students choice of becoming an entrepreneur.

There are a few notable exceptions that are similar in nature to the current study. King & Jennings (2004) find that the inclusion of trading simulation increases student learning. Ascioglu & Kugle (2005) implement a surveying technique to examine the influence of simulations on student enjoyment and learning objectives. Lekvin (2005) examines whether there is a relationship between trading ability (i.e., performance) and academic performance (i.e., grade) and largely finds success in either is independent of the other.

Finally, Moffit, Stull & McKinney (2010) is most similar to the current study. Specifically, they examine pre-and post- simulation knowledge via testing, as well as pre- and post-surveys gathering data on the students and their opinions on the simulation. This latter is very similar to what we do in the current study. They find that students benefit from the

simulation, as grades on the post-exams are significantly higher than on the pre-exams, which suggests an increased understanding of fundamental financial knowledge. They find that approximately 60% of students in the study find the simulation a knowledge-increasing process, while over 80% find the simulation increases their interest in the subject. The Moffit, Stull & McKinney (2010) study does differ from this one in several ways. First, they examine the simulation independent of a classroom. Second, like previous studies, they do not examine the influence of simulation performance on the survey results, but rather just whether the participation influences the respondents' opinions. Third, the current study utilizes a larger sample over a longer period of time, which allows for examination of differing market conditions. Fourth, our simulation allows for trading of a wide range of securities, whereas the Moffit, Stuff & McKinney (2010) simulation allows only equity trading.

We believe the addition of investment performance is a valuable extension to the literature. For example, researchers in behavioral finance have widely documented the "snakebite effect," which suggests that investors who experience a painful loss (or otherwise unsuccessful investment) are less likely to invest going forward (Nofsinger, 2011). Thus, some professors may likely have avoided the use of such simulations, or at least not had extensive classroom discussion on the results, for fear of dissuading students with poor performance from pursuing a career. Thus, we believe the current study complements and extends the existing literature by examining this particular possibility.

DATA

Data are collected via a survey method at the beginning and end of ten courses in upper level Investment Analysis (over the course of three years) at two four-year Universities. Butler University is a private University located in Indianapolis, IN, while the College of Charleston is a public University located in Charleston, SC. The courses are very similar in nature, as both instructors use the same text, employ approximately the same teaching style, and compute grades based upon very similar components and weighting. For instance, both instructors use the simulation as a determinant of the student's grade in much the same way. Specifically, students are graded based upon completion of assignments and explanation of their trading activity, and not on their performance. Both instructors provide a very modest amount of extra credit for performance superior to that of the market (the S&P 500 over the equivalent time period). Thus, the motivation for students to participate in the simulation should be roughly equivalent between the two instructors. On the beginning survey, students were asked a sampling of questions that served as controls for the study, including class level and major. Also, and more importantly, students were asked to subjectively rate themselves (on a scale of one to ten) in four categories:

1. Interest in pursuing a career in the field of investments.
2. Likelihood of managing their own investments after graduation.

3. Level of experience with investments such as stocks, mutual funds, and options.
4. Level of knowledge with respect to investments such as stocks, mutual funds, and options.

The surveys were administered, then collected by the professors and sealed until the end of each respective course to retain anonymity. At that time, the students were again asked to rate themselves in each of the four categories above. The study then focuses on the differing levels of ratings provided by the students on the two surveys. At the end of the respective course, the instructor compiles all data from the surveys. In addition, the student's return on the simulation contest is computed. Both instructors use StockTrak, a widely-used online investment simulation company. Finally, the grade, rounded to the nearest whole percent is recorded for each student respondent. Results of summary statistics are presented in Tables 1 and 2.

Table 1 first presents averages for the total sample. The majority of students taking the courses were male, which is typical of most finance courses. In addition, approximately two-thirds of students completing the survey were seniors at the time of course completion, while a slightly higher percentage was Finance majors. The College of Charleston did not have a Finance major during the sample period. Instead, students can choose to have a Finance concentration with a Business Administration major. While admittedly not the same, the requirements for the concentration are relatively consistent with the requirements for the major at Butler University. Thus, for the sake of this study, we assume they are equivalent.

Approximately 16% of the respondents were graduate (MBA) students, while less than 7% took the class during summer session. The average StockTrak Return was just over 9%, covering approximately 12 weeks during each semester. This represents an average of about 2 percent in excess of the S&P 500 over the equivalent period of time.

The average level of beginning ratings in the Interest and Manage categories are relatively high, at 7.6 and 8.6, respectively. This is as expected given they have enrolled in an upper level investments course, indicating a preexisting interest in the topic. Also predictably, the average beginning levels of Experience and Knowledge are relatively low at 4.1 and 5.0, respectively. The rating in two of the four categories increased, with Interest and Manage slightly decreasing. Since this value can be predictably biased by very low or high starting values, we also calculate the percentage change for each student in each category. The average of these percentage changes implies the average student experiences a substantial increase in perceived knowledge and experience, with a smaller increase in interest. The lone decrease is in the likelihood they will manage their own money in the future. This may be a result of students gaining a more complete knowledge of the time and energy involved in such an endeavor.

The remainder of Table 1 examines the sample, segmented by general return levels. For example, we segment the sample at the median return of each course. Then we combine all above and below median returns to create the subsamples. We find that students that experienced above median returns also had significantly higher ending levels of interest and likelihood of

future management. The only other significant variable is *Male*, indicating males are more likely to generate an above median return. Most importantly, it does not appear as though the percentage change in any of the four knowledge or interest levels is related to their performance in the simulation contest.

Table 1: Summary Statistics, Segmented by Return

	Total	*Segment by Median Return*			*Segment by Top Quartile Return*		
		Above	Below	*p*-value	Above	Below	*p*-value
N	194	97	97		47	147	
IntB	7.6134	7.7959	7.4271	.2132	8.2553	7.4082	.0111
ManB	8.5619	8.6633	8.4583	.3585	9.0426	8.4082	.0082
ExpB	4.1392	4.3265	3.9479	.2319	4.3617	4.0680	.4395
KnowB	4.9639	5.0102	4.9167	.7356	5.2766	4.8639	.1960
IntE	7.4330	7.8980	6.9583	.0049	8.4894	7.0952	.0000
ManE	8.1856	8.4184	7.9479	.0745	8.9574	7.9388	.0001
ExpE	5.9072	6.0714	5.7396	.2260	6.3191	5.7755	.0809
KnowE	6.9175	7.0000	6.8333	.4228	7.1915	6.8299	.1178
IntCh	.0203	.0375	.0028	.3391	.0603	.0076	.2106
ManCh	-.0244	-.0040	-.0453	.2335	.0036	-.0334	.3052
ExpCh	.9708	.9238	1.0187	.6464	1.0006	.9613	.9470
KnowCh	.7126	.7227	.7024	.8974	.6626	.7286	.5581
Male	.7320	.8367	.6250	.0008	.9149	.6735	.0000
MBA	.1598	.1735	.1458	.6014	.1702	.1565	.8279
Senior	.6685	.6702	.6667	.9595	.6591	.6714	.8816
FinMajor	.6856	.7143	.6563	.3869	.7872	.6531	.0659
Summer	.0670	.0714	.0625	.8047	.0638	.0680	.9199
Grade	.8408	.8493	.8320	.1252	.8511	.8376	.3014
STRet	.0928	.2013	-.0179	.0000	.3136	.0222	.0000
ExRet	.0195	.1257	-.0889	.0000	.2390	-.0507	.0000

IntB (*IntE*) is the level of interest in pursuing a career in investments (on a scale of 1 to 10) based upon responses from a survey administered at the beginning (end) of the respective course. *ManB* (*ManE*) is the likelihood of managing their investment portfolio (on a scale of 1 to 10) based upon responses from a survey administered at the beginning (end) of the respective course. *ExpB* (*ExpE*) is the level of experience with investments such as stocks, mutual funds, and options based upon a survey administered at the beginning (end) of the respective course. *KnowA* (*KnowE*) is the level of knowledge with respect to investments such as stocks, mutual funds, and options (on a scale of 1 to 10) based upon a survey administered at the beginning (end) of the respective course. *IntCh*, *ManCh*, *ExpCh*, and *KnowCh* is the percentage change in the beginning and end values of each respective survey variable. *Male* is a dummy variable equal to one if the student was male, zero otherwise. *MBA* is dummy variable equal to one if the student was enrolled as an MBA student, zero otherwise. *Senior* is a dummy variable equal to 1 if the student was enrolled in their senior year, zero otherwise. *FinMajor* is a dummy variable equal to 1 if the student is a finance major, zero otherwise. *Summer* is a dummy variable equal to 1 if the course was a summer course, zero otherwise. *STRet* is the return on the simulated Stocktrak account over the investment period. *ExRet* is the excess return on the simulated Stocktrak account over the investment period, calculated as *STRet* minus the return on the S&P 500 over the same time period. *p*-values are calculated assuming unequal variances and test the differences between the Above and Below columns.

To more closely examine the issue, we also segment the sample by isolating those individuals who generated the returns in the highest quartile for each section. These are the

students one would expect to have the most positive feedback from the process. However, we again find no significant difference in the changes in any of the four categories. We do find that students with higher initial levels of interest, experience, and likelihood of managing their money to be more likely to generate the highest returns, possibly because they spend the most time actually trading in the simulation. Male students and those who have chosen Finance as their major are also more likely to generate the highest returns relative to their peers. In unreported results, the bottom quartile of returns was also segmented from the sample. It could be hypothesized that those with the lowest returns experienced the most dramatic change in the survey response categories, particularly if the "snakebite" effect is present. However, we find no significant differences in any of the variables, again indicated no relationship between simulation performance and knowledge or interest levels.

Table 2: Summary Statistics, Segmented by Student Characteristics

	Male			MBA			Senior			FinMajor			Grade		
	Yes	No	*p*	Yes	No	*p*	Yes	No	*p*	Yes	No	*p*	High	Low	*p*
N	142	52		31	163		123	61		125	59		94	90	
IntB	7.75	7.25	.14	7.16	7.70	.25	7.53	7.80	.38	8.05	6.71	.00	7.82	7.41	.17
ManB	8.68	8.21	.06	8.48	8.58	.80	8.59	8.48	.67	8.67	8.29	.12	8.74	8.34	.08
ExpB	4.39	3.44	.01	4.84	4.01	.12	4.23	3.97	.49	4.37	3.66	.03	4.19	4.09	.76
KnowB	5.16	4.42	.02	5.42	4.88	.24	4.98	5.02	.90	5.22	4.51	.02	5.05	4.92	.65
IntA	7.75	6.56	.00	7.58	7.40	.66	7.20	7.70	.17	7.78	6.49	.00	7.79	6.93	.01
ManA	8.42	7.54	.01	8.52	8.12	.23	7.95	8.52	.03	8.50	7.39	.00	8.48	7.79	.01
ExpA	6.13	5.29	.01	6.35	5.82	.10	5.78	6.11	.24	8.09	5.47	.02	6.21	5.56	.02
KnowA	7.08	6.46	.02	7.55	6.80	.00	6.76	7.23	.03	7.11	6.49	.01	7.15	6.67	.02
IntCh	.05	-.06	.08	.16	-.01	.09	.00	.01	.74	.00	.00	.92	.01	-.01	.80
ManCh	-.01	-.07	.14	.06	-.04	.12	-.06	.05	.01	.01	-.10	.01	-.01	-.05	.27
ExpCh	.88	1.21	.21	.95	.98	.92	.82	1.30	.05	.90	1.15	.33	1.15	.80	.11
KnowCh	.67	0.84	.41	.95	.67	.39	.61	.92	.14	.61	.92	.15	.84	.58	.14

Male, *MBA*, *Senior*, and *FinMajor* are dummy variables and are segmented by that basis. *Grade* is segmented by the median value. Since grades are reported rounded to the nearest whole percentage, there are several grades at the median, which are excluded from this analysis. *p*-values are calculated assuming unequal variances and test the differences between the Yes and No columns.

Table 2 examines the sample segmented by student characteristics. Males have higher levels of all four categories of ratings in both the beginning and end of the semester. However, the only category where the percentage change in survey answers is significantly larger is interest in the profession. Thus, it largely appears the differences based upon gender is due to the inherent nature of the students and has little to do with the experiences of the classroom. Seniors experience a larger increase in the likelihood of personal money management and experience than underclassmen or graduate students. Finance majors have higher levels of ratings in each category, but much like gender, the differences seem to predate the class experience. The only exception to this is that Finance majors see a higher increase in the likelihood of managing their own money, while non-Finance majors experience a decrease. The difference is significant and is

logical given their chosen majors. Finally, the results are interesting when segmenting by median grade. For students that earn an above median grade, their ending rating is larger in all four categories than those earning below median grades. However, there are no significant differences in the change variables.

RESULTS

To more completely examine the significant contributors to the four surveying categories, we consider two variations of the following basic model:

$$Dep = \alpha + \beta_1 STRet + \beta_2 SPDev + \beta_3 SPRet + \beta_4 Male + \beta_5 MBA + \beta_6 Senior + \beta_7 FinMajor + \beta_8 Summer + \beta_9 Grade + \beta_{10} Ins1 + \beta_{11} ClassSz + \varepsilon$$

where the dependent variable represents rating values for each of the four categories of survey questions. The first variation of the model uses traditional ordinary least squares (OLS) regression analysis with the percentage changes (i.e., *IntCh*, *ManCh*, *ExpCh*, and *KnowCh*) in each rating variable as the dependent variables. *STRet* is each student's holding period return over the StockTrak period. *SPDev* and *SPRet* are the standard deviation and return of the S&P 500 over the equivalent time period, respectively.

Male, *MBA*, *Senior*, *FinMajor*, and *Summer* are all dummy variables designed to control for student or course specific characteristics that could influence changes in the dependent variables. *Grade* is the student's final grade, rounded to the nearest whole percentage. *Ins1* is a dummy variable used to identify one of the two instructors teaching the courses in which the survey were administered and is used to control for any instructor specific impact on the results. *ClassSz* is the final control variable, measured as the number of students completing the course in which the survey was administered.

Table 3 presents results for the model above. The only significant influence on the change in interest in the profession is for MBA students, suggesting perhaps those farther along in their education career better hone in on their career aspirations. Finance majors are more likely to experience a significant increase in the likelihood of managing their investments in the future, which is another unsurprising result. On the other hand, Finance majors seem to experience a significantly lower amount of knowledge increase. This is also logical, as these students are likely to have the most pre-course knowledge and, in turn, have less of a "blank slate" than non-Finance majors who may have only had one prior Finance class.

The dependent variable that results in the most significant relations is the change in experience. Interestingly, higher levels of market returns result in lower levels of experience change, suggesting that the best learning may occur in down markets, particularly when the money lost was not your own. Males and seniors obtain lower levels of increase in experience than their counterparts. Finally, students that obtain higher grades have a larger perceived

increase in experience, which is as would be expected. Perhaps most importantly from Table 3, we find that the student's return on the simulation contest is unrelated to their change in any of the four rating categories. This suggests that students' perception of financial material and/or the Finance profession is not altered by their performance on the simulated investment environment. While this does not mean that knowledge does not increase as a result of the simulation, it is an interesting extension of the discussion of benefits from such classroom activity.

Table 3: Multivariate Regressions, OLS

	IntCh		*ManCh*		*ExpCh*		*KnowCh*	
	Coef	*p*-value	Coef	*p*-value	Coef	*p*-value	Coef	*p*-value
Intercept	-.3109	.5727	-.3521	.2837	.2353	.9028	-.3184	.8388
STRet	.0005	.7555	.0011	.2124	.0036	.4976	-.0001	.9807
SPDev	-.0104	.1122	.0011	.7817	-.0163	.4762	.0041	.8251
SPRet	-.0158	.2090	.0030	.6887	-.0797	.0701	.0045	.9450
Male	.0675	.3303	.0237	.5655	-.5078	.0372	-.2322	.2391
MBA	.1967	.0701	.0157	.8069	-.4288	.2573	.0684	.8239
Senior	.0597	.4625	-.0566	.2418	-.5858	.0400	-.2390	.3004
FinMajor	.0098	.8888	.0790	.0595	-.3217	.1898	-.5329	.0080
Summer	.1887	.1821	.0463	.5815	-.3710	.4522	-.2390	.3004
Grade	.0031	.4529	.0019	.4367	.0279	.0568	.0199	.0936
Ins1	.1185	.1556	.0424	.3931	.5029	.0851	.2112	.3721
ClassSz	.0086	.3991	.0021	.7297	.0015	.9665	-.0075	.7951
N	194		194		194		194	
Adj. R-Sq.	.0229		.0310		.0896		.0320	

Ins1 is a dummy variable equal to 1 if the courses is taught by one of the two instructors in which the survey was administered, zero otherwise. *ClassSz* is the number of students in the respective class in which the survey is administered. All other variables are as previously defined.

