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JOURNAL OF ECONOMICS AND ECONOMIC EDUCATION RESEARCH

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LETTER FROM THE EDITOR

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

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

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

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

ECONOMICS EDUCATION ARTICLES

PERSONALITY TYPE AS A DETERMINANT OF STUDENT PERFORMANCE IN INTRODUCTORY ECONOMICS: MACROECONOMICS VS. MICROECONOMICS*

Timothy O. Bisping, Louisiana Tech University
James B. Eells, Ameriprise Financial

ABSTRACT

Personality type has been shown to impact student performance in introductory economics courses. However, research has yet to ascertain the degree to which this relationship might vary across course types. We utilize a one quarter survey course designed to cover the fundamentals of both microeconomics and macroeconomics in order to test the hypothesis that different personality types, as measured by the Myers-Briggs Type Indicator test, will excel in the two fields of study. We show that although a casual comparison of estimated coefficients across disciplines may imply differences in the role of type in the two fields, these differences are not supported by formal testing. We, therefore, find little support for the notion that the relationship between personality type and performance is different for the two fields.

**This study was supported by a grant from the Louisiana Tech University Center for Economic Education.*

INTRODUCTION

Experience has shown that students have no trouble revealing their preferences toward the study of economics. Casual observation has led some to assert that "economics is one of those subjects students either love or hate", as is stated by Borg and Shapiro (1996). Another common, yet noteworthy theme centers on the juxtaposition of microeconomics and macroeconomics. It seems that students rarely find the two branches of economics equally desirable, often expressing a strong preference for one over the other. Given that the two fields are significantly different in their topics and methods, it is probable that students are more likely to excel in the field of study that embraces those methods most consistent with their personal preferences. Furthermore, some degree of self-sorting is apparent among professional economists in a manner consistent with the micro/macro distinction. Variation in student preferences and the self-sorting of economists should not be surprising given the nature of the two branches of economics: macroeconomic theory being highly differentiated, fluid, and evolving, whereas microeconomic theory is somewhat more focused and time-invariant. Taken together these observations suggest that differences in taste concerning the two main branches of economics are associated with different personality/learning types.

Students with certain personality types and learning styles may excel in macroeconomics or microeconomics to varying degrees depending upon the match between their personality characteristics and course content and structure. The importance of this to economics students is clear given that, unlike the informed self-sorting of professional economists, students rarely have the ability, or the necessary a priori information, to choose those economics courses that most closely match their preferences. This is especially true in introductory course where students may have no prior knowledge regarding economics, or perhaps are required to take courses in each.

It has been shown in previous work that personality type does indeed affect student performance in introductory economics courses. In fact, two separate studies find such a relationship, Ziegert (2000), and Borg and Shapiro (1996). However, it is not clear whether these two studies are entirely comparable, as the work by Ziegert examines courses in microeconomics, while Borg and Shapiro focus on courses in macroeconomics. Previous research has not addressed whether the personality types predictive of academic performance in one branch of economics are also predictive in the other. The purpose of this study is to determine whether the relationship between personality type and student performance is

different for microeconomics relative to macroeconomics. These results will potentially help explain differences found in past work, and gain valuable insights into student learning and appropriate pedagogical approaches in introductory economics courses.

PERSONALITY TYPE AND LEARNING STYLES

The measure of personality type we employ is the Myers-Briggs Type Indicator (MBTI) test, which is designed to classify individuals according to personality types consistent with the work of psychologist C. G. Jung. The MBTI is a popular instrument; accordingly, the literature related to the test and its application is immense. A concise overview of the MBTI and Jung's preferences is provided by Isabel Briggs Myers in "Introduction to Type". According to Myers (1998), the MBTI "reports preferences on four dichotomies". These are Introversion vs. Extroversion, Sensing vs. Intuition, Thinking vs. Feeling, and Judging vs. Perceiving. These categories are clarified in Table 1.
The MBTI is designed to "sort" individuals according to these four dichotomies. Each individual has a preference on each dichotomy listed, yielding 16 possible four-letter combinations (for example: ISTJ) or "personality types."

The educational literature is replete with studies showing how various aspects of personality type and student temperament impact academic performance, especially when considered in conjunction with the teaching style of a professor. Fortunately, the results of the MBTI provide information regarding student temperament. The aspects of personality type associated temperament are summarized by Keirsey and Bates (1984) and are reproduced by Borg and Shapiro (1996). A brief summary of their work follows.[1]

Four vital preference combinations (temperaments) associated with student learning are: SP, SJ, NT, and NF. Essentially, following the information in Table 1, individuals choose to focus their attention, take in information, solve problems, and deal with the world around them in ways corresponding to their personal preferences. Combinations of these different preferences yield personality types corresponding to varying levels of comfort with structure, abstract thought, "logical" reasoning, etc. An NT, for instance, will tend to be comfortable with theoretical, logical topics, and demonstrate little need for examples to support theoretical material. NFs, on the other hand, may prefer a significant amount of interaction with classmates, class discussion, and specific examples. An SJ will prefer clear-cut assignments, logical structure to the class and associated material, and are most

comfortable with topics related to concrete facts. SPs prefer high degrees of physical interaction in the classroom with "hands-on" experience, prefer group projects, and do not respond well to typical lecture style course containing little variation in style (Keirsey and Bates, 1984).

TABLE 1*
The Basic Dichotomies of the MBTI

The E-I Dichotomy-- The Focus of One's Attention

Extroversion
Focus on the outer world of people and activity. Energy and attention is directed outward and is received from interacting with people and from taking action.

Introversion
Focus on the inner world of ideas and experiences. Energy and attention is directed inward and is received from reflecting on thoughts, memories, and feelings.

The S-N Dichotomy –Taking in Information

Sensing
Take in information that is real and tangible---what is actually happening. Observant about the specifics of the immediate environment Especially attuned to practical realities.

Intuition
Take in information by seeing the big picture, focusing on the relationships and connections between facts. Seek to grasp patterns. Especially attuned to seeing new possibilities.

The T-F Dichotomy—Making Decision

Thinking
Considers the logical consequences of a choice or action. Examine the pros and cons objectively. Energized by critiquing and analyzing. Problem solvers. Seeks generalizable standards and principles out of specific circumstances.

Feeling
Consider what is important to themselves and to others. Mentally place themselves into the situation to identify with everyone so they can make decisions based on their values about honoring people. Energized by appreciating and supporting others and look for qualities to praise. Seeks to create harmony and treat each person as a unique individual.

The J-P Dichotomy—Dealing with the Outer World

Judging
Prefers a planned, orderly way, seeking to regulated and mange their lives. Decisive.

Perceiving
Prefers a flexible, spontaneous way, seeking to experience and understand life, rather than control it. Detailed plans and final decisions feel confining; prefer to stay open to new information and last minute options. Energized by their resourcefulness in adapting to the demands of the moment.

* This table is an abbreviated replication of the discussion provided by Isabel Briggs Myers in her manual "Introduction to Type"

Ziegert (2000) and Borg and Shapiro (1996) have shown that personality type is predictive of performance in economics courses. Ziegert finds that students of type S and T perform significantly better in introductory microeconomics, while

Borg and Shapiro find that Is perform better that Es in introductory macroeconomics courses. In both studies, performance is measured by course grade. Taking the aforementioned temperaments into account, both Ziegert and Borg and Shapiro find that students with NF temperaments perform at a lower level than their SJ counterparts, but that SPs have no statistically significant difference in performance when compared to student with the SJ temperament. Differences in the two studies are embodied primarily in the magnitude of the associated coefficients implying differing probabilities of success in the course. While the direction of change for both NFs and NTs are identical in these studies, the coefficient for NTs in the Borg and Shapiro study is nearly twice that of those found in the Ziegert study. The differences in coefficients associated with NFs are even more pronounced in the two studies, where the coefficient for NFs in the Borg and Shapiro paper is more than three times that of found by Ziegert. The student/professor temperament match was also found to impact student performance in the Borg and Shapiro paper, but not in the work by Ziegert. Cross-study comparisons should be made with caution, however, as the somewhat ambiguous interpretation of the coefficients from ordered probit regressions makes such comparisons speculative at best, and the independent nature of the two studies eliminates the possibility of formally testing the matter.

While some differences between the past two studies are present, they do not explicitly address the issue of dissimilarities in student performance in microeconomics as opposed to macroeconomics. Consequently, comparing these results may be misleading as the impact of differing study design and course content are unknown. Here we attempt to correct for this deficiency by studying the same topic in a one-quarter course which includes both a micro portion and a macro portion, examining the effect of personality type on performance in each portion of the course separately.

HYPOTHESES

Of primary concern here is the extent to which differences found when comparing the work of Borg and Shapiro with that of Ziegert are due to variations in course content (macro vs. micro) as opposed to study design. Our results, derived from a relatively controlled environment where the same students are tested in both macro and micro, should clarify the extent to which such conclusions can be drawn. This is especially interesting given that the conclusions drawn from comparing these two studies would seem contradictory to our hypothesis presented herein.

Our summary of the MBTI personality types suggests a number of testable hypotheses. First, we anticipate that students with "S" as part of their type are more inclined to succeed in micro due to their preference for detail and tangible facts. Conversely, Ns are more inclined to macro given the "big picture" nature of the subject. Second, we anticipate that students with "J" in their type are more likely to succeed in micro due to the structured nature of the subject, whereas Ps are more apt to succeed to macro which is "more open to change" and is perhaps more flexible. Third, with regard to temperaments, we expect that SJs have an absolute advantage in both subjects, but that advantage may be considerably greater in the micro portion of the course due to the more structured nature of the material. Finally, we expect that NT students will perform relatively better in macro due to its relatively abstract nature.

DATA AND RESEARCH DESIGN

The data were collected in two introductory economics courses, one in Spring 2002, the other in Winter 2003. Each course is a one-quarter survey of both microeconomics and macroeconomics for non-business majors seeking to fulfill part of the university's social science elective requirement. During the first full week of class, the students were given the MBTI self-scorable test. Students were also asked to sign a consent form granting access to the use of their academic records. The analytical data set was created by merging the MBTI scores with student records. We attempt to replicate the research design of Borg and Shapiro and Ziegert where possible, and therefore chose the variables for the analysis accordingly. Definitions are provided in Table 2 below.

Combined enrollment in the two course sections equaled 142 students, 120 of which agreed to participate in the study. Of these, 45 records were missing certain elements of the predictor data (primarily high school GPA and ACT composite score). To avoid the loss of valuable data, we decided to use college GPA (following Ziegert) instead of High School GPA and auxiliary regressions to predict any missing ACT composite scores or college GPAs.[2] This procedure enabled us to retain the 120 records where the MTBI scores were captured. A total of 14 students officially dropped out of the course. Another 4 failed to write at least one exam. We treat these 18 observations broadly as failing to complete the course, leaving 102 observations for analysis.

Each course section was split into 3 segments: an introductory segment dealing primarily with broad economic concepts, the economics discipline and way

of thinking; a micro segment devoted to consumer and producer theory, and selected microeconomic applications; and a macro segment that presented basic macroeconomic concepts and a mixed plate of macroeconomic theory and applications.

Table 2: Variable Definitions

Variable	Description
ENFJ	Dummy variable for student personality type ENFJ
ENFP	Dummy variable for student personality type ENFP
ENTJ	Dummy variable for student personality type ENTJ
ENTP	Dummy variable for student personality type ENTP
ESFJ	Dummy variable for student personality type ESFJ
ESFP	Dummy variable for student personality type ESFP
ESTJ	Dummy variable for student personality type ESTJ
ESTP	Dummy variable for student personality type ESTP
INFJ	Dummy variable for student personality type INFJ
INFP	Dummy variable for student personality type INFP
INTP	Dummy variable for student personality type INTP
ISFJ	Dummy variable for student personality type ISFJ
ISFP	Dummy variable for student personality type ISFP
ISTJ	Dummy variable for student personality type ISTJ
ISTP	Dummy variable for student personality type ISTP
I	Dummy variable for I subtype (relative to E)
S	Dummy variable for S subtype (relative to N)
T	Dummy variable for T subtype (relative to F)
J	Dummy variable for J subtype (relative to P)
NF	Dummy variable for student learning type "NF"
NT	Dummy variable for student learning type "NT"
SP	Dummy variable for student learning type "SP"
AGE	Student age

Table 2: Variable Definitions	
Variable	**Description**
MALE	Dummy variable for male student
NONWHITE	Dummy variable for nonwhite student
COURSE	Dummy variable for Professor/Course Section
ACTR	ACT composite score
GPAR	Current grade point average
CUMHRS	Cumulative hours taken
QRTHRS	Hours enrolled in current quarter
TRANSHRS	Hours transferred
IMR	Inverse Mills Ratio derived from probit selection equation.
CONTINUE	Dummy variable for continued enrollment through macro and micro sections
NINTROQ	Normalized intro quiz score
NINTROT	Normalized intro test score
NMICROQ	Normalized micro quiz score
NMAC1ST	Normalized macro test score where macro taught before micro
NMACROQ	Normalized macro quiz score
NMIC1ST	Normalized micro test score where micro taught before macro
NMICROT	Normalized micro test score
NMACROT	Normalized macro test score
Note: Variables with suffix "1" indicate the micro model; with "2" the macro model	

Instructional methods, course layout, tests, homework, quizzes, and syllabus, were closely replicated in the two course sections. A complicating logistical constraint occurred in Winter 2003 course when the principal instructor in the Spring 2002 course was available to teach only the micro segment of the Winter 2003 course section. This necessitated having a second instructor cover the macro segment of that course section. We control for this effect by specifying the dummy variable, COURSE, taking a value of one where the course is team-taught, zero otherwise. One further difference between the two course sections is in regard

to the order of presentation of the material. The introductory segment was always taught first in each course, with associated exams given prior to the official drop date. However, micro preceded macro in Spring 2002 and this was reversed in Winter 2003. We control for this by including the variables NMIC1ST and NMAC1ST to account for the impact of the presentation of macro (micro) before the micro (macro) material. Though a confounding influence, a fortunate result of this is that in controlling for this order reversal, our results yield a variable with important implications, which we discuss later in our results.

We normalize all quiz and test scores to assume values between 0 and 100 using the following linear scaling formula:

$$YNorm = \frac{100 \times (Y - Y\min)}{(Y\max - Y\min)}$$

where Y equals the corresponding raw quiz or test score.

Students have at their discretion the decision whether to participate in the experiments by continuing enrollment in the course. This decision is influenced by early indicators of performance as well as native ability, personality, and other characteristics. Given the decision to continue enrollment, the performance in the micro and macro segments is influenced by the performance in the segments preceding it, as well as native ability, personality, etc. We specify a system of equations with self-selection as follows:

$$y_{1it} = X_{1it}\beta_1 + y^*_{2i}\delta_2 + u_{1it}$$
$$y_{2it} = X_{2it}\beta_2 + y^*_{1i}\delta_1 + u_{2it}$$
$$I^*_i = Z_i\gamma + e_i$$

where i=1,2, … N students, t=1, 2 courses, y_{1it} is the micro score of the ith student in course t, X_{1it} are exogenous variables predicting the micro score, y_{2it} is the macro score of the ith student in course t, X_{2it} are exogenous variables predicting the macro score, I_i* is the "continue enrollment" decision function of the ith student, *Zi* are exogenous variables predicting enrollment decision. The d_1, d_2, b_1, b_2 and g are unknown parameters and u_{1it}, u_{2it} are random disturbances for the equation system and e_i is a random disturbance for the enrollment decision function. We use the

Heckman two-step estimator that is thoroughly described in most graduate level econometrics textbooks (e.g., Green (1993), Amemiya (1985) and Maddala (1983)). The first step estimates g using probit MLE. The "inverse Mills ratio" is calculated as follows:

$$\hat{\lambda} = \frac{\phi(Z_i\hat{\gamma})}{\Phi(Z_i\hat{\gamma})}$$

where *f* and F are the density function and distribution function of the standard normal evaluated at $Z_i\hat{\gamma}$. In the second step we estimate the combined model using OLS where the dependent variable is positive. The combined model has the following form:

$$\begin{bmatrix} y_1 \\ y_2 \end{bmatrix} = \begin{bmatrix} X_1 & y_2^* & \hat{\lambda} & & 0 & \\ & 0 & & X_2 & y_1^* & \hat{\lambda} \end{bmatrix} \begin{bmatrix} \beta_1 \\ \delta_2 \\ \alpha_1 \\ \beta_2 \\ \delta_1 \\ \alpha_2 \end{bmatrix} + \begin{bmatrix} u_1 \\ u_2 \end{bmatrix}$$

which can be rewritten more compactly as

$$y = X\beta + u$$

The parameters of this model can be consistently estimated using OLS. However, because the Heckman model is heteroscedastic, we use FGLS with the following consistent covariance matrix

$$(X'X)^{-1}X'AX(X'X)^{-1}$$

where A is a diagonal matrix the jth element of which is $[y_j - x_j'\hat{\beta}]^2$. See Amemiya (1985, p.370).