In an attempt to more precisely examine the situation, Table 4 presents logistic regression results designed to capture variables that significantly relate to a positive change in any of the four response variables. Thus, whereas Table 3 examines the dependent variables as continuous, Table 4 collapses them into dummy variables where the respective variable equals 1 if the ending value for the response variable is larger than the beginning value, 0 otherwise. There is a marginally significant negative relation between the volatility of the market and an increase in interest, which is logical if one assumes individuals relate stable conditions to positive interest. Students with higher grades are more likely to have increases in interest and perception of knowledge attainment.

Table 4: Multivariate Regressions: Logistic Models								
	PosIntCh		*PosManCh*		*PosExpCh*		*PosKnowCh*	
	Coef.	*p*-value	Coef.	*p*-value	Coef.	*p*-value	Coef.	*p*-value
Intercept	-5.7057	.0771	-2.7967	.4038	2.9451	.3277	-2.0429	.5479
STRet	.0017	.8356	.0075	.3584	.0197	.0768	-.0053	.6147
SPDev	-.0617	.0989	-.0067	.8663	-.0358	.3305	.0064	.8830
SPRet	-.0637	.3506	-.0350	.6453	-.1418	.0416	-.0395	.6270
Male	-.3659	.3484	.0615	.8872	-.1384	.7185	-.7200	.1497
MBA	.1305	.8228	-.8662	.1775	-.8150	.1951	-.2751	.7068
Senior	-.1448	.7539	-.5477	.2299	-.6252	.2148	-.1975	.7167
FinMajor	-.1671	.6691	.2756	.5209	.0533	.8937	-.8542	.0895
Summer	.9078	.2325	.8114	.3033	-.1820	.8105	-.0746	.9393
Grade	.0507	.0317	.0272	.2821	.0000	.9994	.0678	.0141
Ins1	1.1940	.0210	.2348	.6421	.4792	.2899	.4466	.3999
ClassSz	.0948	.1113	-.0171	.7859	-.0033	.9521	-.0381	.5437
N	194		194		194		194	
% Conc	69.0		64.0		67.5		68.6	

PosIntCh, *PosManCh*, *PosExpCh*, or *PosKnowCh* are dummy variables equal to 1 if the respective change variable was positive, indicating an increased level in the response variable from class beginning to end. All other variables are as previously defined.

Finance majors are less likely to experience an increase in knowledge, which is again consistent with the notion that they have a higher starting level of knowledge. Students with larger StockTrak returns are more likely to have increases in experience levels, although the level of significance is relatively small. Consistent with the results above, the only surprising result is a negative relation between market returns and experience changes. One would expect that students would feel they had a large increase in experience during positive market environments.

CONCLUSION

Using a surveying technique, we examine student opinions in upper level and graduate level investment analysis courses. The study specifically focuses on the interaction between the students' returns on an investment simulation and their responses to four variables: (1) perceived knowledge level, (2) interest level in the discipline, (3) likelihood of managing money in the future, and (4) perceived experience in the discipline. We find the levels of percentage change in each of the four are unrelated to StockTrak (i.e., simulation) performance.

As a whole, our results suggest that any concern over the snakebite effect is unfounded, as there is no link between performance and perceived interest or knowledge level. If anything, we find the opposite as a lower market return (which would generally correspond to lower

absolute simulation performance) actually is associated with an increase in perceived experience level. Thus, we suggest that simulations continue to be used and that instructors not hesitate to make full use of both rankings and performance in classroom discussion.

REFERENCES

Ascioglu, A., & L.P. Kugle (2005). Using trading simulations to teach microstructure concepts. *Journal of Financial Education,* 31(2), 69-81.

Becker, W.E. & M. Watts (1996). Chalk and talk: A national survey on teaching undergraduate economics courses. *American Economic Review*, 86(2), 448-453.

Becker, W.E. & M. Watts (2001). Teaching methods in US undergraduate economics courses. *Journal of Economic Education*, 32(3), 269-279.

Bell, C.R. (1993). A noncomputerized version of the Williams and Walker stock market experiment in a finance course. *Journal of Economic Education*, 24, 317-323.

Brauer, J. & G. Delemeester (2001). Games economists play: A survey of non-computerized classroom games for college economics. *Journal of Economic Surveys*, 15(2), 221-236.

Breen, W. & J. Boyd (1976). Classroom simulation as a pedagogical device in teaching money and banking. *Journal of Financial and Quantitative Analysis*, 11(4), 595-606.

Brown, R.B. & C.J. Guilding (1993). A survey of teaching methods employed in University business school accounting courses. *Accounting Education*, 2(3), 211-218.

Cebula, R. & M. Toma (2002). The effect of classroom games on student learning and instructor evaluations. *Journal of Economics and Finance Education*, 1(2), Article 1.

Chamberlin, E.H. (1948). An experimental imperfect market. *Journal of Political Economy*, 56(2), 95-108.

Clinebell, J.M., & S.K. Clinebell (1995). Computer utilization in finance courses. *Financial Practice and Education*, 5(1), 132-42.

Davis, D. & C. Holt (1993). *Experimental Economics*. Princeton University Press.

Devasagayam, R. *& S.* Hyat *(*2007*).* Pedagogical value of computer-based simulations: A cross disciplinary study. *International Journal of Business Research,* **7***,* 89–95.

Dickie, M. (2006). Do classroom experiments increase learning in introductory microeconomics. *Journal of Economic Education*, 37(3), 267-288.

Farooqi, N. & K.T. Saunders. (2004). A note on teaching methods: The Canadian experience. *Advances in Financial Education*, 2(1), 52-56.

Fels, R. (1993). "This is what I do, and I like it." *Journal of Economic Education*, 24(4), 365-370.

Foster, F.D., S. Gregor, R. Heaney, W. Northcutt, T. O'Neill, A. Richardson, E. Welch, and R. Wood (2006). Impact of computer based share market simulations on learning: A link between self-efficacy and understanding. *Journal of College Teaching and Learning*, 3(2), 45-60.

Fraas, J.W. (1980). The use of seven simulation games in a college economics course. *Journal of Experimental Eduacation*, 48, 264-280.

Frank, B. (1997). The impact of classroom experiments on the learning of economics: an empirical investigation. ***Economic Inquiry***, 35(4):763-769.

Gremmen, H. & J. Potters (1997). Assessing the efficacy of gaming in economic education. *The Journal of Economic Education*, 28(4), 291-303.

Harter, C. & J.F.R. Harter (2010). Is financial literacy improved by participating in a stock market game? *Journal for Economic Educators*, 10(1), 21-32.

Helliar, C.V., R. Michaelson, D. M. Power, & C. D. Sinclair (2000). Using a portfolio management game (Finesse) to teach finance. *Accounting Education*, 9(1), 37-51.

Holt, C.A. (1999). Teaching economics with classroom experiments: A symposium. *Southern Economic Journal*, 65(3), 603-610.

Iqbal, A.M., M.N. Farooqi, & K.T. Saunders (2006). Teaching methods and assessment techniques used for the introductory level undergraduate finance course in British and Irish Universities. *Journal of Economics and Finance Education*, 5(1), 47-61.

Kagel, J.H. & A.E. Roth (1995). *The Handbook of Experimental Economics*. Princeton University Press.

King, D. A., & Jennings, W.W. (2004). The impact of augmenting traditional instruction with technology-based experiential exercise. *Journal of Financial Education,* 30(2), 9-25.

Levkin, B. J. (2005). Some evidence regarding computer-based financial instrument trading simulations and their use as an assessment tool. *Journal of Financial Education,* 31(2), 23-33.

Moffit, T., C. Stull, & H. McKinney (2010). Learning through equity trading simulation. *American Journal of Business Education*, 3(2).

Mullin, R. D. & G.E. Sohan (1998). *Benefit Assessment of Classroom Experimental Economics*. USAF Academy.

Nofsinger, J. (2011). *The Psychology of Investing*. Pearson: New York, 4th ed.

Saunders, K.T. (2001). Teaching methods and assessment techniques for the undergraduate introductory finance course: A national survey. *Journal of Applied Finance*, 11(1), 110-112.

Sherman, P.S., T. Sebora, & L.A. Digman (2008). Experimental entrepreneurship in the classroom: The effects of teaching methods on entrepreneurial career choice intentions. *Journal of Entrepreneurship Education*, 11, 29-42.

Smith, V.L. (1962). An experimental study of competitive market behaviour. *Journal of Political Economy*, 70(2), 165-179.

Tsigaris, P. (2008). Is there a double dividend from classroom experimental games? *American Journal of Business Education*, 1(1), 23-35.

Waggle, D. & G. Moon (2009). Faculty practices in undergraduate investment courses. *Managerial Finance*, 35(5), 461-471.

Williams, A. & J. Walker (2001). Computerized laboratory exercises for microeconomics education: Three applications motivated by experimental economics. *Journal of Economic Education*, 24, 291-315.

Wood, C.W., S.L. O'Hare & R.L. Andrews (1992). The stock market game: Classroom use and strategy. *Journal of Economic Education*, 23, 236-246.

Yandell, D. (2004). Effects of Integration and Classroom Experiments on Student Learning and Satisfaction. *Journal of Economics and Economic Education Research*, 5(3), 17-27.

THE IMPACT OF INDIANA HORSE RACING ON THE INDIANA ECONOMY, A PRELIMINARY STUDY

Susan E. Conners, Purdue University Calumet
Jonathan M. Furdek, Purdue University Calumet
Laurent Couetil, Purdue University
Gregory Preston, US Department of Agriculture

ABSTRACT

This paper reports some of the findings obtained from the survey that was recently conducted regarding the 2009 economic activity of the racing segment of the equine industry. The preliminary results focus on four issues: (1) the direct and indirect economic impact from the horse racing and race horse breeding segment of the equine industry; (2) the direct and indirect impact this industry segment has on employment; (3) the direct and indirect impact this industry segment has on Indiana taxes; and (4) the proportion of expenditures by this industry segment directly in Indiana.

INTRODUCTION

In 1988, the constitutional ban on all forms of gaming in Indiana was removed with a sixty-two percent majority of Indiana voters. In September, 1994, the first pari-mutuel racetrack opened in the state. The racetrack was a combined facility with a casino. From the beginning of pari-mutuel horse racing in Indiana, legislators displayed the foresight to give this fledgling industry a good head start and a solid foundation as it competed with older, more established state racing programs in other states, by providing a share of casino taxes to subsidize purses for the racetracks. A second racetrack and casino was opened and currently the two racetracks, one in Shelbyville, Indiana an the other in Anderson, Indiana continue to function.

In 2007, the Indiana General Assembly passed, and the governor signed into law, a bill that would permit electronic gaming at the state's two pari-mutuel racetracks. This "slots" legislation was the product of unprecedented cooperation and more than ten years of effort put forth by representatives of Indiana standardbred, thoroughbred and quarterhorse racing and breeding associations and the state's two pari-mutuel race tracks in building public understanding of the industry and legislative support for this concept.

With the passage of the slots law, state representatives and senators demonstrated judgment and vision in keeping Indiana dollars in Indiana by promoting the state's homegrown horse racing and breeding industry. The new law reinforced the framework for a growing,

productive industry with the intent that it would generate future agribusiness economic activity, revenue and jobs throughout Indiana.

In the campaign for passage of gaming at the tracks, both horsemen and race tracks relied on the results of a 2005 study by the American Horse Council (American Horse Council, 2005) which was based on 2003 data. This study reported a direct economic impact of $181 million and a total economic impact of $294 million for the Indiana racing and breeding industry.

For the purpose of quantifying the effects of the 2007 slots law and an accurate representation of the current condition of the industry in the state, all four racing and breeding associations came together and commissioned a survey and business analysis of the racing and breeding industry and its economic impact on Indiana.

METHODOLOGY

The data collection portion of the research involved two surveys that were conducted simultaneously. One survey obtained economic data from the Indiana racetracks for the calendar year 2009 and both Indiana horse racing tracks responded with their data. The second part of the study involved a survey of over 7,000 members of the race horse breeding community requesting their economic data for 2009. The breeder survey resulted in 1,000 responses.

Estimation of economic impact utilizes state specific IMPLAN multipliers to estimate the overall economic impact of the industry on the state GDP and on employment. This platform was selected for several reasons. The IMPLAN modeling system is an input-output model that describes commodity flows from producers to intermediate and final consumers (Hodges 2007) . Total industry expenditures, employment compensation, and tax implications can be extracted using this modeling system. It has been in use since 1979 and is currently used by over 500 private consulting firms, university research centers, and government agencies (UNFCCC, 2010). The IMPLAN modeling system combines the U.S. Bureau of Economic Analysis' Input-Output Benchmarks with other data to construct quantitative models. From this data, one can examine the effects of a change in one or several economic activities to estimate its effect on a specific state, regional, or local economy (MIG 2010). The economic impacts of horseracing and breeding related activities were estimated using 2008 IMPLAN multipliers for the State of Indiana. In this study, only the aggregate impact on the State economy was considered. The impact on specific counties or on specific industries was not withi8n the scope of the study.

RESULTS OF THE HORSE RACING INDUSTRY SURVEY

The two racetracks in Indiana, Hoosier Park and Indiana Downs, generated a cumulative income of $319,136,342 in 2009, paid out purses of $49,043,165, paid State and local taxes of $5,106,261, and have an investment of $155,781,213 in land, facilities, and equipment, of which $3,042,146 is new real investments. The industry employed 161 full time employees, 765 part

time employees, and 596 seasonal employees in 2009, which computes to a full time equivalent of 1,240 employees.

The preponderance of racetrack revenue in 2009 came from wagering and most racetrack wagering revenue in 2009 came from off track and pari-mutuel sources. In 2009, 98% of racetrack revenue came from wagering and 2% came from other sources such as admission fees, concessions, and sale of programs. Of the wagering revenue, only 6% was generated at the track while 94% came from off-track and pari-mutuel wagering. The racetracks engaged in Thoroughbred, Standardbred, and Quarterhorse racing in 2009 with Thoroughbred racing generating 53% of the wagering revenues, Standardbred racing accounting for 44% and Quarterhorse racing the remaining 3%.

An examination of daily wagering revenues by breed provided some interesting facts. Although thoroughbred racing seems to be the big attraction and generates the most revenue as well as the most revenue per day, the Indiana racetracks engage in more days of Standardbred racing. The Thoroghbreds wagering revenue was $166,163,798, racing 125 days with $1,329,310 in revenue per day. Standardbreds wagering revenue was $127,928,734, racing 160 days and $799,555 revenue per day. Quarterhorse racing generated $8,722,966 in wagering revenue, racing 56 days with $155,767 in revenue per day. These findings tend to indicate the significance of off-track and specifically, pari-mutuel wagering. What is not known, is the amounts that are paid out as expenses from pari-mutuel wagering.

The major expenditure for the racetracks in 2009 was for purses which accounted for 58.2% of reported expenditures. Wages accounted for 18.4% and other categories of expenditures were commission, 6%; veterinary services, 0.5%; maintenance, 1.7%; general business expenses (insurance, utilities, advertising, equipment purchases, and office supplies), 9.1%. Taxes, state and local, accounted for 6.1% of total expenditures.

ECONOMIC IMPACT OF THE HORSE RACING ON THE INDIANA ECONOMY

The economic impact of the industry is measured in several ways. The direct effects come from the reported level of economic activity, expenditures and employment, generated by the industry, The indirect effects are the changes in the State economy generated by the direct effect. The induced effect is the change in employee household consumption expenditures related to the direct and indirect effects. The total economic impact of the industry, as determined by the IMPLAN model is 2,843 employees, $109,253,392 in labor income, and $488,356,672 in contribution to state GDP. These estimates are generated using IMPLAN 2010. The horse racing industry in Indiana generates by direct payment as well as from indirect and induced economic activity a total of $73 million in tax revenues of which $29 million is in various forms of federal taxes and $45 million returns in State and local taxes.

Using the IMPLAN model with 2008 data, the projected direct and indirect tax revenue consequences from the economic activity of the racetrack is substantial. State and local tax

revenues attributed to the racetrack industry exceed $45 million while federal tax revenues attributed to the racetrack industry of nearly $28 million. The resulting tax impact exceeds $73 million.

RESULTS OF THE RACE HORSE BREEDING SURVEY

A survey of over 7,000 breeders and related operations in the State of Indiana resulted in 1,000 surveys completed and returned. These were the findings:

- 80 counties were represented in the survey with the most responses from Lagrange County (29), Elkhart County (20), and Allen County (16).
- The principal residence of more than 10% of the breeders in the survey was out of state. Thirty-four states were represented in the survey with the most responses indicating Ohio (179), Kentucky (136), and Illinois (113) as the principal residence.
- When asked about organizational affiliations, 32% were affiliated with Thoroughbred organizations, 58% with Standardbred organizations, and 10% with Quarterhorse organizations.
- When asked about investments in horses, property and equipment since the slots in 2007, 19% indicated the number of horses had increased, while 69% indicated the number of horses had decreases, with 12% indicating no change. The amount of property owned increased for 1% of the breeders, while 68% had decreased property holdings, and 31% had no change in property holdings. The investment in equipment reportedly increased for 2% of the respondents, decreased for 32%, and was unchanged for 66%.
- The number of horses owned in the 1,000 responses, was reported to be 3,365 while 65% of those horses raced in 2009 and 215 of the horses that raced, or 21% had won in 2009.
- Most of these horses were kept on the owner's property (68%) while 7% were kept at training facilities and 25% reported other types of facilities held their horses.
- The other type of facilities included race tracks (38.4%), other farms (20.5%), fairgrounds (11%), breeding farms (8%), and out of state (15.5%).

The most significant sources of revenue were the purses and breed awards received by the breeders. Of the 1,000 responding in the sample, 586 breeders indicate $15,400,083 in purses for an average of $26,280 per winning breeder. Breeders also reported breed awards totaling $1,569,299 for an average of $8,622 per breeder reporting these awards. Breeders reported a total income of $31,682,037 in Indiana which represented a significant part of their total income, since many breeders operate in multiple states.

The total expenditures reported by the 1,000 breeders responding to the survey total $58,193,160 for 2009. Nearly two thirds of the breeders reside outside of Indiana. Of the 1,000 survey responses received, 353 indicated in-state residence and 647 were out-of-state breeders operating in Indiana. The 353 in-state breeders were from 80 counties. Out of the 353 in-state breeders, 82 did not report expenses. The 271 that did report expenses report a total expenditure of $19,344,954 which is an average of $71,384 per breeder. Since the sample represents approximately one seventh of the breeders in the State, total expenditures per county were projected based on the number of responding breeders per county. The projections provide a geographical as well as financial picture of the horse breeding industry.

In the breeder survey, 648 responses came from breeders licensed in Indiana but residing in another state. Thirty-four States were represented in the sample. Of the $58,193,160 in total

expenses reported in the survey, $38,233,324, or 66% is reported by breeders indicating their residence is outside of Indiana, indicating that the breeding industry is also a significant export market for the State of Indiana.

Out-of-State breeders indicate that they earn a substantial portion of the revenue generated by the breeding industry. Of the $31,682,037 of revenues reported in the survey, $24,775,875 were reported by out-of-State residents operating in Indiana.

ECONOMIC IMPACT OF THE RACE HORSE BREEDING INDUSTRY ON THE INDIANA ECONOMY

The survey results were tabulated and the total industry parameters estimated by projecting the sample results proportionately to the population. The sample operations indicate a total expenditure of $58,193,160 for the year 2009 which projects to a total expenditure of $414,352,120 by the industry in 2009. In a similar fashion, the economic impact of the breeding industry was determined using the IMPLAN 2010 model. The race horse breeding industry generates a total of $49 million in tax revenue of which $24.4 million is in State and local tax revenue. This is the total direct and indirect tax effect.

Using the IMPLAN model with 2008 data, the projected direct and indirect tax revenue consequences from the economic activity of the racetrack is substantial. State and local tax revenues attributed to the horse breeding industry exceed $24 million while federal tax revenues attributed to the horse breeding industry also exceed $24 million. The resulting tax impact exceeds $49 million.

CONCLUSIONS

The year 2009 was a difficult year economically for the economy in general, the state economy, and also the equine industry. The situation in a more stable economic environment may be significantly more positive. One inescapable conclusion emerges from the data and analysis of the report: the State of Indiana is generating extraordinary economic activity from its design of and ongoing investment in the state horse racing and breeding industry.

When viewed from a nation-wide perspective, a racetrack is either expanding or declining, but not standing still. When a racetrack is successful, it can afford to offer larger purses and attract better horses and athletes, drawing in larger incomes from pari-mutuel and off-track wagering, which then affords an opportunity to offer even more attractive purses. When a racetrack is less successful, purses decline and the cycle reverses.

The 2005 American Horse Council study reported a direct economic impact of $181 million and a total economic impact of $294 million for Indiana racing industry. The findings of this study five years later indicate $733 million direct effect with over $1 billion total impact for the racing industry. The 2005 study reports $5 million paid in state and local taxes with the

current study reporting $69 million state and local tax revenue. The industry currently generates direct and related employment of 9,865 jobs.

PROSPECTS FOR FUTURE RESEARCH

There are important refinements that need to be made in the study. The preliminary results are a simple extrapolation from the sample. The large proportion of responses from out of state breeders suggests that a closer look at the proportions of inquiries may lead to a more accurate estimate of the impacts. There is also an opportunity to examine more closely the proportion of expenditures by breeders that occur in Indiana and the proportion of off track and pari-mutuel racetrack revenues are from Indiana and from outside Indiana. An additional opportunity is to explore the impacts on specific industries as well as specific counties where these activities occur.

There are several important aspects of the industry that need to be explored. A significant share of racetrack revenues comes from off track and pari-mutuel sources. A significant investment in the breeding segment of the equine industry is from out-of-state interests. These elements indicate that the equine industry is a significant export industry, generating in-state revenues from out-of-state sources. A second factor is the amount and nature of investment spending as real investments have long-lasting impacts on the economy. A third factor is the impact of a relatively infant industry. Although the race tracks have been in operation for several years, the supporting components of the industry are growing and the IMPLAN multipliers tend to be backward-looking and may not properly assess this significant growth element.

REFERENCES

American Horse Council,(2005) "The Economic Impact of the Horse Industry on the United States", published by Deloitte Consulting.

Hodges, A.W., (2007) "Understanding and Using Economic Multipliers", USDA Economists Group.

Minnesota IMPLAN Group (MIG), www.IMPLAN.com (2010).

Mulkey, D. and A. W.Hodges, (2009) "Using IMPLAN to Assess Local Economic Impacts", Florida Cooperative Extension Services, FE 16.

UNFCCC, United Nations Framework Convention on Climate Change (2010), www.unfccc.int/files/adaptation/methodologies_for/vulnerability_and_adaptation/application/pdf/economic_models_-_input-output_modeling_with_implan_.pdf

ARE MY COLLEAGUES SOFT ON (ACADEMIC) CRIME?

Robert T. Burrus, UNC Wilmington
J. Edward Graham, UNC Wilmington
Mike Walker, UNC Wilmington

ABSTRACT

This paper uses a survey to investigate faculty perceptions about the frequency of student cheating, what kinds of behaviors should be considered cheating, and which remedies might reduce academic dishonesty. The survey queries faculty about their perceptions of the factors that contribute to student cheating. The survey was administered at UNC Wilmington in early 2009 and its results were used to direct the rewriting of the UNCW student academic honor code. Generally, faculty definitions of cheating are broader than student definitions: faculty believe that student cheating is a major problem and faculty are moderately vigilant in detecting cheating (though they perceive their peers to be "soft on crime"). Policy prescriptions for reducing cheating include building a community of academic integrity, creating an honor pledge, and imposing harsher penalties.

INTRODUCTION

Most universities publish a statement addressing academic honesty. Usually, this statement will be a centerpiece of a university honor code; these codes hold that that the pursuit of knowledge requires unwavering honesty among all members of the academic community. The codes typically mention various infractions including plagiarism (word-for-word copying, the mosaic, the paraphrase), cheating on examinations and even various forms of bribery (buying, receiving, or offering some material consideration to obtain a grade).

Honor codes are important in steering students toward a culture of honor in the pursuit of knowledge. Codes at the military academies, Ivy League schools, and such schools as UVA and Washington and Lee frame their entire academic cultures with their honor codes, but such ambitious foundations for academic integrity are the exception. Nonetheless, academic honor codes have garnered interest, and some of this interest likely derives from a perception of an increase in academic dishonesty over the past couple of decades and from a wide range of corporate and public ethical failures. These perceptions, and curiosity about how those perceptions might manifest themselves at a mid-size regional university in the Southeast, encouraged this research. How do faculty perceive the level of academic integrity at the university, and how might those perceptions impact faculty performance, and expectations, in the

classroom? How would those perceptions differ across business schools and "general" colleges of arts and science? Findings will be important to the student, faculty and administrator.

Some background on cheating and stakeholder perceptions of cheating is provided in the next section. The third section describes the survey and data collected for this study. Descriptive statistics are provided. We then conduct a traditional cross-sectional study of our data - employing a standard limited dependant variable PROBIT model - seeking to discover the importance of faculty perceptions of cheating in describing the detection and punishment of academic dishonesty. We report our results, suggest and conduct a series of tests for robustness, and examine the implications of our findings for the various university stakeholders. We conclude the paper with a summary and a set of encouragements for subsequent research.

BACKGROUND

McCabe and Trevino (1997) argue that institutions with formal honor codes that "are widely distributed and understood by members of the academic community" are "an integral part of the campus culture," as with UVA and W and L. The converse might also be implied: if academic honesty is not highlighted early and often for the entering college student, it might not become a part of that student's academic "fabric." Kidwell and Wozniak (2003) surveyed students about cheating at a small liberal arts college and found that over 70 percent of those surveyed reported cheating, plagiarism or other forms of academic dishonesty; many reported multiple violations. Other studies (Baird, 1980; Singhal, 1982; Franklyn-Stokes and Newstead, 1995) confirm the same, with over half of students admitting to cheating and a similar portion of faculty reporting that they have observed cheating in their classroom (Stevens and Stevens, 1987; Stern and Havlicek, 1986). Greene and Saxe (1992) suggest that students acknowledge cheating as typical and see "no harm, no foul."

Other studies consider what, exactly, students consider to be cheating and the factors associated with greater amounts of cheating. While students are conflicted about whether many behaviors constitute cheating, prior research generally indicates that students agree that the most obvious cheating behaviors (such as copying answers off your neighbor's paper during an exam) are, indeed, cheating.

Whitley (1998) and Kerkvliet (1994) find that GPA, inordinate focus on grades as opposed to learning, greater perceived grade pressure, fewer hours spent studying, working more hours outside of class, membership in a fraternity or sorority, and too frequent partying and alcohol consumption all contribute to cheating. As well, lower levels of self reported honesty are correlated with greater likelihoods of academic dishonesty.

Research suggests that students do not cheat because they do not understand the nature of cheating – they cheat perhaps because of their own perception of a low likelihood of being caught, or of only modest consequences if they are. Expulsion from the university, a common penalty for all offenses at the military academies, the Ivys and Washington and Lee, is not

generally enforced at other universities except in the most egregious examples of academic dishonesty. A movement toward certain expulsion would likely reduce the number of reported cheating incidents and reduce actual cheating.

Environmental factors that impact cheating include perceptions that other students are cheating (Bunn et al., 1992; Mixon and Mixon, 1996; Mixon, 1996) and whether or not clear definitions of cheating are given (Franklyn-Stokes and Newstead, 1995; Burrus et al., 2007). McCabe and Trevino (1993) suggest that student honor codes impact cheating behavior, but note this impact may simply reflect widespread beliefs that honor codes reduce overall cheating.

Mentioned above, the certainty and severity of punishment for cheating are also important factors impacting cheating. Hollinger and Lanza-Kaduce (1996) show that increases in the probability of being caught cheating reduces cheating behavior. As well, Mixon (1996) and Burrus et al. (2007) find that the severity of punishment is an important inverse determinant of the likelihood of cheating.

Faculty perceptions of cheating have not been widely examined. Studies by Wright and Kelly (1974), Barnett and Dalton (1981), and Graham et al. (1994) generally find that students and faculty agree about the most severe or obvious forms of cheating (copying from other student's exams, using cheat sheets, and turning in research that is not your own), but disagree concerning which other behaviors are, indeed, cheating (plagiarism and bibliographical misrepresentation, working with other students on homework when it has been expressly forbidden, using an old test to study without the teacher's knowledge, and getting questions or answers about an exam from someone who has already taken it). Interestingly, while students do admit to cheating, Symaco and Marcelo (2003) find that some behaviors are not as prevalent as previously thought. These activities include remembering as many questions as possible to share with their friends after an exam and looking at another's answer sheet during a quiz.

While students and faculty do not necessarily agree on the behaviors that constitute cheating, Ballew and Roig (1992) showed student perceptions of professors' attitudes were similar to the actual attitudes held by the professors. Professors, however, believed that students were more tolerant of cheating than students reported themselves to be. Smith, Nolan and Dai (1998) focused on faculty perception of the determinants of academic dishonesty. They conclude that classroom environment contributes to the extent and degree of cheating, a result that matches student perceptions.

Since individual faculty are rarely in control of student-specific and campus environmental factors that impact cheating behaviors, these factors generally cannot be used to influence academic honesty. As Smith, Nolan and Dai (1998) point out, however, faculty members do make direct contributions to honor code enforcement.

Given that the certainty and severity of punishment impact student cheating behavior, this study examines the factors that impact this "certainty and severity." Faculty involved in the survey are from a regional university where penalties for cheating are primarily determined by the professor (a "private resolution"); honor cases do not go before an official honor board unless

students and faculty cannot agree on whether cheating occurred and/or what the punishment for cheating should be or unless the alleged incident is egregious or pervasive. Faculty are responsible for confronting academic dishonesty and meting out appropriate penalties.

DATA

The data for this study were collected early in 2009 in support of the Honor Code Task Force at the University of North Carolina Wilmington. The task force was charged, late in 2007, with studying the UNCW Honor Code and bringing forth recommendations for its improvement.

The entire faculty (including part-time faculty) were asked to participate in a survey that first collected demographic information and then gathered faculty perceptions about student academic honesty at UNCW. Two hundred thirty-eight responses from over 866 faculty members were obtained. Excluding incomplete surveys, 213 usable observations make up our sample.

Faculty members were asked to provide information on their age, the number of years employed at UNCW, their gender, their academic rank, and their academic unit. Respondents were then queried about how often they observe and suspect academic dishonesty and about the types of behaviors that they consider to constitute academic dishonesty.

Respondents were also asked about their perceptions of the certainty and severity of punishment for cheating. They were asked whether the penalties they administer for academic fraud were severe and whether the penalties that other UNCW professors administer were severe. They were asked whether they were personally vigilant in detecting cheating and whether or not their faculty peers were vigilant. Respondents were then asked how vigilant they were in confronting detected cheaters and whether they believed that other UNCW faculty members were vigilant.

Table 1: Demographic Variables and Perceptions of Cheating

Variable Name	Definition	Average or Proportion
Time	Time at Institution.	7.28
Female	Dummy variable: 1=female; 0=other	0.42
Tenure	Dummy variable: 1=tenured; 0=other	0.50
Business	Dummy variable: 1=professor in business school; 0=other	0.14
Obs	Number of observed episodes of cheating per semester.	1.99
Knowhc	Dummy variable: 1=professor knows honor code very well	0.23
Degreed	Dummy variable: 1=professor believes that honor code violations are a moderate to major problem on the campus	0.66
Cheatwor	Dummy variable: professor believes that cheating behaviors are getting worse	0.30
Discuss	Dummy variable: professor discusses the honor code on the first day of class.	0.78

Table 1 provides professor-reported demographic information and perceptions of the cheating behavior of students in their classes.