The middle right-hand-side variables y_2^* is the macro exam score in the course where macro preceded micro. Similarly, y_1^* is the micro exam score in the course where micro preceded macro. These are defined as follows:

$$y_2^* = \begin{cases} y_2 & \textit{if macro preceded micro} \\ 0 & \textit{otherwise} \end{cases}$$

The combined model specified above is convenient for testing cross equation hypotheses. In particular, we are interested in testing (jointly) if the personality coefficients in macro are the same as in micro and whether the micro exam effect is the same as the macro. This provides us with 3 test scenarios:

Test 1. The personality coefficients in macro are the same as those in micro and the micro exam effect is the same as the macro exam effect.
Test 2. The personality coefficients in macro are the same as those in micro.
Test 3. The micro exam effect is the same as the macro exam effect.

Clearly, 2 and 3 are a decomposition of 1. These tests are easily carried out in the least squares second step by imposing linear restrictions of the (Rb-r) form, computing the corresponding F-statistics, and evaluating these against a critical F of the same numerator and denominator degrees of freedom. The results of these tests are presented in Tables 5 through 7.

RESULTS

Descriptive statistics for our model variables are presented in Table 3. Estimates for the probit selection equation are presented in Table 4, and parameter estimates for the microeconomics and macroeconomics equations are presented in Tables 5-7, where we also present the results of three test scenarios discussed in the previous section. We estimate three separate systems of equations, corresponding to the three aspects of personality type under consideration (i.e., personality type, the individual dichotomies, and temperaments). In each case, we first present a casual comparison of the results for the two fields of study within the context of

each of these three personality type characteristics. We then provide additional results in the form of formal tests designed to determine whether the impact of personality type differs for the two fields.

Table 3: Descriptive Statistics

Variable	Mean	Std.Dev.	Minimum	Maximum
ENFJ	0.0500	0.2189	0	1
ENFP	0.1917	0.3953	0	1
ENTJ	0.0167	0.1286	0	1
ENTP	0.0500	0.2189	0	1
ESFJ	0.0333	0.1803	0	1
ESFP	0.0500	0.2189	0	1
ESTJ	0.0833	0.2775	0	1
ESTP	0.1000	0.3013	0	1
INFJ	0.0333	0.1803	0	1
INFP	0.0917	0.2898	0	1
INTJ	0.0083	0.0913	0	1
INTP	0.0750	0.2645	0	1
ISFJ	0.0167	0.1286	0	1
ISFP	0.0750	0.2645	0	1
ISTJ	0.0917	0.2898	0	1
ISTP	0.0333	0.1803	0	1
I	0.4250	0.4964	0	1
S	0.4833	0.5018	0	1
T	0.4583	0.5004	0	1
J	0.3333	0.4734	0	1
NF	0.3667	0.4839	0	1
NT	0.1500	0.3586	0	1
SP	0.2583	0.4396	0	1
AGE	21.0583	2.5282	19	35

Table 3: Descriptive Statistics				
Variable	**Mean**	**Std.Dev.**	**Minimum**	**Maximum**
MALE	0.6667	0.4734	0	1
NONWHITE	0.2750	0.4484	0	1
COURSE	0.4333	0.4976	0	1
ACT_R	24.7141	4.3822	14	34
GPA_R	2.7607	0.8986	0	4
CUMHRS	51.4846	35.9669	0	156
QRTHRS	9.3917	2.6735	0	14
TRANSHRS	9.6846	18.8692	0	95
IMR	0.0000	0.4751	-2.0918	1.65643
CONTINUE	0.8500	0.3586	0	1
NINTROQ	54.5917	20.6020	1	100
NINTROT	69.5417	21.9181	1	100
NMICROQ	65.2083	32.8313	0	100
NMICROT	60.6833	29.1034	0	100
NMACROQ	49.6389	28.1247	0	100
NMACROT	62.0917	30.3127	0	100
NMAC1ST	30.7500	40.5989	0	100
NMIC1ST	35.5500	38.6688	0	97

First, in Table 5, we present the estimates for the model which includes all 16 personality types, though these results should be interpreted with caution given that some of these types are sparsely populated in the sample. A casual examination of these results reveals that some aspects of personality type are relevant in determining student performance in both macroeconomics and microeconomics, though the results suggest that this relationship may not be identical for the two fields. In the microeconomics equation students with the ISTJ personality type performed significantly better than their INTJ counterparts, as did INFPs. ISFJs, on the other hand, performed significantly worse. The results for the macroeconomics portion of the class vary somewhat form this as differences exist in both significance and magnitude of coefficients.

Table 4: Probit Selection Equation Results				
	Coeff.	**Std .Err.**	**t-ratio**	**P-value**
INTERCEPT	-4.8962	3.5370	-1.3843	0.1663
NF	0.6234	0.5952	1.0475	0.2949
NT	0.5472	0.7570	0.7228	0.4698
SP	0.3533	0.7105	0.4973	0.6190
AGE	0.0764	0.1549	0.4928	0.6221
MALE	-0.2855	0.4288	-0.6657	0.5056
NONWHITE	-0.2279	0.4992	-0.4566	0.6480
PROFB	0.8513	0.5879	1.4480	0.1476
ACTR	-0.0124	0.0543	-0.2286	0.8192
GPAR	0.0156	0.2839	0.0551	0.9561
CUMHRS	-0.0052	0.0101	-0.5206	0.6027
QRTHRS	0.1243	0.0926	1.3416	0.1797
TRANSHRS	0.0037	0.0153	0.2419	0.8089
NINTROQ	0.0311	0.0153	2.0344	0.0419
NINTROT	0.0289	0.0104	2.7778	0.0055
Dep Var = CONTINUE				

First, as was the case in microeconomics, ISTJs perform at a higher level that do INTJs, while ISFJs tend to do worse. The INFP coefficient, however, fails to achieve significance, while the coefficient for ENTJs suggests they perform significantly worse that those with the INTJ type. Past performance in the class, as illustrated by the variables NINTROQ1, NINTROT1, and NMacro (NMicro) Q1, cumulative GPA all have a positive impact on student performance in microeconomics, while in macroeconomics cumulative GPA does not. On the surface, personality type would appear to impact student performance in both micro and macroeconomics, with slight variations, primarily in the performance of INFPs and ENTJs. While we did not hypothesize about potential differences between the personality types, we see little evidence in these results that would support the hypotheses of our paper. This evidence suggests limited differences in the two fields, yet more formal tests are needed to verify this. Therefore, in an attempt to

verify this conclusion, we test the restriction that the joint effect of personality type is the same across the macro and micro equations (see Test 2, Table 5)). The results of the test suggest that we cannot reject the null that jointly, the personality type effect is the same.

Table 5: Personality Type Estimates

	Coeff.	Std.Err.	t-ratio	P-value	
INTERCEPT1	-15.6933	15.1009	-1.0392	0.3004	
ENFJ1	5.5633	5.7938	0.9602	0.3386	
ENFP1	2.6584	4.9857	0.5332	0.5947	
ENTJ1	1.2697	6.4516	0.1968	0.8443	
ENTP1	-3.1968	6.6997	-0.4772	0.6340	
ESFJ1	1.1699	4.6234	0.2530	0.8006	
ESFP1	7.8425	5.5431	1.4148	0.1593	
ESTJ1	7.4340	5.1562	1.4418	0.1515	
ESTP1	7.4668	5.3751	1.3892	0.1669	
INFJ1	3.6184	6.9535	0.5204	0.6036	
INFP1	10.2049	4.9761	2.0508	0.0421	**
INTP1	3.1440	4.4350	0.7089	0.4795	
ISFJ1	-18.8074	6.9225	-2.7169	0.0074	***
ISFP1	2.9385	5.1410	0.5716	0.5685	
ISTJ1	10.0790	5.0974	1.9773	0.0499	**
ISTP1	-0.5628	5.0117	-0.1123	0.9107	
AGE1	0.1457	0.3540	0.4115	0.6813	
MALE1	3.1587	2.3668	1.3346	0.1841	
NONWT1	1.4161	2.4787	0.5713	0.5687	
COURSE1	-12.8019	8.0521	-1.5899	0.1141	
ACTR1	0.0287	0.3327	0.0863	0.9314	
GPAR1	2.8646	1.4427	1.9856	0.0490	**
CUMHRS1	0.0078	0.0330	0.2348	0.8147	
QRTHRS1	0.3423	0.6937	0.4935	0.6224	