The average faculty respondent's time at UNCW is 7.27 years, around 40 percent of the sample respondents were females, nearly 50 percent were tenured, and 14 percent were business faculty. Table 1 indicates that only 23 percent of faculty respondents were "very familiar" with the campus honor code, 66 percent of faculty suppose that honor code violations were a "moderate" to "major" problem, only 30 percent believe that violations were becoming more frequent. Over three quarters of respondents reported a discussion of academic honesty with their students at the beginning of each semester.

Respondents also report two episodes of observed cheating in their courses per semester but suspect around four academic dishonesty offenses where the average course load was approximately three classes per semester. Thirty-one percent of the sample reported seeing three episodes of cheating and 60 percent suspect three or more episodes of academic dishonesty each semester.

Table 2: Behaviors that are Considered Cheating by Faculty

Variable Name	Definition	Proportion
AskH	Asking for help from a classmate on the assigned homework, paper or project	0.05
Backex	Writing formulas or other information on the back of an exam as soon as it is received	0.075
Comhw	Comparing homework answers	0.10
Oldt	Studying from old exams	0.24
Chpaper	Having someone else check over a written paper	0.03
Manip	Visiting a professor to influence a grade	0.24
Study	Studying with another student for and exam	0
Badcite	Using only citations that confirm your point of view	0.08
Text	Text messaging during a lecture	0.37
TotalHarsh	Number of times a faculty member confirmed a minority cheating behavior (less than half of the respondents also consider the behavior as cheating)	1.19 (average)
Excuse	Using a false excuse to get out of taking an exam or turning in an assignment	0.80
Glance	Looking at another student's exam	0.94
Allgla	Allowing a student to look on an exam	0.97
Askth	Asking a student about a take home exam	0.54
Askin	Asking about the content of an exam from a student who has already taken it	0.69
Givein	Giving information about an exam	0.81
Falcites	Adding citations to a bibliography when those cites don't appear in the paper	0.77
Nocites	Failing to properly cite a source	0.87
Cheat	Using a cheat sheet	0.95
Calc	Programming formulas into a calculator	0.88
Attend	Signing an attendance sheet for someone who is not in class	0.96
TotalNorm	Number of times a faculty member confirmed a consensus cheating behavior (more than half of the respondents also consider the behavior as cheating)	9.19 (average)

Survey respondents were also asked about the types of behaviors that they considered to be cheating. Table 2 lists behaviors that might constitute cheating and reports the percentage of

the sample that believed that the behavior represents academic dishonesty. The table is split into two sections; the top section reports the behaviors that are not consensus cheating behaviors while the bottom reports consensus cheating behaviors. As well, the average number of times (out of 9) that the faculty chose a non-consensus cheating behavior as cheating is 1.2. The average number of times (out of 11) that a faculty member chose a consensus behavior as cheating is 9.18.

Table 3 reports faculty perceptions about their own policing of cheating and the policing of cheating of others. As a general rule, faculty members believed that other professors were soft on crime while they were not.

Table 3: Attitudes Toward Severity of Punishment and Certainty of Punishment

Variable Name	Definition	Proportion
Vvconfp	Professor is very vigilant in detecting and confronting cheating	0.45
Mvconfp	Professor is moderately vigilant in detecting and confronting cheating	0.36
Snconfp	Professor is either slightly vigilant or not vigilant in detecting and confronting cheating	0.19
Sevp	Professor inflicts severe punishments for cheating	0.20
Msevp	Professor inflicts moderately severe punishments for cheating	0.54
Mildsevp	Professor inflicts mild punishments for cheating	0.26
Vvconfo	Others are very vigilant in detecting and confronting cheating	0.15
Mvconfo	Others are moderately vigilant in detecting and confronting cheating	0.44
Snconfo	Others are either slightly vigilant or not vigilant in detecting and confronting cheating	0.41
Sevo	Others inflict severe punishments for cheating	0.02
Msevo	Others inflict moderately severe punishments for cheating	0.28
Mildsevo	Others inflict mild punishments for cheating	0.70
Cer	Vvconfp+Mvconfp	0.81
Sev	Sevp + Msevp	0.74
Cero	Vvconfo + Mvconfo	0.61
Sevo	Sevo + Msevo	0.30

MODEL

Examining the factors that influence the certainty and severity of punishment, we estimate the following equation using a probit specification:

$$CER/SEV_i = \beta_0 + \beta_1(TIME_i) + \beta_2(FEMALE_i) + \beta_3(TENURE_i) + \beta_4(BUSINESS_i) + \beta_5(OBS_i) + \beta_6(HARSHIN_i) + \beta_7(KNOWHC_i) + \beta_8(DEGREED_i) + \beta_9(CHEATWOR_i) + \beta_{10}(DISCUSS_i) + \beta_{11}(CERO_i) + \beta_{12}(SEVO_i) + e_i.$$

The model is run twice with the independent variable in the first model being the faculty member's own perceptions of whether they are "moderately" to "very" vigilant in detecting

cheating (as opposed to "slightly" or "not at all vigilant") and, in the second, whether the penalties they assign are "moderate" to "severe" (as opposed to "mild"). Other variables included as independent variables on the right hand side of the model are defined in Tables 1 - 3 save for HARSHIN, which is the ratio of number of harsh definitions of cheating to the number of normal definitions of cheating (see Table 2), CERO, which represents the faculty perceptions of the vigilance of other faculty in confronting cheating, and SEVO, denoting faculty perceptions of the severity of punishment of other faculty (see Table 3).

Ex ante, faculty members that observe more cheating, have increased knowledge of the honor code, believe that cheating is a problem and believe that cheating is getting worse are expected to confront cheating with increased frequency and to be more severe in the punishments meted. Faculty members who believe that behaviors typically not identified with cheating are, indeed, cheating are also expected to be more vigilant at confronting cheating and to have harsher penalties. Hence, we anticipate positive and significant coefficient estimates on OBS, HARSHIN, KNOWCH, DEGREED, and CHEATWOR. We also expect a positive sign on DISCUSS for the severity of punishment model, but not necessarily for the certainty model, as faculty usually spell out how cheaters will be punished on the first day of class but rarely discuss how they will be detected and confronted. We have no priors on TIME, FEMALE, TENURE, and BUSINESS, as no earlier studies have been conducted on these variables as they relate to faculty perceptions of cheating.

Finally, we are conflicted about whether the certainty that other faculty members confront cheating, CERO, and the severity of the punishments that other faculty dish out, SEVO, will have positive or negative impacts on the self-reported vigilance of detection and severity of punishment for the surveyed faculty. On the one hand, faculty might be encouraged to be tougher on crime if they believe their peers are tough on crime, or they may be tougher on crime to compensate for the shortcomings of their peers.

RESULTS

Considering those variables about which no prior expectations were made, female professors perceive themselves as tougher on crime than their male counterparts, as FEMALE is positive and significant in both the certainty and severity models. Tenured faculty persons, on the other hand, believe that they are better at confronting classroom crime than their untenured colleagues, but having tenure doesn't impact self-reported severity of punishment.

Other results are generally consistent with our expectations. Instructors who discuss academic integrity during the first days of class are also more likely to report severity in punishments and vigilance in confronting cheaters. Faculty members who are relatively harsh in their definitions of cheating and those who believe that the degree of campus cheating is high are more likely to report severity in assigning punishments while the probability of reporting

vigilance in confronting cheating is higher for faculty who are relatively familiar with the honor code.

Importantly, faculty members who believe that other faculty are tough on crime report being tougher themselves. This proposition holds except that the perception that others impose tough sentences for cheating does not significantly impact the certainty of confronting cheating. Our results generally show that the decisions to confront cheating and impose severe penalties are not really related, but faculty members are strongly influenced by the behavior of their peers.

Model results are provided in Table 4.

TABLE 4: Probit Results

	Model 1 (Y=CER)		*Model 2 (Y=SEV)*	
Variable	*Coefficient*	*b/St.Er.*	*Coefficient*	*b/St.Er.*
Constant	-0.83	-2.06**	-1.88	-4.49***
TIME	-0.04	-0.98	0.05	1.49
FEMALE	0.55	2.08**	0.46	1.95**
TENURE	0.62	1.90*	-0.15	-0.53
BUSINESS	0.27	0.84	0.22	0.71
OBS	0.03	0.40	-0.02	-0.40
HARSHIN	0.37	0.48	1.36	1.75*
KNOWHC	0.76	2.07**	0.47	1.37
DEGREED	0.20	0.73	0.70	2.74***
CHEATWOR	0.14	0.46	0.12	0.45
DISCUSS	0.48	1.65*	0.84	3.21***
CERO	1.63	5.77***	1.16	3.46***
SEVO	-0.21	-0.71	0.84	3.37***
Log likelihood	-75.012		-84.9804	
Restricted	-104.33		-122.705	
Pseudo R-sq	0.281011		75.44912	

*significant at the 10% level **significant at the 5% level ***significant at the 1% level

CONCLUSION

Most studies on student cheating find that students commit academic infractions if they perceive that other students are cheating. Perceptions matter. Anecdotally, some schools that trumpet their honor codes derive benefits from an extracurricular impression that the schools' students are cut from a different cloth; others might enjoy similar enhancements following a similar path, with overall improvements in the schools' reputations being one of the results.

In this paper, we find that professors are increasingly vigilant in policing student cheating and assigning harsher penalties if they believe that their peers are tough on crime - even though they generally believe that they are harsher on academic crime than their peers. This finding has important policy implications. First, while it is generally noted that honor codes help to create a

culture of academic integrity among students, embracing that culture by faculty may encourage greater vigilance in detecting and punishing cheaters. Second, as the literature shows, the fostering of an academic community in which faculty are engaged in ensuring academic integrity will likely lead to fewer incidences of cheating. Third, the precise manner with which a university, a school of business or an individual faculty member might contribute to this "culture of academic integrity" is not immediately evident, and will invite further research.

REFERENCES

Baird, J. S., Jr. (1980). Current trends in college cheating. *Psychology in the Schools* 17 (4): 515-22.

Barnett, D. C., and J. C. Dalton (1981). Why college students cheat. *Journal of College Student Personnel* 22 (6): 545-51.

Bunn, D. N., S. B. Caudill, and D. M. Gropper (1992). Crime in the classroom: An economic analysis of undergraduate student cheating behavior. *Journal of Economic Education* 23 (Summer): 197-207.

Franklyn-Stokes, A., and S. E. Newstead (1995). Undergraduate cheating: Who does what why? *Studies in Higher Education* 20 (2):159-72.

Graham, M. A., J. Monday, K. O'Brien and S. Steffen (1994). Cheating at small colleges: An examination of student and faculty attitudes and behaviors. *Journal of College Student Development* 35 (4): 255-60.

Greene, A.S. and Saxe, L. (1992). Everybody (else) does it: Academic cheating. Paper presented at the Annual Meeting of the Eastern Psychological Association, Boston, MA.

Hollinger, R. C., and L. Lanza-Kaduce (1996). Academic dishonesty and the perceived effectiveness of countermeasures: An empirical survey of cheating at a major public university. *NASPA Journal* 33 (4): 292-306.

Kerkvliet, J. (1994). Cheating by economics students: A comparison of survey results. *Journal of Economic Education* 27 (2): 121-33.

Kidwell, L., K. Wozniak and J. P. Laurel (2003). Student reports and faculty perceptions of academic dishonesty. *Teaching Business Ethics,* 7(3): 205-214.

McCabe, D. and Trevino, L. (2001). Cheating in academic institutions: A decade of research, *Ethics and Behavior*, 11(3): 219-232.

McCabe, D. L., and L. K. Trevino (1997). Individual and contextual influences on academic dishonesty: A multi-campus investigation. *Research in Higher Education*, 38 (3): 379-96.

McCabe, D. L. and L. K. Trevino (1993). Academic dishonesty: Honor codes and other contextual influences. *Journal of Higher Education*, 64 (5): 522-38.

Mixon, Franklin G., Jr. (1996). Crime in the classroom: An extension. *Journal of Economic Education*, 27 (3): 195-200.

Mixon, F. G., Jr., and D. C. Mixon (1996). The economics of illegitimate activities: Further evidence. *Journal of Socio-Economics*, 25 (3): 373-81.

Nowell, C., and D. Laufer (1997) Undergraduate student cheating in the fields of business and economics. *Journal of Economic Education*, 28 (1): 3-11.

Roig, M. and C. Ballew (1992). Attitudes toward cheating by college students and professors. Paper presented at the Annual Meeting of the Eastern Psychological Association, Boston, MA. 1992.

Singhal, A. C. (1982). Factors in students' dishonesty. *Psychological Reports* 51(December): 775-80.

Smith, J., R. Nolan and Y. Dai (1998). Faculty perception on student academic honesty. *College Student Journal,* 32(3): 305-310.

Stern, E., and L. Havlicek (1986). Academic misconduct: Results of faculty and undergraduate student surveys. *Journal of Allied Health*, 5 (2): 129-42.

Stevens, G., and F. Stevens (1987). Ethical inclinations of tomorrow's managers revisited: How and why students cheat. *Journal of Education for Business*, 63 (1): 24-29.

Symaco, L. and E. Marcelo (2003) Faculty perception on student academic honesty. *College Student Journal*, 37(3): 24-29.

Whitley, B. E., Jr. 1998. Factors associated with cheating among college students: A review. *Research in Higher Education*, 39 (3), 235-74.

Wright, J. C., and Richard Kelly. 1974. Cheating: Student/faculty views and responsibilities. *Improving College and University Teaching*, 22 (1): 31.

THE CONTINUING ROLE OF SWITZERLAND AND THE SWISS FRANC IN INTERNATIONAL FINANCE

Sebastien Groux, Sam Houston State University
Kurt Jesswein, Sam Houston State University

ABSTRACT

Switzerland has had a long and unique role in international business and finance. Investors have historically been drawn towards Switzerland because of their trust in the stability of the Swiss currency. The Swiss economy attracts many international corporations because of its competitiveness on the tax front and its facilitated access to other European countries. This concentration of multinationals in Switzerland has a direct impact on the utilization of the Swiss franc in international finance. Furthermore, individual investors around the world are drawn to invest in Swiss banks, due in large part to the bank secrecy guaranteed in the Swiss Constitution along with special tax advantages offered in several Swiss cantons. The strong infrastructure that supports the Swiss banking system also adds to the attractiveness of Swiss franc investments.

However, the recent financial crisis may have a damaging impact on the reputation of the Swiss banking system. Increased scrutiny is being directed once again at the "Gnomes of Zurich". In addition, Switzerland's geographic and economic position within the heart of Europe has fostered speculation on Switzerland possibly joining the European Union. This article examines the past and present role that Switzerland and the Swiss franc have played in the high stakes world of global finance and postulates what its future involvement might be.

INTRODUCTION

Given the growth in globalization over the past few decades, international trade has become increasingly important. The use of foreign currencies is an unavoidable consequence of engaging in international trade in the highly-globalized and integrated world economy. For most of the twentieth century and beyond, the U.S. dollar has been THE leading international currency, both in terms of its role as the leading foreign reserve currency and its presence in international transactions.

Other currencies, most notably the British pound, Japanese yen, Deutsch (German) mark, and Swiss franc have also played significant roles in the global economy. Since 1999 the Euro has operated as the common currency within the European Monetary Union, thereby replacing the Deutschmark and other European currencies. (Seventeen nations have so far adopted the Euro: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, The Netherlands, Portugal, Slovakia, Slovenia, and Spain, while ten other

members of the European Union – Bulgaria, Czech Republic, Denmark, Latvia, Lithuania, Hungary, Poland, Romania, Sweden and the United Kingdom – have chosen not to adopt it).

The Euro has consequently become the second most important currency in international trade and finance behind the U.S. dollar. Given its geographical proximity to various members of the European Union (EU) and economic ties to its neighbors, increased scrutiny has been directed at the likelihood of Switzerland joining the EU, as well as the possible future of the Swiss franc, vis-à-vis, the Euro. Switzerland has also come under a lot of political pressure with respect to its bank secrecy regulations. Such political affairs could have an impact on Switzerland's status as a leading economic power and concomitantly the use of the Swiss franc in global finance.

What follows is an examination of the Swiss economic system and the Swiss franc. Because the present situation cannot be understood without reviewing the past, we begin by offering an historic view of the Swiss economy, looking at major events that impacted the role of the Swiss economy and the Swiss franc. This includes an examination of factors that have led the Swiss economy, and more specifically, Swiss banking and the Swiss franc, becoming so dominant in world affairs. The conclusion will focus on what can be expected with respect to the future position of Switzerland and the Swiss franc in global finance.

SWITZERLAND AND THE SWISS FRANC

It is commonly acknowledged that "modern" Switzerland began in the 1840s with the acceptance and implementation of a new constitution. This constitution gave the country a more centralized administration, transforming the formerly independent canton regions into a single economic area. Important aspects of the constitution included the creation of a strong, unified banking system and the adoption of a common currency, the Swiss franc, for all of the Swiss cantons. The economy encountered some early difficulties, but overall Switzerland has flourished under the new constitution.

It did suffer through some unflattering times during and between the two World Wars. Switzerland did not take an active part in either of the wars, but some argue that Germany could have invaded Switzerland relatively easily and did not invade because it proved to be very useful as an independent state. For example, the Swiss National Bank bought gold from the German Reichsbank, with Germany then using the Swiss francs received in return as payment to buy raw materials from other countries that would not accept its gold. Swiss banks were also very heavily involved in providing financing to various German enterprises, as documented in the Bergier Report (Independent Commission of Experts Switzerland).

After the Second World War, the Swiss remained neutral but began to join international bodies such as the European Free Trade Association and the Council of Europe. Indeed, with Switzerland having limited natural resources and being landlocked, it depended heavily on foreign trade. However, Switzerland stayed out of the European Union to maintain its

independence and strived to facilitate trade with its international partners. The Swiss government continues to maintain that its interests can be guaranteed without joining the European Union due to the various bilateral agreements it has with its neighbors, along with the benefits of operating under the Free Trade Agreement of 1972 (State Secretariat for Economic Affairs).

THE SWISS FRANC: TRADING, RESERVE, OR INVESTMENT CURRENCY?

The Swiss franc (internationally recognized as the CHF, from the Latin *Confoederatio Helvetica franc*) has been and continues to be a major international currency. But to what does the term "major international currency" refer? Indeed, one can look at currencies from at least three perspectives. First, one can examine the volume with which individual currencies are traded in the global markets. Only seven currencies, the U.S. dollar, Euro, Japanese yen, British pound, Australian dollar, Swiss franc, and Canadian dollar, make up the bulk (87.6 percent) of foreign exchange trading worldwide. The list is dominated by the U.S. dollar and the Euro, which make up approximately sixty percent of all foreign exchange trading. Currently the Swiss franc is currently the sixth most highly traded currency in the world, accounting for around 6.4 percent of daily transactions (Bank for International Settlements).

Second, one can look at the amount of currency held as bank reserves by foreign banks. For this perspective the Swiss franc is clearly not among the most widely held foreign reserve currencies. According to current statistics the Swiss franc comprises less than 0.1 percent of the total official foreign exchange reserves (International Monetary Fund). *Nonetheless*, given its historical importance, it is interesting to note that despite its relative lack of use, the IMF continues to list the Swiss franc within its statistical summary of international reserve currencies.

And third, one can focus on the amount of money invested in accounts labeled in a specific currency such as the size and scope of investments made by non-Swiss entities in Swiss securities accounts. It probably goes without saying that Switzerland is best known as a haven for foreign investment. However, investing in a country does not always mean investing in that country's currency so one usually refers to "assets under management" when examining the issue of investments managed within specific countries. The total volume of cross-border private banking at the end of 2009 was $7,400 billion with Switzerland being the global leader with approximately $2,000 billion under management, or 27 percent of the market. In comparison, the rapidly growing financial centers of Singapore and Hong Kong have only a 9% share ($700 billion) between them (Swiss Bankers Association). Although not all of the assets managed by Swiss banks are held in Swiss francs, the existence of vast holdings within the Swiss banking market indicates the important role that Switzerland maintains in global finance.

THE CONTINUING IMPORTANCE OF SWITZERLAND AND THE SWISS FRANC

The importance of Switzerland and the Swiss franc can be attributed to various factors. First and foremost, Switzerland offers a strong and stable economy. The Swiss have managed to foster steady economic growth while consistently maintaining low rates of inflation. Indeed, the stable Swiss economy is a key factor explaining why investors look to invest in Swiss francs. Even with the introduction of the Euro, the Swiss franc has lost little of its influence, thanks largely to its approach to monetary policy (Fischer). Furthermore, it has been noted that the volatility of the Swiss franc remains little changed since the introduction of the Euro, and in fact, the Euro appears to have had a stabilizing effect on the Swiss franc (Reynard).

A second factor helping the Swiss franc maintain its importance is the presence of many large and globally-diversified companies domiciled in Switzerland. Looking at the number of corporations headquartered in Switzerland and knowing that one-third of Swiss GDP comes from the activities of multinational corporations, one can see why Switzerland and the Swiss franc continue to play major roles in the global economy (Swiss American Chamber of Commerce).

The important role that commerce plays can be explained from several perspectives. First, Switzerland's business-friendly legal and fiscal environment is commonly cited by many international firms as factors in moving their world or regional headquarters to Switzerland. The Swiss-American Chamber of Commerce reports that remaining competitive on the tax front is among the key steps necessary to ensure that multinationals move to and then stay in Switzerland. Second, the stability of the Swiss economy and of the Swiss franc is attractive to multinational corporations looking at investment locations. Third, Switzerland has geographical benefits as it is centrally situated within the European Union area and has easy access to the major European markets. Furthermore, the Swiss proclivity toward maintaining high standards results in it being a very good test market for businesses hoping to introduce products in Europe (Parsons). Using Switzerland as a base for operations often leads companies to rely on the Swiss franc as a trading currency. This use of the Swiss franc is bolstered by Swiss accounting standards that are specially adapted to facilitate the currency translation process.

Switzerland is well known as a location that attracts wealthy investors from around the world. This can be explained by various aspects of the Swiss constitution that appeal to rich investors (Federal Department of Finance). For example, bank secrecy is a policy under which the identity and amount of money invested by people in Swiss financial institutions are kept private. Likewise, there are specific Swiss cantons that are known to target wealthy investors. These cantons offer tax breaks specifically designed to benefit the wealthiest from around the world (Kirchgassner). The number of wealthy individuals who have emigrated to Switzerland over the years is a testament to their success.

Furthermore, Switzerland has a state-of-the art banking infrastructure. It is likely that Swiss banking know-how, together with its technological expertise, are leading criteria for global investors looking to transfer money. Investors trust the Swiss banking system as one of the safest

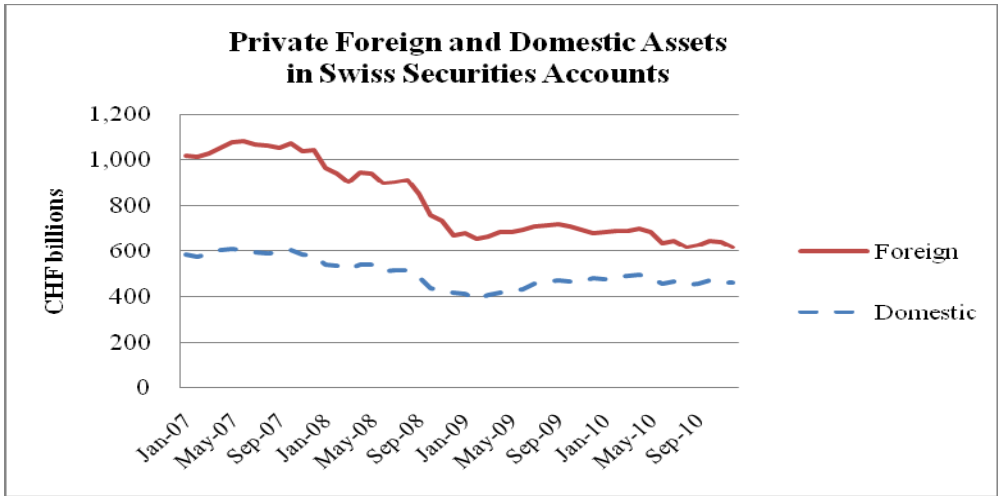
places to invest money. It is impossible to know to what extent the quality of the Swiss bank infrastructure accounts for Switzerland's success in banking. But Switzerland has always been known for its use of the most modern facilities and technologies and has always been able to anticipate market demands in terms of financial products and technologies.

The stature of private banking within the Swiss economy has been well summarized in comments attributed to Swiss private banker Hans J. Baer who declared that private banking is the full range of services that a client may wish to obtain and this therefore extends way beyond wealth management. Swiss private banking starts at the three international airports at Zurich, Geneva and Basel and continues via the railway stations and luxury hotels of our country right up to the doors of Sprüngli's cake shop. Swiss private banking encompasses our hospitals, cultural institutions, media, lawyers, shops, schools, universities and, of course, our banks and asset managers (Geiger & Hürzeler).

FUTURE ROLE OF SWITZERLAND AND THE SWISS FRANC

What will become of Switzerland and the Swiss franc? This is a complex issue that can be examined from many perspectives. We have noted that Switzerland offers a complex mix of factors than explain why investors have historically looked there for investment purposes. However, in the near term, the current financial crisis has likely had and will likely continue to have a negative impact on the Swiss banking system. This may reduce the prominence of Switzerland and the Swiss franc in the global marketplace. We find that since 2007 there has been a significant outflow of funds from Switzerland. As seen in Exhibit 1, foreign investments in Swiss securities accounts have declined by almost 40 percent since the peak in 2007 (a loss of some $460 billion) while domestic investments are down only around 25 percent (a loss of $145 billion).

Exhibit 1



Source: Swiss National Bank, Monthly Statistical Bulletin February 2011

Similarly, Swiss economic policies have come under fire, most notably from the U.S. but also from some of its European neighbors. The main target has been UBS (the Union Bank of Switzerland), probably the largest manager of private wealth assets in the world. For example, the U.S. Treasury department has recently negotiated the transfer of names of many American customers who allegedly had illegal investments in UBS bank accounts. The crucial importance of bank secrecy is therefore being pierced with unknown consequences for the future role of Swiss banks managing the financial affairs of foreign investors.

The long-term fortunes of Switzerland likely revolve around whether or not Switzerland would be willing to join the European Union and the ability of the Swiss franc to remain independent of the Euro. We have shown that Switzerland offers unique advantages in promoting itself as a financial center, advantages that can only be maintained if it remains neutral and stays outside of the EU. Indeed, joining the EU would force the Swiss to abide by its requirements. Even if, as with the British, Switzerland joined the EU without joining the currency union, a variety of costly adjustments might endanger the role Switzerland plays as a leading economy and the role of the Swiss franc as a major international currency.

But what is the likelihood of Switzerland to join the Euro? Joining the euro would likely benefit the Swiss economy in two key areas: lower transactions costs from not having to exchange currencies and less uncertainty in valuing transactions, as the majority of business activities would be denominated in Euros. However, adopting the Euro would cause Switzerland to lose a significant amount of seigniorage that it currently exploits due to some of the boutique value placed on Swiss francs. Investors may not be as willing to look at Switzerland if some of the unique benefits of the Swiss franc and Swiss banking system are negated by a move to the Euro.

SUMMARY AND CONCLUSION

This paper highlights the importance of Switzerland in international trade and finance. The Swiss franc is among the most widely traded currencies and has a very distinct role in international money management. Four explanations for the level of importance placed on Switzerland were given. First, investors trust the stability of the Swiss economy and the Swiss franc. Second, Switzerland attracts many multinationals due to its competitiveness on the tax front and its facilitated access to nearby European countries, which has an impact on the commercial utilization of the Swiss franc. Third, wealthy individuals look at Swiss banks because of their famous bank secrecy laws as well as the special tax benefits offered by specific cantons. Fourth, the quality of the Swiss banking infrastructure has a positive impact on the overall level of trust in the banking system.

The continued role of Switzerland and the Swiss franc has been questioned due to the current financial crisis that has damaged some of the reputation of the Swiss banking system. Even as the Swiss franc continues to be heavily traded in the global foreign exchange markets,

we observe massive capital outflows from Switzerland, particularly from foreign private investors. Although still viewed as one of the safest financial markets in the world, it does not exist in isolation and is not sheltered from global contagions, which may have caused Switzerland to lose some of its stellar reputation. It is difficult to say if this drop in confidence in the Swiss financial markets will last long term, but if it would, the survival of Switzerland as a major, independent player in the global financial markets will be in jeopardy.

If this happens, Switzerland might need to consider joining the EU. If it would join, even without adopting the Euro as its currency, Switzerland will likely suffer from losing some of its comparative advantages in making itself relevant in the global marketplace. The Swiss banking system and the Swiss franc might therefore become nothing more than components necessary for maintaining well-diversified international portfolios rather than as significant players attractive to corporate and private investors alike.

The Swiss banking market is fully aware of the challenges it faces. In a recent study, Swiss bankers overwhelmingly acknowledged the need to become more tax and regulatory transparent (KPMG). While some resent the imposition of outside regulatory pressures that can put pressures on their profitability, the majority appear to be willing to let their historical competitiveness in providing financial solutions to global customers adjust to the new realities; they look forward to adapting their business strategies to thrive in the new global financial marketplace.

REFERENCES

Bank for International Settlements. (2010). *Triennial central bank survey*. Retrieved February 2, 2011 from www.bis.org/publ/rpfxf10t.pdf.

Federal Department of Finance (n.d.). *Protection of privacy in financial matter*. Retrieved May 12, 2011 from www.efd.admin.ch/dokumentation/zahlen/00579/00607/00621/index.html?lang=en.

Fischer, A.M. (2002). Fluctuations in the Swiss franc: what has changed since the euro's introduction? *Journal of Public Policy*, 22:2, 143-159.

Geiger, H. & H. Hürzeler. (2003). The transformation of the Swiss private banking market. *Journal of Financial Transformation* 9, 93-103. Retrieved May 5, 2011 at www.capco.com/capco-institute/capco-journal/journal-9.

Independent Commission of Experts Switzerland. (2002). *Switzerland, national socialism and the second world war*. Retrieved May 3, 2011 from www.uek.ch/en/schlussbericht/synthesis/ueke.pdf.

International Monetary Fund. (2010). Currency composition of official foreign exchange reserves (COFER). Retrieved February 1, 2011 from www.imf.org/external/np/sta/cofer/eng/cofer.pdf.

Kirchgassner, G. (2009). The reform of fiscal equalization (NFA) in Switzerland. Swiss Institute for International Economics and Applied Economic Research. Retrieved May 4, 2011 from www.forumfed.org/en/pubs/2009-10-26-kirchgaessner.pdf.

KPMG. (2010). Defining the future of Swiss private banking. Retrieved May 2, 2011 at www.kpmg.com/CH/en/Library/Articles-Publications/Documents/Sectors/pub_20101110_Defining-the-Future-of-Swiss-Private-Banking_EN.pdf.

Parsons, K. (2003). Switzerland: a commercial crossroads of Europe. Retrieved May 2, 2011 from www.trade.gov/exportamerica/MarketBrief/mb_swiss_0403.html.

Reynard, S. (2008). What drives the Swiss franc? Working Paper 2008-14, Swiss National Bank. Retrieved May 1, 2011 from www.snb.ch/n/mmr/reference/working_paper_2008_14/source.

State Secretariat for Economic Affairs. (n.d.). European policy of Switzerland. Retrieved May 2, 2011 from www.seco.admin.ch/themen/00513/00538/index.html?lang=en.

Swiss American Chamber of Commerce & Boston Consulting Group. (2007). Multinational companies on the move: how Switzerland will win the battle. Retrieved May 4, 2011 from www.amcham.ch/publications/downloads/2007/amchambook07_e.pdf.

Swiss Bankers Association. (2011). Wealth management in Switzerland: Retrieved May 2, 2011 from www.swissbanking.org/en/20110107-bro- vermoegensverwaltungsgeschaeft_de-rva.pdf.

Swiss National Bank. (2011). Monthly statistical bulletin February 2011. Retrieved February 18, 2011 from www.snb.ch/en/iabout/stat/statpub/statmon/stats/statmon.