Table 5: Personality Type Estimates					
	Coeff.	**Std.Err.**	**t-ratio**	**P-value**	
TRNHRS1	-0.0138	0.0638	-0.2169	0.8286	
NINTOQ1	0.2315	0.1064	2.1765	0.0311	**
NINTROT1	0.4817	0.1300	3.7062	0.0003	***
NMICROQ	0.1627	0.0656	2.4818	0.0142	**
NMAC1ST	0.1041	0.0882	1.1804	0.2398	
IMR1	32.2235	7.7675	4.1485	0.0001	***
INTERCEPT2	-6.9577	9.9193	-0.7014	0.4842	
ENFJ2	-1.1303	4.1357	-0.2733	0.7850	
ENFP2	-4.7434	3.7394	-1.2685	0.2067	
ENTJ2	-11.1587	4.9583	-2.2505	0.0259	
ENTP2	6.0220	4.9115	1.2261	0.2222	
ESFJ2	0.9379	3.2906	0.2850	0.7760	
ESFP2	2.6213	6.7003	0.3912	0.6962	
ESTJ2	2.9034	5.1865	0.5598	0.5765	
ESTP2	1.1367	3.8982	0.2916	0.7710	
INFJ2	-0.3707	4.4042	-0.0842	0.9330	
INFP2	4.6407	3.3409	1.3891	0.1670	
INTP2	-3.4858	4.6754	-0.7456	0.4571	
ISFJ2	-12.5858	5.7834	-2.1762	0.0312	**
ISFP2	0.4068	4.0173	0.1013	0.9195	
ISTJ2	7.9640	3.9349	2.0239	0.0448	**
ISTP2	9.4226	5.1848	1.8174	0.0712	*
AGE2	-0.0483	0.2936	-0.1645	0.8695	
MALE2	2.0824	1.7851	1.1665	0.2453	
NONWT2	-0.6731	2.0020	-0.3362	0.7372	
COURSE2	39.1603	7.0952	5.5193	0.0000	***
ACTR2	-0.0881	0.3007	-0.2928	0.7701	
GPAR2	1.9003	1.6049	1.1841	0.2383	

Table 5: Personality Type Estimates					
	Coeff.	**Std.Err.**	**t-ratio**	**P-value**	
CUMHRS2	0.0388	0.0263	1.4756	0.1422	
QRTHRS2	0.1125	0.4259	0.2640	0.7921	
TRNHRS2	0.0310	0.0533	0.5819	0.5616	
NINTOQ2	0.0963	0.0758	1.2715	0.2056	
NINTROT2	0.1815	0.0963	1.8845	0.0615	*
NMACROQ	0.2960	0.0645	4.5927	0.0000	***
NMIC1ST	0.4118	0.0927	4.4414	0.0000	***
IMR2	9.3710	6.1305	1.5286	0.1286	
Restriction Tests					
MBTI	**F-Stat**	**DF (n,d)**	**Prob**		
Test 1	0.9038	16,144	0.5661		
Test 2	0.7707	15,144	0.7080		
Test 3	3.9245	1,144	0.0495	**	
Note: * = 0.10 significance; ** = 0.05 significance; *** = 0.01 significance.					

Table 6 contains the results for the individual personality traits. Here we find fewer significant coefficients than was the case in the previous model. Note that none of the individual dichotomies are significant in the microeconomics equation, though gender, GPA, and performance in the introductory portion of the course are significant. The macro equation yields quite different results. Here we find that Is tend to perform better than Es, and that Ss perform better than Ns. Other results are reasonably consistent with our other models/equations, and teaching micro first is again a significant determinant of student performance. In interpreting these results, it should be noted that any lack of significance of this measure of personality type is not entirely surprising given the seemingly superior relevance of personality type and temperament suggested in the literature. Nonetheless, we do see evidence of differences in the results of macro relative to micro. While these personality traits appear to play no significant role in determining student performance in microeconomics, the results in macroeconomics show Is and Ss at a relative advantage to Es and Ns. While we had no prior expectations regarding the I vs. E comparison, we had anticipated that Ss would be at a relative advantage in

both fields, but that the advantage may be relatively smaller in macroeconomics. This hypothesis, however, is obviously not supported by our results. Further evidence of this is provided in Table 6 where we report the results of our across equation restrictions on the joint effect of personality trait. Our test fails to reject the null of equal effects across equations, once again bringing into question the notion that the impact of personality traits/characteristics varies across the two fields (see Test 2, Table 6).

Table 6: Individual Dichotomy Estimates

	Coeff.	Std.Err.	t-ratio	P-value	
I1	0.6523	1.9128	0.3410	0.7335	
S1	1.5445	2.0527	0.7524	0.4529	
T1	-1.0762	1.9168	-0.5615	0.5752	
J1	1.3035	2.0174	0.6461	0.5191	
AGE1	0.2573	0.3840	0.6698	0.5039	
MALE1	4.3361	2.4337	1.7817	0.0766	*
NONWT1	1.2768	2.7790	0.4595	0.6465	
COURSE1	-8.0808	7.7953	-1.0366	0.3014	
ACTR1	0.1180	0.3574	0.3302	0.7417	
GPAR1	2.6077	1.3605	1.9168	0.0570	*
CUMHRS1	-0.0034	0.0298	-0.1153	0.9084	
QRTHRS1	0.2842	0.7276	0.3906	0.6966	
TRNHRS1	-0.0349	0.0715	-0.4876	0.6264	
NINTROQ1	0.2566	0.1077	2.3836	0.0183	**
NINTROT1	0.4317	0.1453	2.9713	0.0034	***
NMICROQ	0.1807	0.0694	2.6019	0.0101	**
NMAC1ST	0.0653	0.0897	0.7279	0.4677	
IMR1	25.1580	8.9150	2.8220	0.0054	***
INTERCEPT2	-10.1545	12.7568	-0.7960	0.4272	
I2	3.1050	1.8058	1.7194	0.0874	*
S2	4.7012	2.0167	2.3311	0.0210	**

Table 6: Individual Dichotomy Estimates					
	Coeff.	**Std.Err.**	**t-ratio**	**P-value**	
T2	1.0160	2.1849	0.4650	0.6425	
J2	0.1881	1.7358	0.1084	0.9138	
AGE2	-0.1169	0.3900	-0.2998	0.7647	
MALE2	2.2767	2.0014	1.1375	0.2570	
NONWT2	1.0105	2.0665	0.4890	0.6255	
COURSE2	42.9035	6.8284	6.2831	0.0000	***
ACTR2	0.2721	0.2939	0.9257	0.3559	
GPAR2	2.0068	1.6992	1.1810	0.2393	
CUMHRS2	0.0550	0.0303	1.8178	0.0709	**
QRTHRS2	-0.2982	0.4511	-0.6611	0.5095	
TRNHRS2	-0.0334	0.0554	-0.6020	0.5480	
NINTOQ2	0.0324	0.0804	0.4029	0.6876	
NINTROT2	0.1388	0.0979	1.4180	0.1581	
NMACROQ	0.2901	0.0648	4.4763	0.0000	***
NMIC1ST	0.4608	0.0912	5.0518	0.0000	***
IMR2	1.8823	6.3027	0.2986	0.7656	
Restriction Tests					
I-S-T-J Subtypes	**F-Stat**	**DF (n,d)**	**Prob**		
Test 1	1.9212	5,166	0.0934	*	
Test 2	0.6014	4,166	0.6622		
Test 3	7.4149	1,166	0.0072	***	
Note: * = 0.10 significance; ** = 0.05 significance; *** = 0.01 significance.					

The results for student temperaments are presented in Table 7. As suspected, we find that student temperaments do impact student performance in a significant fashion. In microeconomics we find that NTs are at a relative disadvantage when compared to SJs, though the coefficients associated with other temperaments are not significant. In macroeconomics, NTs are once again at a relative disadvantage when compared to SJs, as are NFs. While we had anticipated

that SJs would be at a relative advantage in both fields of study, we hypothesized that they would be at a larger relative advantage in microeconomics. However, we find the relative disadvantage of NTs to be very similar in the two equations, and NFs are indeed at a relative disadvantage in macro, rather than micro. So while we do find that temperaments play a role in student performance in introductory economics, we find little support for our original hypothesis. Further, any variation in the role of personality type across disciplines once again finds no support in our test of across equation restrictions, which fails to reject the null of equal effects of all temperaments across the micro and macro equations (see Test 2, Table 7).