FISCAL POLICY OF SRI LANKA, PAST AND FUTURE

Ihtsham ul Haq Padda, Federal Urdu University of Arts, Science, and Technology, Islamabad

ABSTRACT

The internal conflict of Sri Lanka has seriously affected its fiscal stance and put it at the door of the bankruptcy through high fiscal deficits and sky rocketing public debt. The end of thirty years internal conflict in May, 2009 is a major turning point. The growth performance of Sri Lanka can boost up by gaining the confidence of investors and taking control over Northern Province. This study analyzes whether it has tried to minimize the welfare cost of revenue collection. It finds that, in spite of financing expenditure of internal conflicts, has been conducted in accordance to tax smoothing policy but not perfectly. Now, when the conflict is over reduction in the deficit can be attained if Sri Lanka finances its permanent expenditure by increasing the tax rate; and if there are transitory shocks to the expenditures or output these should be financed through creating public debt but this debt should be contingent. The rehabilitation in the internal conflict affected areas requires building infrastructure in those areas. So that conflict affected people should also get fruits of the development and come in the main stream and not indulge in anti state activities. For this purpose one of the options would be reduction in the defense expenditure which can be used for development.

INTRODUCTION

The government resources in Sri Lanka, like other developing countries, are sadly insufficient with persistent budget deficit to achieve socially desirable fiscal objectives. The internal conflict was the major reason of the high deficit. However, now the deficit can be corrected through fiscal adjustments and regulations in the shape of government spending cuts and/or tax increases. Another problem is the decision of sharing out the burden of fiscal adjustment between expenditure and tax revenue generation and the creation of public debt. This necessitates an assessment of the initial level of taxes and spending to decide whether to adjust them at the desired level is politically and economically realistic. Tax increases may be less problematic as compared to reducing expenditure if the current level of tax revenue is comparatively low based. However, considerations in the former case of the tax smoothing hypothesis acquires vital role. (Barro, 1979)

According to the Ricardian Equivalence Theorem, for a given amount of public expenditure, if taxes are lump-sum then the shifts between taxes and public debt to balance the budget would have no significant effect on real variables. Within the Ricardian framework,

approximation of non-lump-sum taxes is also economically valid. However, there is an important second order effect of the excess burden (welfare costs) of taxation over time. Non-lump-sum taxes (like sales tax, excise duties) distort economic incentives and impose what Musgrave (1958) called excess burden on the economy by changing the pattern of economic behavior. The changes in behavior caused by taxes create motivation for taxpayers to move out of taxed activities towards activities that are not being taxed, or are taxed at lower marginal rates. If the taxed activities are valued ones, the substitution effect reduces economic welfare. Because doing without taxes is entirely unfeasible, the dilemma for policy makers is how to finance indispensable government expenditure while keeping welfare cost of additional taxation comparatively low.

And yet the society would benefit if taxes are imposed in a way that minimize the welfare cost of taxation. As most of the time, the tax rate is increased to finance the increments in public expenditure, the changes in marginal rate of taxation consistent with the changes in public expenditure would have distortionary effects and increase the welfare cost of taxation. One way to minimize the welfare cost of taxation is to finance the fiscal imbalances by issuing bonds as an alternative to non-lump-sum taxes. That has the advantage of spreading the burden of these taxes over time. Several previous studies, particularly by Barro (1979, 1981), Sahasakul (1986) and others have analyzed the positive theory of optimal taxation over time.

This study recounts the recent literature in the area with a view to identifying the main line of research followed in this study. The focus is on to explore whether fiscal policies followed by Sri Lanka are consistent with the tax smoothing hypothesis (TSH) or not.

REVIEW OF LITERATURE

Barro (1979) originally used the tax smoothing hypothesis to determine the optimal level of debt. With regard to the level of debt, the argument is that if government spending requirements fluctuate over time, the government should keep tax rates almost invariable and let the level of debt fluctuate to absorb the fiscal impact of economic fluctuations. Regarding debt structure, the argument is that a government minimizing the welfare cost of fiscal policy should manage its debt with the intention of diminishing the risk caused by fluctuations in tax rate and change tax rate later on in response to economic state of affairs. Initially, Barro (1981) proposed the random walk test of tax rate series to check the presence of tax smoothing behavior. The random walk theory predicts that tax rate changes have the same distribution and are independent of each other, so the past movement or trend of tax rate cannot be used to predict its future movement. The unit test is conducted to see whether the changes in tax rate are predictable or not. There are many studies which focused only on the random walk test; however, the presence of tax smoothing behavior has been tested by Serletis and Schorn (1999), Cashin, Olekalns, and Sahay (1998), Cashin, Haque, and Olekalns (2003), Strazicich (2002), Adler (2006) etc. by applying the vector autoregressive approach (VAR) between tax rate and budget surplus of

Huang and Lin (1993) and Ghosh (1995). The VAR approach was considered an improvement on early tests of random walk which was considered sufficient for testing tax smoothing behavior. On the other hand, the VAR approach focused on the optimal path of budget surplus.

There are many reasons to proceed beyond the random walk test (Campbell, 1987). First of all, the random walk of the tax rate can also be caused by the behavior of the politicians, unrelated to the tax smoothing behavior. Secondly, it is difficult to assess the economic significance of statistical rejection of random walk. Thirdly, there are useful time-series proprieties that are not explored when focusing exclusively only on random walk test. In view of these reasons Campbell (1987), Campbell and Shiller (1987) and Bohn (1991) provided base for Huang and Lin (1993) and Ghosh (1995) to build a new test for testing the behavior of tax smoothing. In accordance with the VAR approach, the predicted time path of the budget surplus/deficit for a government is calculated. Afterwards the predicted budget surplus/deficit time series is compared to the actual budget surplus/deficit time series in order to visually assess the fit and the economic significance of the model. If the model is true then the two series should be identical. The theoretical properties of the tax smoothing hypothesis translate into cross-equation restrictions on the VAR. In this fashion, the standard statistical procedure can be applied as VAR to evaluate the tax smoothing hypothesis.

The model developed by Haung and Lin (1993) and Ghosh (1995) and used in most of the tax smoothing studies is essentially an indirect method of testing the tax smoothing hypothesis because it focuses on the budget surplus due to the difficulty of measuring the permanent government expenditures. However, Sahasakul (1986) uses the direct approach for testing the behavior of tax smoothing. He focuses on the behavior of tax rate and the government permanent expenditure rate. In this contrast, he considers non-defense expenditures as permanent expenditure. Later on, Abeysinghe and Jayawickrama (2006) conclude that long run relationship between permanent expenditure rate and tax rate is an economically plausible indication of tax smoothing behavior by the government.

There is a limited literature on examining the presence of tax smoothing behavior in developing countries. Cashin, Olekalns, and Sahay (1998), Cashin, Haque and Olekalns (1999), Rocha (2001), Cashin, Haque and Olekalns (2003) have analyzed data for India, Pakistan, Sri Lanka and Brazil for this purpose. All these studies have used the Ghosh (1995) approach to test the tax smoothing hypothesis for these countries. The findings are mixed e.g. the Inter-temporal tax smoothing model is successful in describing the fiscal behavior of India and Pakistan but not that of Sri Lanka and Brazil. Whereas, Padda (2009) used the approach of Sahasakul (1986) and Abeysinghe & Jayawickrama (2006) who findings are in the line of previous studies for India and Pakistan but not for Sri Lanka.

PUBLIC FINANCES OF SRI LANKA

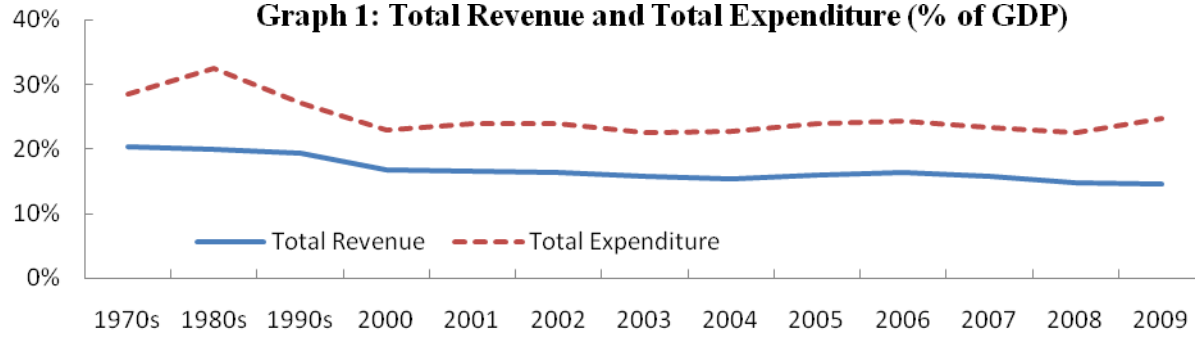
With an economy of US$43.323 billion in 2010, Sri Lanka is an important economy in the South-Asian region. It has been deregulating, privatizing, and opening the economy to international competition since 1977. Thirty years of internal conflict has seriously affected its spending and taxation decisions, especially the late 1980s. Economic growth has been uneven in the ensuing years as the economy faced a large number of global and domestic economic and political challenges. In 2001 to 2004, Sri Lanka faced bankruptcy with debt reaching more than 100% of GDP while it has declined to 82.9% of GDP in 2009. In 2002, the economy commenced a gradual recovery. The government has, however, been able to exert a modicum of fiscal control, and inflation trended down. However, the resumption of the internal conflict in 2005 had led to a steep increase defense expenditures. Fiscal robustness is an important pre-condition for achieving overall macroeconomic stability and economic growth. Sri Lanka have run large fiscal deficits and have faced adverse consequences in 1980s and 1990s on economic growth, partly because not much prudence has been shown in using public expenditure to accelerate economic growth. Higher fiscal deficit have also led to a sharp deterioration of almost all macro indicators like interest rate, GDP growth, current account deficit, public debt, etc. Fiscal deficit remained high because of the government's inability to mobilize additional resources and/or to curtail current expenditures. The deficit was more than 10% of GDP in 2001 and 2009.

The graph 1 shows that total revenue-to-GDP ratio of Sri Lanka was more than 20% per annum on average in the decade 1970s with declining trend it was 20% in 1980s and 19.34% during 1990s. Thereafter, it had sharp declining trend and was 14.6 % in 2009. The total expenditure-to-GDP ratio was 28.3% per annum on average in the decade of 1970s, 32.5% in 1980s and 27% in 1990s after that it has decreasing trend and in 2009 it is at 24.7% in 2007. The large and persistent fiscal deficits engendered considerable concerns about sustainability of the economic growth. There has been a consensus that the large and persistent deficit reduces economic growth (Romer, 2001). So it is the most alarming situation because the budget deficit of Sri Lanka never came below 6.7% of GDP, in spite of, having reasonable tax-to-GDP ratio. To meet such a situation Fiscal Management (responsibility) Act 2003 in Sri Lanka has aimed at ensuring that government’s financial strategy must based on principles of responsible fiscal management and facilitating public scrutiny of fiscal policy performance but the ground realities do not seem to ensure it.

In 2006 in Sri Lanka, public debt stood at 93% of the GDP which was 101% in 2001. The share of external debt is the major part of public debt. Like total public debt external debt has also decreasing trend as percentage of GDP. Its share decreased from 74 % of GDP in 1990 to 43 % in 2006. Its external debt-to-GDP ratio has a gradual declining trend is observed from a peak level of 62% in 1989 to 38% at end of 2007. However, the country’s total external debt-to-GDP ratio is still above the internationally accepted comfortable level. Development expenditures remained around 6% of GDP. It is dire need to increase development expenditure especially

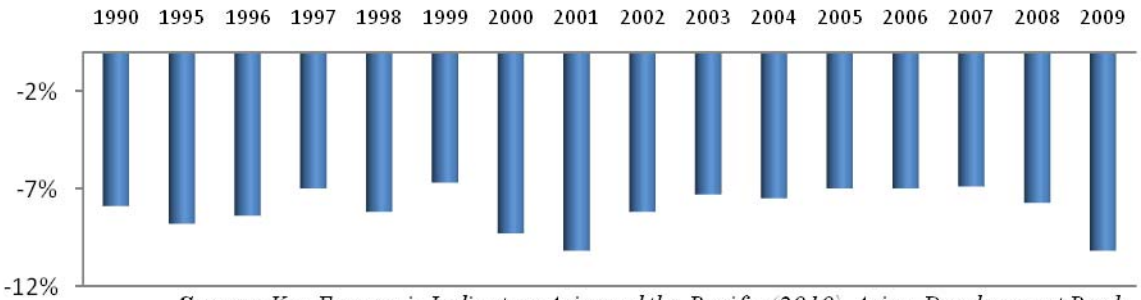
when internal conflict has ended. It would make incremental changes by building roads, highways, buildings, schools, and hospitals etc. especially in conflict affected areas of the Northern Province. Upsurge in the development spending would be a positive sign for infrastructure development and augmenting growth momentum.

Graph 1: Total Revenue and Total Expenditure (% of GDP)



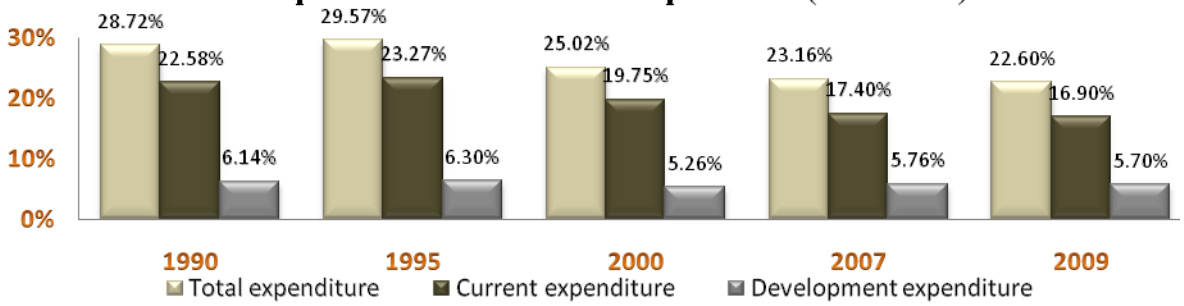
Source: *Key Indicators for Asia and the Pacific (2010) and World Development Indicators (2008)*

Graph 2: Fiscal Deficit (% of GDP)



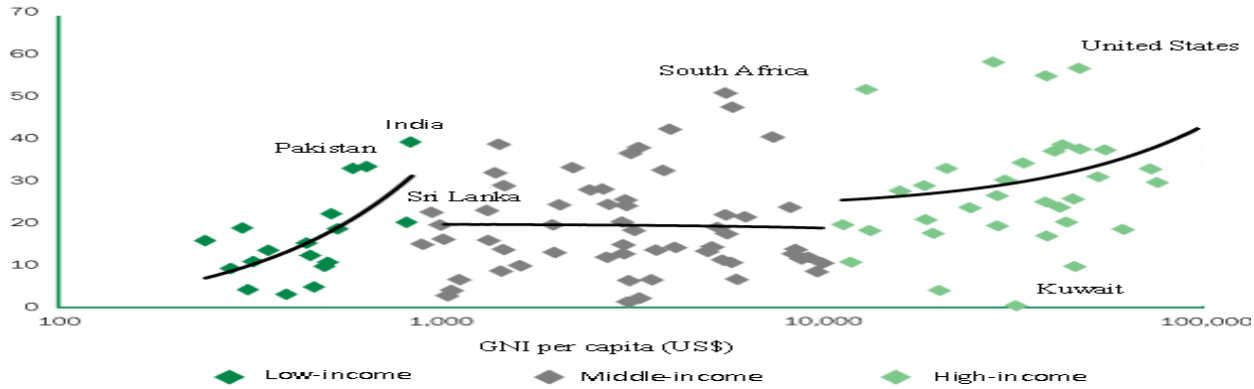
Source: *Key Economic Indicators Asia and the Pacific (2010), Asian Development Bank.*

Graph: 3 Structure of Total Expenditure (% of GDP)



Source: *Sources: Central Bank of Sri Lanka, Annual Reports.*

Graph: 4 Direct Taxes as a Share of Central Revenue in Sri Lanka and other Countries (2006)



Source: World Development Indicators (2008)

Sri Lanka continues to rely heavily on indirect taxes. In developed countries the share of direct taxes are much higher than indirect taxes. Graph 4 shows different patterns of tax structure in low-income, middle-income and high income countries. The reality is that high-income countries tend to tax income and property, whereas low-income countries tend to rely on indirect taxes on international trade and goods and services. The situation of Sri Lanka is alarming in this regard because, on one hand, it has high tax-to-GDP ratio, and yet it has highest share of indirect taxes in the tax revenue. Therefore, Sri Lanka needs to reform its fiscal policy so that the burden of taxation from the poor for equity and social justice is significantly reduced.

MODEL SPECIFICATION

This section sketches a model that outlines an optimal fiscal policy ---one that achieves a balance between additional taxation, and borrowing with a view to meeting its development requirements. The TSH assumes that the individuals' efforts to reduce their average tax burden impose social welfare costs on the society and that these costs would increase if not minimized by a policy of tax rate smoothing. The representative agent and the government share a common time horizon, and the agent's utility function remains unaltered by the provision of public goods. The government expenditures are exogenously given and distortion in taxes involves a social welfare loss such. The models of Bohn (1990), Ghosh (1995) and Abeysinghe & Jayawickrama (2006) assume that distortionary costs are approximately proportional to the square of the revenue raised. So the welfare cost of taxation per unit of output is defined as,

$$z(\tau_t) = \frac{\tau_t^2}{2} \qquad (1)$$

Where τ is the tax rate, the quadratic deadweight loss function assures that $z'(\tau_t) > 0$ and $z''(\tau_t) > 0$. In a stochastic environment, the deadweight loss is determined by the

expectations of future tax rates. Since a single tax rate is assumed for the whole economy, so the total dead-weight loss of the whole economy is obtained by multiplying (1) by income Y_t.

The government typically wants to minimize the present value of distortions of raising revenue subject to the constraint that the present value of its revenues be not less than some specific level. Because of increasing marginal distortionary costs of raising revenue through raising taxes, the government will choose a smooth path for taxes. The government's objective function is given as,

$$V = Min\frac{1}{2}\sum_{i=0}^{\infty}\rho^i E_t(\tau_{t+i}^2)Y_{t+i} \quad (2)$$

E_t represents expectations at time t. The dynamic budget constraint faced by government is as follows;

$$D_t = (1+r)D_{t-1} + G_t - T_t \quad (3)$$

Where "*r*", the real interest rate related to "ρ" discount rate as $\rho = \frac{1}{1+r}$, D_t is government debt, G_t is government non-interest expenditure and T_t is tax revenue.

When expectations and no-ponzi game condition which rules out unlimited lending or borrowing by the government are imposed then equation (3) gives

$$\sum_{i=0}^{\infty}\rho^i E_t(G_{t+i}) + D_{t-1} = \sum_{i=0}^{\infty}\rho^i E_t(T_{t+i}) \quad (4)$$

Dividing (2) and (4) by Y_{t+i} and solving the constrained optimization problem gives;

$$E_t\tau_{t+i} = \tau_t \quad for\ all\ t = 1, 2, 3, \ldots \quad (5)$$

This gives the time path of taxes that minimizes the present value of the welfare costs subject to the requirement that it satisfies the overall budget constraint. It states that changes in tax rate cannot be predicted. That is, tax rate follows a martingale (a martingale is a stochastic process (i.e., a sequence of random variables) such that the conditional expected value of an observation at some time is equal to the observation at that earlier time). It is the basic implication of TSH that its presence can be considered a necessary condition to analyze the presence of tax smoothing. To obtain a sufficient condition Gosh (1995) extends the model by putting expression (5) into (4) to obtain an optimal tax rate.

$$\tau_t = \left(\frac{1-\psi}{\psi}\right)d_t + \left(\frac{1-\psi}{\psi}\right)\sum_{i=0}^{\infty}\psi^i E_t g_{t+i} \quad (6)$$

Where $\psi = \left(\frac{(1+n)}{(1+r)}\right)$, and n represent long-run output growth rate and d_t, g_t and τ_t are debt, expenditure and tax rates respectively and, assuming $\psi < 1$. (i.e. $n < r$ which assures dynamic efficiency of an economy).

According to (6) the only martingale that satisfies the TSH is that which sets the tax rate exactly equal to the annuity value of the sum of government debt and the present discounted value of expected government expenditure. Its right hand side represents the constant flow of expenditure that is expected to sustain the remaining government's time horizon. It is made up of

all the long-run components of permanent government expenditure rate and is symbolized by g_t^p. So (6) becomes

$$\tau_t = g_t^p \quad (7)$$

Plugging (7) into (5) we get,

$$E_t(\tau_{t+1}) = g_t^p \quad (8)$$

It states that for perfect tax smoothing only permanent government expenditure should prompt additional taxes but in the reverse case there is no tax smoothing. If only changes in tax rate cause permanent expenditure then there would be no tax smoothing. Conversely there may be two additional situations: one, if both cause each other; and, second, when none of the two causes each other. In former situation, there is weak tax smoothing and in the latter it does not exist. However, if any other exogenous variable with permanent expenditure also has a significant effect on taxes then there will be a weak tax smoothing.

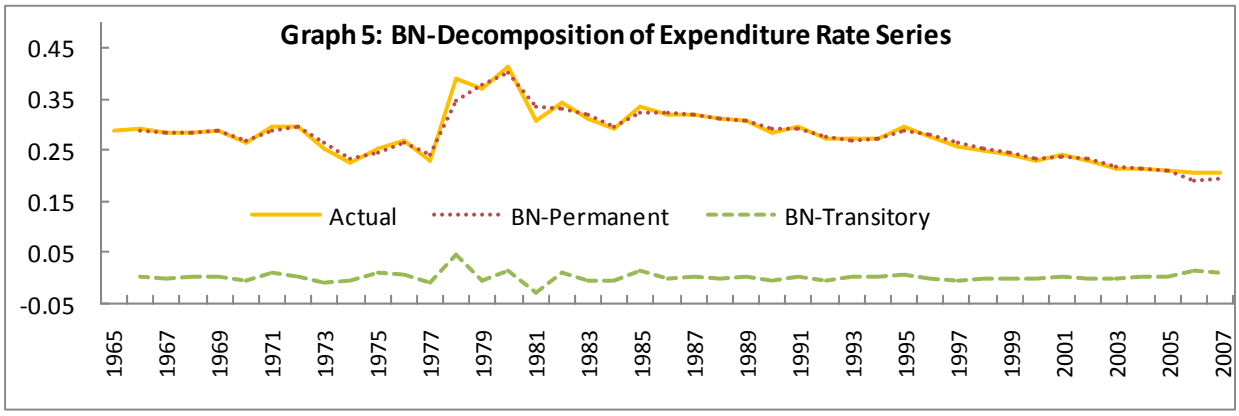
DATA AND ESTIMATION

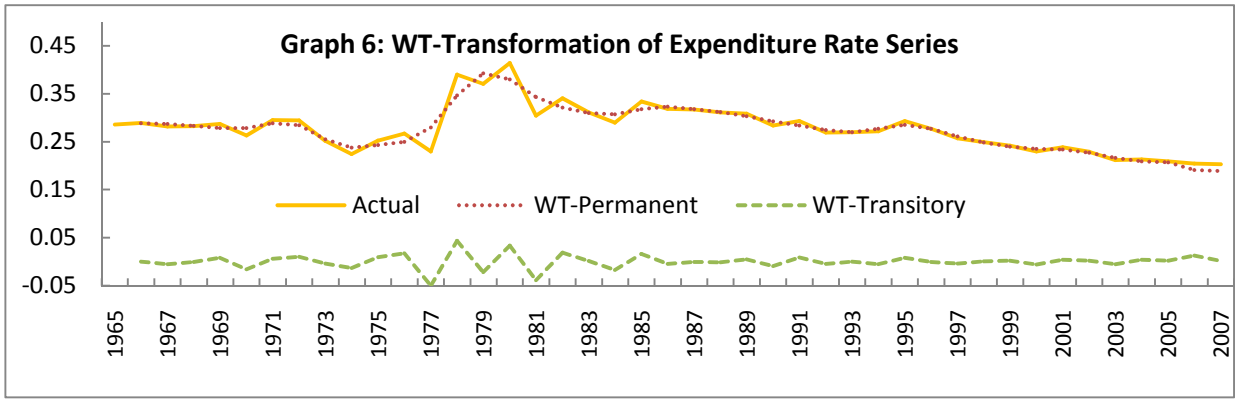
The Data

Depending on the data availability we selected sample period from 1965 to 2007. Data for Government Revenue, Government Expenditure, Gross Domestic Product (GDP) and Money is obtained from International Financial Statistics (IFS) and World Development Indicators (WDI). Revenue is cash receipts from taxes, social contributions, and other revenues such as fines, fees, rent and income from property or sales. Grants are also considered as revenue but are excluded here. Expenditure is cash payments for operating activities of the government in providing goods and services. It includes compensation of employees (such as wages and salaries), interest and subsidies, grants, social benefits, and other expenditures such as rent and dividends. The series which are used for estimation are formed from the above main variables. The average marginal tax rate should be computed using changing weights. The computation of average marginal tax rate is difficult due to unavailability of data. The average tax rate, revenue-to-GDP ratio, would be a better proxy for the effective tax rate than a fixed-weighted average marginal tax rate. Ghosh (1995), Olekalns (1997), Ashworth and Evans (1998), Adler (2006) and many others consider the average tax rate calculated as total revenue-to-GDP ratio a better proxy for average marginal tax rate. Another reason to use revenue-to-GDP ratio is that governments are directly concerned to its total revenue, not the tax revenue alone, while deciding its expenditures. Therefore, this study uses the average tax rate in our exercise. The expenditure rate is average expenditure rate calculated as total government expenditure-to-GDP ratio. Permanent expenditure rate and transitory rate series are formed by decomposing the expenditure rate series by two different techniques namely; Baveridge-Nelson Decomposition and Wavelet Transformation.

Decomposition of Total Expenditure Rate Series

There is no unique way to decompose a series into permanent and transitory components. Main detrending techniques recently being used are: Hodrick-Prescott filter, Beveridge-Nelson decomposition, linear trend, segmented trend, first order differencing, unobservable components model, Band-Pass Filter (BP), Baxter-King (BK), and others. The survey articles by Harvey and Jaeger (1993) and Dupasquier, Guay, and St-Amant (1997), Canova (1998) explores the properties of the detrending techniques. The consensus is that, both quantitatively and qualitatively, decomposition of a time-series into permanent and transitory components varies widely since alternative detrending filters extract different types of information from the data. Also, all the structural time-series models suffer from significant deficiencies. Therefore, for roundness this study uses the Beveridge and Nelson (1981) (BN) decomposition method (a qualitative approach) and Wavelet transformation (WT) (a quantitative approach) to decompose the government expenditure rate series into permanent and transitory components.





The decomposed components of Sri Lankan government expenditure rate series with BN and WT techniques are presented in Graphs 5 and 6. The best fit ARIMA (p, d, q) model for BN-decomposition is ARIMA (1, 1, 0). The graphs show that Sri Lanka has faced considerable transitory shocks to its expenditure from mid-1970s to mid-1980s. There seems to be a considerable transitory component in the total expenditure as the internal conflict started during this period in Sri Lanka. The decomposed transitory part with Wavelet Transformation shows higher values than that of BN-decomposed series.

Descriptive Statistics

The study seeks to ascertain the fiscal behavior Sri Lanka. This section compares the average tax rates and average expenditure rate to form an idea of the fiscal adequacy of these countries. The tax-to-GDP and expenditure-to-GDP ratios are important for maximizing economic growth. The tax and expenditure rates are a lot lower in developing countries than in the developed ones, which in one form or other display characteristics of a welfare state. Mean value of tax rate and expenditure rate were 19.52% and 28.16% of GDP, respectively. The coefficients of variance, a comparative measure of volatility, show that tax rate has been more volatile as compare to expenditure rate.

Table 1: Descriptive Statistics

	Tax Rate	*Expenditure rate*
Mean	0.195275	0.281641
Median	0.197322	0.282056
Maximum	0.263565	0.413591
Minimum	0.153432	0.209402
Std. Dev.	0.042350	0.010490
Coef. of Var.	0.216874	0.037246

Source: Key Indicators for Asia and the Pacific (2008) and World Development Indicators (2008)

Sri Lanka has faced high fiscal deficits throughout its economic history. Mean value of tax-to-GDP ratio is almost at optimal level of other developing countries. The expenditure-to-GDP ratio is also in the given range of optimal level proposed by Tanzy and Schuknecht (1998). However, as noted in Section 3, the tax structure of Sri Lanka has been typically like other developing countries. The share of indirect taxes in the total central revenue in 2006 was 76% of GDP very high. This has affected its capacity to keep the social cost of taxation reasonably low and its tax-expenditure ratio at the socially desirable.

Estimation

As a first step, the necessary condition (of random walk in tax rate) for tax smoothing suggested in equation (5) is checked. The results show that the tax rate series is following a random walk. This indicates that changes in the tax rate have been permanent; however, random walk is only a sufficient condition. The findings of the unit root teat are similar to Cashin, Haque and Olekalns (1997) who argue for random walk in the tax rate series of Sri Lanka but could not find out tax smoothing using Vector Auto-regressive (VAR) process between tax rate and actual part of the budget balance.

Table 2: ADF Unit Root Test for Tax, Expenditure and Money Growth Rates

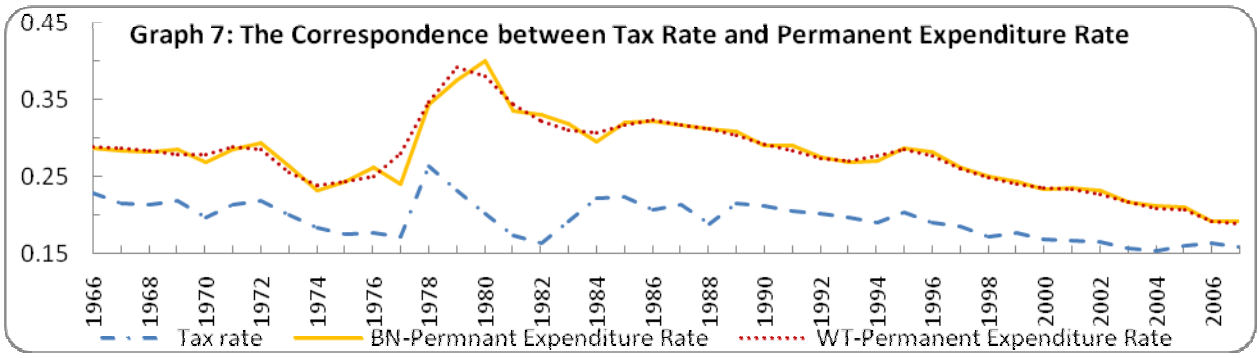
Unit Root Test in	*Exogenous*	*Tax rate*	*Expenditure rate*	*Money Growth rate*
Level	Constant	-2.956314	-2.459686	-4.794623*
	Const and Trend	-3.618188	-2.858643	-2.555234
	None	-0.837740	-0.664242	-0.199246
First Difference	Constant	-6.104672*	-9.081539*	---
	Const and Trend	-5.440512*	-9.066434*	---
	None	-6.001924*	-9.167377*	---

*Note: Null Hypothesis: The series has a unit root. * Null is rejected at 5% level.*

So, as a next step, the unit root test for expenditure rate series was carried out. The null hypothesis of non-stationarity could not be rejected for tax rate (as described earlier) and expenditure rate at level i.e. both the series are integrated at order one. However, the series of growth rate of money (M1) turned out to be stationary. The results reveal that all variables having unit root at level are stationary at first difference.

Graphical Analysis

Graph 7 shows the correspondence between tax rate series and both permanent parts of expenditure rate series i.e. BN and WT. The gap between the two series is the fiscal deficit. It widens in late 1970s and 1980s; the main reason being that Sri Lanka started privatization and deregulation in 1977 and faced internal conflict in 1980s. One of the main consequences of the deficit is the accumulation of huge public debt due to easy and concessional availability of external loans. Due to these reasons Sri Lanka enjoys the dubious distinction of being the highest indebted country in the region. Furthermore, its sky-rocketing debt became unsustainable in the beginning of this decade. However, things looked a little bit cheerful as the fiscal deficit started decreasing in 1990s and was at its lowest in 2006 but it could not be sustained as in 2009 it was 10.2% of GDP at its highest.



It is interesting to note that despite a big gap between tax rate and permanent expenditure rate series, indicating fiscal deficit, the graph 8 shows a close correspondence between them. The correspondence is almost perfect before and after 1980s. However, the decade of 1980s was very crucial when country faced an internal conflict. So naturally for this period the correspondence is not perfect. On the whole, the graph indicates that expected changes in permanent expenditure have been reflected in the changes in tax rate. The correspondence is moderately tight which suggests that Sri Lanka has tried to minimize the welfare cost of taxation.