Table 7: Temperament Estimates

	Coeff.	**Std.Err.**	**t-ratio**	**P-value**	
INTERCEPT1	-15.0451	17.1460	-0.8775	0.3815	
NF1	-0.5549	2.7912	-0.1988	0.8427	
NT1	-6.4661	2.4932	-2.5935	0.0103	**
SP1	-1.9709	2.3607	-0.8349	0.4050	
AGE1	0.3883	0.3677	1.0559	0.2925	
MALE1	5.1599	2.4424	2.1127	0.0361	**
NONWT1	1.9249	2.7272	0.7058	0.4813	
COURSE1	-8.9683	7.4367	-1.2060	0.2295	
ACTR1	0.1206	0.3511	0.3435	0.7317	
GPAR1	2.8417	1.3104	2.1686	0.0315	**
CUMHRS1	-0.0103	0.0296	-0.3478	0.7284	
QRTHRS1	0.3539	0.7130	0.4963	0.6203	
TRNHRS1	-0.0303	0.0712	-0.4257	0.6709	
NINTROQ1	0.2520	0.1026	2.4570	0.0150	**
NINTROT1	0.4363	0.1401	3.1139	0.0022	***
NMICROQ	0.1722	0.0667	2.5800	0.0107	**
NMAC1ST	0.0687	0.0856	0.8026	0.4233	
IMR1	24.7100	8.6291	2.8636	0.0047	***
INTERCEPT2	-8.6539	14.0753	-0.6148	0.5395	
NF2	-5.0671	2.7300	-1.8561	0.0652	*

Table 7: Temperament Estimates					
	Coeff.	**Std.Err.**	**t-ratio**	**P-value**	
NT2	-6.3050	3.1654	-1.9919	0.0480	**
SP2	-1.1182	2.5038	-0.4466	0.6557	
AGE2	0.0230	0.4106	0.0560	0.9554	
MALE2	3.0910	1.8825	1.6420	0.1025	
NONWT2	1.4889	2.0378	0.7306	0.4660	
COURSE2	41.6545	6.8021	6.1238	0.0000	***
ACTR2	0.2817	0.2918	0.9653	0.3358	
GPAR2	2.2429	1.6351	1.3717	0.1720	
CUMHRS2	0.0422	0.0304	1.3883	0.1669	
QRTHRS2	-0.2154	0.4824	-0.4466	0.6557	
TRNHRS2	-0.0248	0.0573	-0.4332	0.6654	
NINTOQ2	0.0473	0.0862	0.5493	0.5835	
NINTROT2	0.1681	0.1005	1.6726	0.0963	*
NMACROQ	0.2783	0.0636	4.3742	0.0000	***
NMIC1ST	0.4378	0.0905	4.8364	0.0000	***
IMR2	2.8425	6.2465	0.4551	0.6497	
Restriction Tests					
Temperaments	**F-Stat**	**DF (n,d)**	**Prob**		
Test 1	2.1064	4,168	0.0822	*	
Test 2	0.7824	3,168	0.5053		
Test 3	6.4532	1,168	0.0120	**	
Note: * = 0.10 significance; ** = 0.05 significance; *** = 0.01 significance.					

COMPARISON TO PAST WORK

As noted previously, prior to this current study, the only evidence available regarding the impact of personality type in macroeconomics relative to microeconomics, was from casual examination of the results of two independent

studies which were not specifically designed to make this determination. Here we present a brief comparison of our results, relative to those found by past authors.

In microeconomics, Ziegert (2000) determined that Ss and Ts performed significantly better than Ns and Fs, and that NFs and NTs performed worse than SJs. This is in contrast to our results for microeconomics which show no significant relationship for the individual personality traits, and that, in terms of temperaments, only NTs perform significantly worse than SJs. In macroeconomics, Borg and Shapiro (1996) find that Is perform better than Es, and that NFs and NTs perform at a lower level than SJs. Whereas our macro results show that not only do Is perform better than Es, but also that Ss perform better than Ns, in addition to NFs and NTs performing more poorly than SJs.

While some similarities appear to exist between our work and past work, the main goal here is to determine the degree to which conclusions drawn from a casual comparison of past work would hold up to formal statistical testing. A comparison of the coefficient signs and magnitudes from the work of Borg and Shapiro with that of Ziegert might lead one to conclude that the role of personality type is significantly different in the two fields. For instance, the two papers show no similarities in the significance of individual dichotomies, and the magnitudes of the temperament coefficients are two to three times larger in Borg and Shapiro (macro) when compared to those found by Ziegert (micro)[3]. Contrasting this with our results, a simple comparison of coefficients might suggest that the relationship for the individual dichotomies is quite different in macro vs. microeconomics, and somewhat different from that suggested by a comparison of past research. One might also conclude the impact of temperaments is only slightly different in the two fields, which of course differs from that suggested by past work. Fortunately, the structure of our study allows the ability to move past casual comparison and perform a formal test of the relationship between personality type and student performance. We find that although the estimates are not identical for the two fields of study, their differences cannot be confirmed through formal statistical testing. This important result confirms the relevance of this current work which allows for formal testing and finds that the results do not support conclusions drawn from a casual comparison of past work.

FURTHER RESULTS

One anomaly in our study worthy of exploitation is that, while great care was taken to ensure that both course sections were taught using identical methods,

the fact remains that the order in which macro and micro were taught was reversed in the two sections. We control for this effect in our modeling, as is demonstrated by the NMAC1ST and NMIC1ST variables, and thus its impact should be negligible for our primary results. We believe, however, that the inclusion of this variable provides a unique opportunity to further our understanding of economic education. Given the often-debated issue regarding the order in which micro and macroeconomics are to be placed in the curriculum, the coefficient on these variables provides valuable information. The variables are designed to determine the effect of performance in macro (micro) on a student's performance in micro (macro) given that the macro (micro) portion of the class was taught first. If a positive, significant, coefficient is found for either of these variables, it implies that material learned in one section of the course had a positive influence on performance in the other, and therefore students benefited from the order in which the material was taught. Notice that in all models, the coefficient of MIC1ST is positive and significant, whereas the coefficient on MAC1ST is relatively small, and insignificant. To further explore this, we test the restriction that the coefficients of MAC1ST and MIC1ST are equal in each model (Test 3 in Tables 5-7). We find that we can reject this null at the .05 level in all models. This result implies that teaching microeconomics before macroeconomics benefits students, whereas the opposite is not true.

CONCLUSION

We construct a study designed to directly compare the relative role of personality type as a predictor of student performance in introductory macro vs. microeconomics. Past work on the role of personality type has failed to effectively address the potential differences in the role of type in determining student performance in introductory macroeconomics as opposed to microeconomics. Previous studies have, coincidentally, been performed on both introductory micro and macro, allowing for comparisons between the two fields that are speculative at best. Interestingly, such comparisons lead one to conclude that the role of personality type is different in the two fields. Our study utilizes a one-quarter survey course designed to cover both macroeconomics and microeconomics, thus allowing a direct comparison, and formal testing, of potential differences in the role of personality type in the two branches of introductory economics. Though a casual comparison of our results would suggest that differences in the two fields do exist, all formal tests reject the notion, implying that personality type plays a similar role

in the two fields of study. Further results suggest that the order in which the two fields are taught plays a significant role in determining student performance. We find that teaching microeconomics first tends to help students in learning macroeconomics, though the reverse is not true.

ENDNOTES

1 For a more detailed description the reader is referred to the work by Borg and Shapiro (1996).

2 These regressions take the following form: 1) LOGACT=3.35798 - NONWHITE*0.13969 + MALE*0.07375 and 2) LOGGPA=1.25178 - NONWHITE*0.09190 - NF*0.15458 - NT*0.33596 - SP*0.15539, where LOGACT and LOGGPA are the log of ACT composite and college GPA, respectively, and the independent variables are defined in Table 2. Predictions are converted to levels for the analysis.

3 Recall that these coefficients are from ordered probit models, and should be interpreted accordingly.

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TEACHING COMPARATIVE ADVANTAGE AND INTERNATIONAL TRADE: PITFALLS AND OPPORTUNITIES

Will C. Heath, University of Louisiana at Lafayette

ABSTRACT

This paper discusses pitfalls and opportunities in teaching (and writing about) comparative advantage at the introductory or "principles" level of instruction. We propose that instructors might improve their treatment of this topic by using fractions to represent relative opportunity costs, the true basis of comparative advantage. Using that simple instructional device can be a very effective way to convey the essence of comparative advantage and develop less-than-obvious implications for international trade, such as the fact that domestic firms compete against other domestic firms - not just their foreign counterpoints - in the determination of comparative advantage, patterns of trade, and shares of global markets.