Co-integration Analysis

The equation (8) presents sufficient condition of presence the TSH. As tax rate and permanent expenditure rate series for Sri Lanka are I(1). Therefore, cointegration analysis could be conducted between the two. Table 3 shows that residuals obtained from regression are stationary, which indicates that co-integration exists between the tax rate and expenditure rate series. The estimates of β are identical under both BN- and WT-measures of permanent expenditures at 0.68, implying that 68% of changes in permanent expenditures are reflected in the taxes, and that although there has been tax smoothing, it is not perfect (i.e. $\beta \neq 1$). The test also supports insights derived from unit root in tax rate and Graph 8 i.e. Sri Lanka is smoothing its tax rate overtime, though again not perfectly.

Error Correction Analysis

As the results with both type of decomposed series are similar so we precede the analysis with the WT-permanent expenditure rate component for further analysis based on the Error Correction Mechanism. This study also conducts the ECM analysis with BN-permanent expenditure which gives similar results, not presented here. The ECM is presented in Table 4 with tax rate and permanent expenditure rate as dependent variables. The error correction terms

(EC_{t-1}) have expected sign in both equations while it is significant only for tax equations. *This indicates that in long-run tax decisions in Sri Lanka have been made in the light of previous permanent expenditure decisions.* It reveals that in the short-run current taxes are also significantly affected by previous period's permanent expenditures and taxes. The current permanent expenditures are influenced by both previous period's permanent expenditures and taxes significantly. The results indicate that lagged difference variables of tax rate and permanent expenditure rate have significant effects on changes in tax rates. This reveals that tax decisions are being made in the light of previous expenditure and tax decisions--- and that the government of Sri Lanka is smoothing its tax rate over time. The estimated results reveal that error correction is happening in the model. The coefficient of feedback is -0.72, implying that approximately 72% of disequilibrium in previous year is corrected in the current year. The lagged difference variable of permanent expenditure is also significant in both cases implying that it also impacts on tax rate in the short-run.

Table 3: Co-integration Analysis for Sri Lanka (Dependent variable τ_t)		
	BN Unit Root Series	*WT Smooth Series*
θ^p_{t-1}	0.686174 (53.01)	0.686524 [54.34106]
DW statistics	0.595821	0.648686
Rho(ϱ)	0.681968	0.655866
ARCH	17.84558 [0.000150]	50.35472 [0.00000)
Serial Corr. LM F Test	17.16263 [0.000005]	13.71580 [0.000035]
ADF unit root test of residuals	-3.40435**	-3.608709**
*Note: DW values are greater than 1% critical value (0.511) indicating that the series are co-integrated. The ADF critical values are -3.92 at 5% and -3.38 at 10% level. ** denotes significance at 10% level.*		

The Error Correction Mechanism with additional transitory I(0) variables is presented in Table 4 with tax rate and permanent expenditure rate as dependent variables with additional I(0) variables (ECM-2). The error correction terms (EC_{t-1}) have expected signs in both equations, though significant only for tax equations. The results of ECM-2 are similar to that of ECM-1. But with additional I(0) exogenous variables of money and transitory expenditures the feedback coefficient (error correcting term) becomes weaker, implying that only 46% of disequilibrium is corrected. The coefficient of money has expected positive sign but insignificant in both models. However, the transitory part of government expenditure is significant. It may be noted that occurrence of such transitory effects does not violate the tax smoothing hypothesis. As we noted above, the transitory expenditures have significant impact on taxes. Therefore, it can be concluded that Sri Lanka has been financing internal conflict transitory expenditures through

higher fiscal deficits by getting concessional loans. These deficits have been accumulated in the form large public debt due to the availability of concessional loans from international sources. This easy approach to debt made the external debt of Sri Lanka unsustainable in 2001. (Chaudhary & Anconflict, 2000)

Table 4: Error Correction Test

Variable	ECM-1		ECM-2	
Dependent / *Explanatory*	$\Delta\tau_t$	Δg_t^P	$\Delta\tau_t$	Δg_t^P
	Coefficient [t-Statistic]	Coefficient [t-Statistic]	Coefficient [t-Statistic]	Coefficient [t-Statistic]
C	-0.00342 [-1.435633]	-0.00113 [-0.56868]	-0.00622 [-1.223042]	-0.0092* [-2.71328]
EC_{t-1}	-0.72397* [-4.588281]	0.068789 [0.589415]	-0.45927* [-2.80834]	0.030568 [0.280407]
Δg_{t-1}^P	0.997207* [4.040469]	1.278663* [6.142566]	0.773657* [3.651263]	1.308443* [9.263575]
$\Delta\tau_{t-1}$	-0.2995 [-1.814392]	-0.12595 [-0.899777]	-0.21448 [-1.467455]	-0.03375 [-0.34636]
m_{t-1}	----------	----------	0.020998 [0.617706]	0.05045* [2.22634]
g_{t-1}^P	----------	----------	-0.67374* [-3.563804]	-0.23917 [-1.8978]

*Note: Other lagged explanatory variables are also included in the ECM. * indicates significant a 5% level. See appendix for detailed results.*

The findings of our analysis are consistent with those of Narayan (2005), but are opposite to those of Cashin, Haque and Olekalns (1999). The latter have concluded that fiscal behavior of Sri Lanka is not consistent with the tax smoothing hypothesis. The main reason for our results being radically different from those of Cashin, Haque and Olekalns (1999) is the differeces in the estimation periods of the two studies. The sample period used in the Cashin et al study was 1964-1997 while the present study uses a much longer estimation period of 1965-2007. This is also clear from Graph 8 which shows a more close correspondence between the two series after 1980s than before. Another reason may be the use of different estimation techniques used in the two studies. Temporary increases in government expenditure (justified by natural shocks) tend to become enduring and lead to permanent tax increases required to finance them (Barro, 1979; Peacock & Wiseman (1979). Under such a situation the optimal solution to controlling the budget deficit is clearly expenditure cuts. But if expenditure reduction would not be possible then a combination of tax increases and bond financing should be feasible alternatives. In such a situation tax increases should not be in response to transitory increase in expenditures. Hence, keeping with our findings it can be concluded that Sri Lanka has, to some extent, tried to

minimize the welfare cost of taxation by smoothing the tax rate, though not perfectly, over the sample period.

CONCLUSION AND POLICY IMPLICATIONS

The present study has investigated whether fiscal policies adopted by Sri Lanka have been consistent with the tax smoothing hypothesis or not. And, if not, then how the tax and spend decisions have been made. Attention was then focused on the experience of public finances of Sri Lanka. It concludes that public finances of Sri Lanka have experienced severe fiscal deficits and sky-rocketing public debt which is unsustainable. It has faced such a situation due to prolonged internal conflict which prevailed over thirty years. The financing of the conflict expenditures was the major source of the deficit and the debt. Now, when the conflict is over, the current expenditure can be curtailed. However, the development expenditures have got crucial importance especially in the conflict affected area. The only way is to mobilize additional resources by generating a higher level of tax and non-tax revenue and cut down of unnecessary current expenditures. It need not be emphasized that there is an urgent need for well designed fiscal reforms to generate primary surpluses and reduce public debt burden. However, fiscal adjustment should not be achieved at the cost of the development expenditure; rather it should come from serious revenue mobilization efforts to increase domestic tax revenue. The end of the conflict has opened the door for reconstruction and development projects in the north and east. Funding these projects will be difficult, as the government already is faced with high debt interest payments, a bloated civil service, and high budget deficits. The rehabilitation in the internal conflict affected areas requires building infrastructure in those areas. So that conflict affected people should also get fruits of the development and come in the main stream and not indulge in anti state activities. For this purpose the defence expenditures should be reduced and these should be used as development expenditures.

The empirical findings of this study reveal that Sri Lanka have tried to minimize welfare cost of taxation but its fiscal behavior does not fully accord with the predictions of the tax smoothing theory. Keeping in view these findings a number of policy implications flow from them. Further, it stands to reason that, to some extent at least, the severe debt crises that Sri Lanka has faced can be attributed to their failure to do tax smoothing in a systematic fashion and to their inability to synchronize their spending and taxing and borrowing decisions. *It follows that Sri Lanka would probably be better off if it finances its permanent expenditure by increasing the tax rate; and if there are transitory shocks to the expenditures or output these should be financed through creating public debt.* However, such debt should be contingent. Secondly, the desired tax rate should be decided in such a way that the government's inter-temporal budget constraint is not violated and future generations are not affected. Thus, *to reduce budget deficit, government might increase taxes and now it has opportunity to cut down its defense expenditure.*

REFERENCES

Abeysinghe, T., & Jayawickrama, A. (2006). A Direct Test of Tax Smoothing: The Experience of Some OECD Economies. *July 2006, FEMES, Beijing and December 2006, NUS-Melbourne Symposium, Melbourne.*

Adler, J. (2006). The Tax smoothing Hypothesis: Evidence from Sweden, 1952–1999. *Scandinavian Journal of Economics, 108* (1), 81-95.

Asian Development Bank. (2010). *Key Indicators for Asia and the Pacific 2010.* Metro Manila, the Philippines.

Barro, R. J. (1979). On the Determination of the Public Debt. *Journal of Political Economy, 87* (5), 940–971.

Barro, R. J. (1981). On the Predictability of Tax-Rate Changes. *NBER Working Paper No. 636*.

Barro, R. J. (1986). U.S. Deficits since World War I. *Scandinavian Journal of Economics, 88* (1), 195-222.

Beveridge, S., & Nelson, C. R. (1981). A New Approach to Decomposition of Economic Time Series into Permanent and Transitory Components with Particular Attention to Measurement of the 'Business Cycle'. *Journal of Monetary Economics*, *7*, 151-174.

Bohn, H. (1990). Tax Smoothing with Financial Instruments. *The American Economic Review, 80* (5), 1217-1230.

Campbell, J. Y. (1987). Does Saving Anticipate Declining Labor Income? An Alternative Test of the Permanent Income Hypothesis. *Econometrica, 55* (6), 1249-1273.

Campbell, J. Y., & Shiller, R. (1987). Cointegration and Tests of Present Value Models. *Journal of Political Economy , 95* (5), 1062–1088.

Cashin, P., Haque, N., & Olekalns, N. (1999). Spend Now, Pay Later? Tax Smoothing and Fiscal Sustainability in South Asia. *International Monetary Fund,* Working Paper No. 63.

Cashin, P., Haque, N., & Olekalns, N. (2003). Tax Smoothing, Tax Tilting and Fiscal Sustainability in Pakistan. *Economic Modelling, 20* (1), 47-67.

Cashin, P., Olekalns, N., & Sahay, R. (1998). Tax Smoothing in a Financially Depressed Economy: Evidence from India. *International Monetary Fund,* Working Paper No. 122.

Chaudhary, M. A., & Anwar, S. (2000). Foreign Debt, Dependency, and Economic Growth in South Asia. *The Pakistan Development Review, 39* (4), 551–570.

Daubechies, I. (1992). Ten Lectures on Wavelets. *CBMS-NSF Regional Conference Series on Applied Mathematics. 61*. Philadelphia, PA: Society for Industrial and Applied Mathematics.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association, 74*, 427–431.

Engle, R. F. & Granger, C. W. (1987). Co-integration and Error Correction: Representation, Estimation and Testing. *Econometrica, 55,* 251–276.

Ghosh, A. R. (1995). Intertemporal Tax Smoothing and Government Budget Surplus: Canada and the United States. *Journal of Money, Credit and Banking*, 1031- 1045.

Huang, C., & Lin, K. S. (1993). Deficits, Government Expenditure, and Tax Smoothing in the United States: 1929–1998. *Journal of Monetary Economics, 31*, 317–339.

Padda, Ihtsham Ul Haq. (2009). *Have Developing Countries been Seeking to Minimize the Welfare Cost of Taxation? Evidence from Barro's Tax Smoothing Hypothesis.* Unpublished doctoral dissertation. Islamabad: Federal Urdu University of Arts, Science and Technology.

Padda, Ihtsham Ul Haq, & Akram, N. (2010). Fiscal Policy and Growth Nexus: Scenario of Developing Economies. *The Empirical Economics Letters, 9*(4), 405-412.

Padda, Ihtsham Ul Haq. (2011). Decomposition of Expenditure Rate Series into Permanent and Transitory Parts *European Journal of Scientific Research,* 56 (1).

International Monetary Fund. (2009). *International Financial Statistics (CD- ROM)*, Washington, DC, International Monetary Fund.

Musgrave, R. A. (1959). *The Theory of Public Finance*. New York: McGraw Hill.

Narayan, P. K. (2005). The Government Revenue and Government Expenditure Nexus: Empirical Evidence from Nine Asian Countries. *Journal of Asian Economics, 15*, 1203-1218.

Sahasakul, C. (1986). The U.S. Evidence on Optimal Taxation over Time. *Journal of Monetary Economics, 18,* 251-275.

Serletis, A., & Schorn, R. (1999). International Evidence on the Tax- and Revenue-Smoothing Hypotheses. *Oxford Economic Papers 51*, 387-396.

Strazicich, M. C. (2002). International Evidence of Tax Smoothing in a Panel of Nineteen Industrial Countries. *Applied Economics, 34* (18), 2325-2331.

Trehan, B., & Walsh, C. E. (1988). Common Trends, The Government Budget Constraint, and Revenue Smoothing. *Journal of Economic Dynamics and Control, 12*, 425-444.

APPENDIX: Table A-1: Error Correction Test				
Variable	ECM-1		ECM-2	
Dependent / *Explanatory*	$\Delta\tau_t$	Δg_t^p	$\Delta\tau_t$	Δg_t^p
	Coefficient [t-Statistic]	Coefficient [t-Statistic]	Coefficient [t-Statistic]	Coefficient [t-Statistic]
C	-0.00342 [-1.435633]	-0.00113 [-0.56868]	-0.00622 [-1.223042]	-0.0092* [-2.71328]
EC_{t-1}	-0.72397* [-4.588281]	0.068789 [0.589415]	-0.45927* [-2.80834]	0.030568 [0.280407]
Δg_{t-1}^p	0.997207* [4.040469]	1.278663* [6.142566]	0.773657* [3.651263]	1.308443* [9.263575]
Δg_{t-2}^p	-1.54267* [-4.060171]	-0.84302* [-2.908262]	-0.82599* [-2.251281]	-1.17927* [-4.8217]
Δg_{t-3}^p	0.981204* [2.624466]	0.193118 [0.932295]	0.319271 [0.798618]	0.834576* [3.131661]
$\Delta\tau_{t-1}$	-0.2995 [-1.814392]	-0.12595 [-0.899777]	-0.21448 [-1.467455]	-0.03375 [-0.34636]
$\Delta\tau_{t-2}$	-0.28362 [-1.666578]	-0.11966 [-0.842291]	-0.46343 [-3.2057]	-0.27514* [-2.8551]
$\Delta\tau_{t-3}$	-0.341202* [-2.219347]	-0.00662 [-0.056287]	-0.16233 [-0.980845]	-0.09732 [-0.88216]
m_{t-1}	----------	----------	0.020998 [0.617706]	0.05045* [2.22634]
g_{t-1}^p	----------	----------	-0.67374* [-3.563804]	-0.23917 [-1.8978]
R-squared	0.70173	0.689251	0.830431	0.899632
SIC	-5.12748	-5.51893	-5.38747	-6.19857
DW stat	2.028314	1.749563	2.391095	1.772842
Normality test (Jarque-Bera)	1.065770 (0.586909)	5.233168 (0.073052)	1.082282 (0.582084)	1.340889 (0.511481)
Serial Corr. LM F Test	0.319671 (0.729433)	1.395828 (0.269677)	2.217875 (0.133701)	0.377438 (0.377438)
ARCH F Test	0.013639 (0.907759)	2.082958 (0.160454)	0.024526 (0.876538)	0.245838 (0.623409)
Heteroskedasticity F Test	1.648126 (0.153251)	2.033416 (0.068684)	1.361938 (0.294820)	2.984666 (0.026948)
*Note: The coefficient t values are given in brackets and diagnostic p-values are given in parentheses. *Indicates significance at 5% level. The lag selection criteria are adjusted R-square, AIC and SIC.*				