INTRODUCTION

> A young schoolboy is struggling with his first-ever lesson on fractions.
> He cannot understand why 10/50 is less that ½.
>
> "I just don't get it," he says. "Obviously 10 is bigger than 1."
> "Of course," explains his teacher, "but you must also consider the denominator."
> "Yes, I know," the student responds, "but 50 is really bigger than 2."

We might find such an exchange amusing, but economics principles students routinely make essentially the same mistake when they first encounter the theory of comparative advantage. Fortunately, grasping the essence of comparative advantage is as easy as understanding why ½ is greater than 10/50.

The fundamental axiom of comparative advantage is well known in the context of international trade: A country has a comparative advantage in the production of a good or service if its marginal opportunity costs of production are

lower than the marginal opportunity costs of another country producing the same good or service. Consider the following table depicting production possibilities for two countries.

Country A	Country B
Widgets 10	Widgets 8
(or)	(or)
Gadgets 3	Gadgets 2

The table indicates that Country A must forego production of 10 widgets to produce 3 extra gadgets, while Country B could produce 2 extra gadgets at an opportunity cost of 8 widgets. Thus Country B has the comparative advantage in producing widgets (and Country A in producing gadgets). Comparing the marginal opportunity costs of these two countries is analogous to comparing the values of two fractions, in this case 10/3 relative to 8/2. In order to see which has the larger value, one must compare entire fractions, not just numerator to numerator or denominator to denominator. When economics students first contemplate comparative advantage and international trade, they are apt to make the mistake of comparing like products across national boundaries, ignoring production of different products among domestic producers - widgets in Country A to widgets in Country B. But such comparisons say nothing about opportunity costs *within* a country, the true basis of comparative advantage. The mistake is exactly the same as that of the young schoolboy who compares numerators to numerators of fractions, or denominators to denominators.

This paper discusses pitfalls and opportunities in teaching (and writing about) comparative advantage at the introductory or "principles" level of instruction. The issues raised here have importance beyond academics and questions of pedagogy. Many policy debates revolve around the appropriate extent and form of government intervention in international trade. Various interested parties and constituencies argue that protectionism, in one form or another, is needed to save domestic jobs, nurture "infant industries," uphold environmental standards, or promote any number of other alleged benefits. To make informed judgments about the costs and benefits of protectionist policies, economics students must understand the rationale for free trade, and the consequences - obvious and subtle, intended and unintended -- of policies that would alter the nature of trade across national boundaries.

IN THE BEGINNING: THE RICARDIAN DISTINCTION BETWEEN ABSOLUTE AND COMPARATIVE ADVANTAGE

Scholars generally credit David Ricardo with first articulating the principle of comparative advantage and its implications for international trade. His 1819 discussion remains to this day one of the clearer statements of comparative and absolute advantage (not his terminology), and the distinction between the two. The following passages (pp. 115-16) from the chapter, "On Foreign Trade," are particularly germane:

> *The quantity of wine which [Portugal] shall give in exchange for the cloth of England, is not determined by the respective quantities of labour devoted to the production of each, as it would be, if both commodities were manufactured in England, or both in Portugal.*
>
> *England may be so circumstanced, that to produce the cloth may require the labour of 100 men for one year; and if she attempted to make the wine, it might require the labour of 120 men for the same time. England would therefore find it in her interest to import wine, and to purchase it with the exportation of cloth.*
>
> *To produce wine in Portugal, might require only the labour of eighty men for one year, and to produce …cloth in the same country, might require the labour of ninety men for the same time. It would therefore be advantageous for her to export wine in exchange for cloth. This exchange might even take place, notwithstanding the commodity imported by Portugal could be imported could be produced there with less labour than in England. Though she could make the cloth with the labour of ninety men, she would import it from a country where it required the labour of 100 men to produce it because it would be advantageous to her rather to employ her capital in the production of wine, for which she would obtain more cloth from England, than she could produce by diverting a portion of her capital from the cultivation of vines to the manufacture of cloth…. Thus England would give the produce of the labour of 100 men for the produce of the labour of 80.*

Portugal could produce the same amounts of both cloth and wine as England could produce, but with less labor devoted to each product. Thus Portugal enjoyed what we today would term "absolute advantage" in the production of each good.

And yet, it would be in Portugal's interests to trade with England according to the principle of "comparative advantage," since the opportunity costs of foregone output would be greater if Portugal produced cloth, than if England produced cloth (and vice-versa for wine).

The distinction between comparative advantage and absolute advantage in the Ricardo's illustration is essentially this: Absolute advantage is about production of like products in different countries, whereas comparative advantage is about production of different commodities in the same country. Absolute advantage is a matter of comparing the labor costs of producing wine in Portugal, for instance, with the labor costs of producing wine in England. Comparative advantage is more complicated, inasmuch as it involves a comparison of the opportunity costs of producing two different goods - labor employed in the production of wine or, alternatively, in the production of cloth - within each country.

Returning to the mathematics analogy, absolute advantage is a matter of comparing the values of numerators to numerators of fractions, or denominators to denominators. Comparative advantage, on the other hand, is about the value of one entire *fraction* relative to another *fraction*, not just numerators to numerators or denominators to denominators. We shall see that this pedagogical device, this use of fractions, is enormously helpful both in conveying the essence of comparative advantage, and in drawing important implications for international trade.

CURRENT PEDAGOGY: PITFALLS AND OPPORTUNITIES

Authors of economics principles textbooks must treat comparative advantage under constraints on the number of pages allowed by publishers, as well as the level of technical difficulty, given the lack of prior knowledge on the part of principles students. Unfortunately, these constraints can lead to truncated discussions lacking in depth and subtlety, especially in developing the implications for international trade. Instructors may therefore wish to elaborate the textbook discussion, both to avoid certain pitfalls and to develop important insights in teaching comparative advantage and international trade.

For their part, textbook authors must endeavor to avoid the kinds of phrasing that jumbles concepts and adds confusion to an inherently confusing subject. We recently surveyed leading economics principles texts (including Arnold, 2004; Ayers and Collinge, 2004; Bade and Parkin, 2004; Case and Fair, 2002; Ekelund and Tollison, 2000; Friedman, 1990; Gwartney, Stroup, Sobel and McPherson, 2003; Mankiw, 1998; McConnell and Brue, 2002; McEachern, 2000;

Miller, 2004; O'Sullivan and Sheffrin, 2001; and Parkin, 2003) and found passages that could muddle the distinction between absolute advantage and comparative advantage (especially if one reads them in the wrong context, as students are wont to do), and discussions that could be extended in ways that provide additional insights into policy regarding international trade and government regulation of it.

The authors surveyed define comparative advantage and absolute advantage in theoretical terms that are entirely consistent with Ricardo. But when they move on to more concrete issues of international trade, they sometimes use language that could confuse these two concepts in the mind of the beginning student. For example, Bade and Parkin (2004:494) define absolute advantage correctly as "When one person is more productive than another person in several or even all activities." They then state that "The activities in which the U.S. workers are relatively more productive *than their Mexican counterparts* are those in which the U.S. has a comparative advantage" (emphasis added). Do they really mean *comparative* advantage or, in keeping with their own definition of it, *absolute* advantage? Students will have trouble seeing the crucial distinction between absolute and comparative advantage. The fact that U.S. workers are more productive than their Mexican counterparts does not by itself explain comparative advantage, any more than the value of a numerator alone establishes the value of a fraction.

Consider also McEachern's discussion (2000:391) of labor, capital and international trade: "A well-educated and well-trained labor force is more productive than an uneducated and unskilled one… Some countries, such as the United States and Japan, have an educated work force and an abundant stock of modern capital. Both resources result in *greater productivity per worker*, making each nation quite competitive in producing goods that require skilled labor and sophisticated capital" (emphasis added). McEachern comes close to equating comparative advantage with worker productivity, which is to say, *absolute* advantage. His "well-educated and well-trained" workers in the U.S. and Japan are more productive than workers in other countries, just as Portugal's workers were more productive than England's in Ricardo's illustration above. The crucial point, as Ricardo went on to explain, is that such comparisons do not explain why nations should, and do, trade with one another.

Students new to the subject of comparative advantage are especially likely to compare an industry in one country to its counterpart in another country, given the intuitive appeal of the approach. Authors and instructors should therefore be careful to avoid language that invites a simple comparison of like industries. The ability to produce goods and services depends upon resource endowment,

technology, capital accumulation and many other factors. But when one merely compares the productive efficiency of a firm in one nation with the productive efficiency of its *counterpart* firm in another nation, one is, by *definition*, drawing a comparison of absolute advantage, not comparative advantage. To do so is in effect to compare numerators to numerators of fractions. And while one may even be able to explain why one numerator is larger than the other, that does not fully explain which fraction has the larger value.

The pitfall of comparing like industries across borders can be easily avoided by presenting comparative advantage in the context of comparing fractions. Furthermore, this device presents an opportunity to extend the theory of comparative advantage to in a way seldom found in principles-level textbooks. The following section addresses this issue.

A MOST SURPRISING TRUTH ABOUT INTERNATIONAL TRADE

Comparative advantage in international trade is determined by countries' marginal opportunity costs, and those costs depend upon the productivity of domestic producers relative to the productivity of other *domestic* producers in each country. It follows that domestic workers and firms compete in a very real sense with other domestic workers and firms in alternative domestic production. David Friedman discusses this aspect of comparative advantage in his intermediate microeconomics textbook, *Price Theory* (1990). He asks his readers to consider the following (p. 140):

> *There are two ways we can produce automobiles. We can build them in Detroit or we can grow them in Iowa. Everyone knows how we build automobiles. To grow automobiles, we begin by growing the raw material from which they are made - wheat. We put the wheat on ships and send the ships out into the Pacific. They come back with Hondas on them.*

While there are no machines out in the Pacific turning wheat into automobiles, the effect would be the same for U.S. consumers if there were. More to the point, it would be the same for U.S. auto makers if such a machine really did exist. What actually happens on the other side of the ocean does not alter the fact that U.S. auto workers compete in a very real way against U.S. wheat producers, not just against Japanese auto workers: *To have a comparative advantage in producing*

automobiles, U.S. firms in Detroit must be able to build cars cheaper than farmers in Iowa can grow them.

If U.S. auto manufacturers thus compete with U.S. farmers, then trade restrictions in the form of tariffs or import quotas on Japanese automobiles protect U.S. auto workers from (and at the expense of) U.S. wheat producers. All of the textbooks in our survey address the costs of protecting jobs, as indeed they should do, but the discussions focus on the protected industry and the effect on prices for domestic consumers. Other domestic industries not affected directly may be affected indirectly, however. If the U.S. trades wheat to Japan in exchange for automobiles, then fewer autos coming from Japan means less wheat going the other way. Auto tariffs thus protect U.S. auto makers at the expense of wheat producers by reducing the demand for wheat.

Perhaps less obviously, but no less importantly, auto tariffs also protect U.S. auto makers from U.S. wheat producers by preventing them from "growing cars in Iowa." As Friedman (1990:140) points out, "Tariffs are indeed a way of protecting American workers - from other American workers." On this aspect of protectionism current pedagogy could be improved. Not one of the books in our sample suggests that imposing quotas and tariffs might protect domestic producers from other domestic producers, albeit perhaps indirectly and unintentionally. More generally, none of the textbooks in our sample establishes explicitly the connection between domestic, intra-national competition and international trade.

Here again, the use of fractions is helpful as a device for understanding the implications of comparative advantage as they relate to the ever-changing patterns of global trade and the consequences of protectionist policy. Consider McConnell and Brue's (2002:99-101) hypothetical situation involving the United States and Mexico. Each country is capable of producing both avocados and soybeans as depicted in the following tables:

Table 1a: U.S Production Alternatives

Product	R	S	T	U	V
Avocados	0	30	33	60	90
Soybeans	30	20	19	10	0

Table 1b: Mexico's Production Alternatives					
Product	A	B	C	D	E
Avocados	0	20	24	40	60
Soybeans	15	10	9	5	0

Each country must forgo some (constant) amount of one product in order to produce more of another. Since this example assumes constant marginal opportunity costs, the following fractions for the U.S. and Mexico represent each country's production alternatives at all levels of output:

U.S	Mexico
90 Avocados	60 Avocados
30 Soybeans	15 Soybeans

Computing fractions allows us to compare opportunity costs directly. In terms of forgone production, the U.S is shown to be the least-cost producer of soybeans, and Mexico the least-cost producer of avocados. Therefore the U.S. has a comparative advantage in the production of soybeans, and Mexico in the production of avocados. This is true despite the fact that the U.S. can produce more of both products.

Now let us extend the soybean/avocado illustration beyond the discussion in McConnell and Brue. Assume that new technology is made available to U.S. avocado producers, allowing them to be more productive than before. The U.S. production alternative table thus becomes (let us assume) the following:

Table 2a: U.S Production Alternatives					
Product	R	S	T	U	V
Avocados	0	50	55	100	150
Soybeans	30	20	19	10	0

Table 2b: Mexico's Production Alternatives					
Product	A	B	C	D	E
Avocados	0	20	24	40	60
Soybeans	15	10	9	5	0

And the fractions become:

U.S	Mexico
150 Avocados	60 Avocados
30 Soybeans	15 Soybeans

The U.S. has now gained the comparative advantage in the production of avocados, and lost the comparative advantage in soybeans. The reason for the gain of comparative advantage is not that the U.S. can now produce 150 avocados to Mexico's 60 avocados, even though this might seem to be the obvious explanation. The U.S. could already produce more avocados in the original illustration - 90 avocados (Table 1.a) as compared to Mexico's 60. Avocado producers in the U.S. became more productive *relative to U.S. soybean producers*, and therein lies the reason for their gaining the comparative advantage. (Likewise, and the loss of comparative advantage in the production of soybeans had nothing to do with developments in that industry.)

Without adding a lot to the standard treatment of comparative advantage, instructors have the opportunity to develop an important and surprising truth about international trade: namely, that domestic firms compete against other domestic firms - not just their foreign counterpoints - in the determination of comparative advantage, patterns of trade, and shares of global markets. Developing this insight would require the extra pages that editors might be reluctant to add to an already-voluminous principles book. But instructors could easily handle it within the usual textbook structure.

CONCLUSION

Authors and instructors might improve their treatment of comparative advantage and international trade if they would present these subjects explicitly in terms of comparative values of fractions. Using that simple instructional device can

be a very effective way to convey the essence of comparative advantage and develop less-than-obvious implications for international trade.

In particular, we would emphasize that important truths about comparative advantage and international trade will elude students who commit the fundamental error of comparing like industries in different countries. Such comparisons not only ignore domestic opportunity costs, the true basis of comparative advantage, but they also cast the entire discussion of international trade in inappropriate language. Too easily the student comes to think of international trade issues in terms of "us" versus "them." This sort of perspective is simplistic and, at least for some students, probably provides a (false) rationality in defense of various protectionist policies whose costs may outweigh their benefits.

An improved treatment of comparative advantage at the principles level would better prepare students to understand the complexities of global economics, and to recognize when policies to restrict or otherwise alter free trade are potentially harmful. Students deserve no less from an introductory course in economics.

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ECONOMICS ARTICLES

MONETARY POLICY AND HOUSING MARKET: COINTEGRATION APPROACH

Doh-Khul Kim, Mississippi State University - Meridian
Kenneth A. Goodman, Mississippi State University - Meridian
Lauren M. Kozar, Mississippi State University - Meridian

ABSTRACT

There is a general consensus based upon accepted economic theory and empirical research that expansionary monetary policies will positively affect most sectors of the economy, such as the durable and non-durable good industries. Many studies have shown the responses of key economic variables (price and demand) on the housing market to such monetary policies. However, little research has been performed to observe the differentials across housing sub-markets, such as new home construction and existing home sales. Findings regarding these differentials across the two sub-markets will provide valuable insights for both economic policy makers and housing market agents. This study finds that the existing home sales market is more affected by expansionary monetary policies than is the new home construction market.

INTRODUCTION

Economists and policy makers constantly monitor the general status of the economy by weighing both aggregate data (e.g., GDP, inflation, unemployment) and sectoral data (e.g., production by industry) against proper economic policy. When economic growth is sluggish and unemployment rates are high, the central bank may need to adopt expansionary monetary policies. In theory, expansionary monetary policies stimulate production activities, increase consumer confidence, and raise employment levels. In recent years, the Federal Reserve System (FED), which is the central bank in the U.S., has adopted such expansionary monetary policies as the U.S. economy has experienced slow growth and recession since 2001. The execution of these policies has led to the lowest federal funds rate (*liquidity effect*) in the U.S. in over 40 years.

As a result, both consumers and producers can utilize these low interest rates to reduce their borrowing costs and increase their investment expenditures. This increase in expenditures should be realized in a corresponding increase in total GDP. However, numerous empirical studies, such as Christiano et al. (1997), have shown that prices of goods do not respond immediately to expansionary monetary policies. Using U.S. data, their research argues that prices remain at current levels for a substantial period of time. These results imply that the FED should maintain the expansionary monetary policies for durations sufficient to allow the lagged changes in price levels to be realized. Therefore, such expansionary monetary policies will eventually lead to lower interest rates and higher GDP, positively affecting most industries in the economy. The durable-goods industry, which produces goods such as automobiles, computers, appliances, furniture, etc., is one of the sectors affected significantly by interest rate fluctuations. Another, perhaps better, representative of a market susceptible to interest rate fluctuations is the housing market.

This paper will study the effects of changing monetary policies on the housing market by observing the response differentials between new home construction and existing home sales (two housing sub-markets) to interest rate changes. Although several previous studies (Kau and Keenan, 1980; Wheeler, M. and Chowdhury A. R., 1993; Rahman and Mustafa, 1997; He and Winder, 1999; Ahmed and Dua, 2001; Capozza and Li, 2001; Raddatz and Rigobon, 2003; Davis and Heathcote, 2004) have examined the interactions and responses between numerous economic variables on the general housing market and policy changes in the economy, little research has been performed to observe the behavior between these two housing sub-markets. It is commonly accepted that both new home construction and existing home sales are positively affected by expansionary monetary policies. However, the magnitude of the responses may differ between the two sub-markets.

Research into the identification of this response differential should be useful to various economic interests such as economic policy makers and housing market agents. Because new home construction involves construction activities while existing homes sales do not, increases in new home construction over existing homes sales will represent greater infusions to total GDP. Therefore, if new home construction is affected more than that of the existing home sales (or people prefer new homes to existing homes), then expansionary monetary policies will affect the economy more significantly as they create and induce higher construction activities and employment. Increased construction of new homes would put less inflationary pressure on the housing market thanks to increased supply levels to meet the higher

housing demand. Alternately, if expansionary monetary policies (or shock) affect existing home sales more than new home construction, relatively less construction activities and employment would result. A reduction in construction of new homes would put more inflationary pressure on the housing market due to a lack of supply to meet the higher housing demand.

To identify the relationship and the responses in these two sub-markets, this paper employs a cointegration approach, which is a commonly adopted framework in recent time-series research. The Johansen cointegration procedure (1988) is used to determine the presence of any long-term equilibrium linkage between (1) new home construction and monetary policy and (2) existing home sales and monetary policy. The cointegration vectors are then constructed in hopes of identifying any differences between the magnitude and responses of the relationships to the same economic monetary policy.

This paper finds that the demand for existing home sales is more responsive to economic monetary policies (or shock) than is the demand for new home construction. Thus, expansionary monetary policies will induce more inflationary pressure, resulting in relatively less activity in construction and employment.

EMPIRICAL METHODOLOGY

Data

The housing data used in this research were obtained from Bureau of Economic Analysis and U.S. Census Bureau. Data were obtained for total residential structures investment and new home construction, with the data for existing home sales being derived as the difference between residential structure investment and new home construction. The time period chosen is from 1972 to 2003 in quarterly measures. The interest rate data were obtained from the Federal Reserve System. Interest rate data were obtained for the federal funds rate, the 3-month Treasury bill, the 5 year Treasury note, the 10-year Treasury note, and the conventional mortgage from 1972 to 2003 in quarterly measures. An augmented Dickey-Fuller test (1981) was used to determine the existence of unit roots in the levels of the variables. According to Table 1, all the variables have unit roots (are non-stationary) in their level-form, but all are found to be stationary in their first-difference form.

Thus, all variables have single unit roots and are cointegrated in the same order, *I(1)*. Hence, the cointegration test can be performed without a problem. The

lag lengths were chosen accordingly in each model following the results of Akaike's Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC) tests. In other words, each model in this study is the most parsimonious with no autocorrelation.

Table 1: Augmented Dickey-Fuller Test

Interest Rate	New Home Construction	Existing Home Sale
-1.312 (-7.506)	-1.887 (-16.801)	-1.715 (-5.942)

Note: The numbers in parenthesis indicate t-statistics for the first differenced variables and they all reject the null hypothesis of the unit root, whereas the numbers in the upper row accept the hypothesis at 5% significance level. Thus, all the variables are non-stationary in levels and have the same single unit roots, ***I***(1).

Cointegration Test

A multivariate cointegration technique proposed by Johansen [1988] and Johansen and Juselius [1990] as a system-based reduced-rank regression approach was used to determine the existence of any long-run equilibrium relationship(s) among the variables. The cointegration test was performed first because the results from that test would be used for the following cointegrating vector analysis. This Johansen and Juselius [1990] test is preferred to the simpler regression-based Engle and Granger [1987] test because it fully captures the underlying time-series properties of the data and thus provides a test statistic for the total number of cointegrating vectors and permits direct hypothesis testing on the coefficients of those cointegrating vectors. In addition, because this test makes all of the variables explicitly endogenous, the results are constant with respect to the direction of normalization that follows. For this cointegration test, the variables are new home construction, existing home sales, and interest rate. The results provide information about the relationships among these variables.

A cointegrating vector implies a long-run relationship among jointly endogenous variables. The more cointegrating vectors the model has, the more stable the system composed of the non-stationary variables will be. According to Table 2, the value of 96.23 exceeds the 95% critical value of the λ_{trace} statistic (29.68) as shown in the first panel.[1] Thus, the null hypothesis of no cointegrating vectors is rejected and the alternative hypothesis of one or more cointegrating vectors is accepted. Next the $\lambda_{trace}(1)$ statistic is used to test the null of $r \leq 1$ against

the alternative of two or three cointegrating vectors. Because the λ_{trace} (1) statistic of 27.64 is greater than the 95% critical value of 15.41, the null hypothesis is rejected. However, λ_{trace} (2) statistic of 0.20 is less than the critical value (3.76) and the null hypothesis is accepted. Therefore, it can be concluded that there are two cointegrating vectors.

Table 2: Results of Johansen Maximum Likelihood Estimation Test

Null Hypothesis	Alternative Hypothesis	95% Critical Value	λ_{trace} Value
$r = 0$	$r > 0$	29.68	96.23*
$r \leq 1$	$r > 1$	15.41	27.64*
$r \leq 2$	$r > 2$	3.76	0.2
Null Hypothesis	Alternative Hypothesis	95% Critical Value	λ_{max} Value
$r = 0$	$r = 1$	20.97	68.58*
$r = 1$	$r = 2$	14.07	27.44*
$r = 2$	$r = 3$	3.76	0.20

Notes: * denotes significance at the 5% level. *r* denotes the number of cointegrating vectors and the 5% critical values of the maximum eigenvalue and the trace statistics are obtained from Enders' RATS Handbook (1996).

Using the λ_{max} statistic, the null hypothesis of no cointegrating vectors ($r = 0$) against the specific alternative $r = 1$ is clearly rejected as the calculated value λ_{max} (0, 1) = 68.58 exceeds the 95% critical value (20.97). Testing $r = 1$ against e alternative of $r = 2$, the calculated value of λ_{max} (1, 2) is 27.44, whereas the critical value at the 95% significance level is 14.07. Therefore, it can be concluded that there are two cointegrating vectors as the test $r = 2$ against $r = 3$ is not rejected. Both tests show there are two cointegrating vectors present among the variables and it can be concluded that there are long-run equilibrium relationships among new home construction and existing home sales and interest rate (or money supply) on the U.S. housing market.

Cointegrating Vector

Table 3 displays the values of the coefficients in one of the cointegrating vectors.[2] As long as the estimated coefficients have the same direction (positive or

negative) as those predicted by economic theory, the vector does adhere to economic convention.

Table 3: Normalized Cointegrating Vector		
New Home	Interest Rate	Existing Home
1.000	-3.02	0.27
Existing Home	Interest Rate	New Home
1.000	-11.14	3.69
Note: The cointegrating vector is normalized with respect to new home and existing home sales, respectively. The signs of all the coefficients are consistent with general expectations.		

All the coefficients in Table 3 are consistent with theoretical predictions and the findings of most empirical studies. There is a negative relationship between the interest rate and both new home construction and existing home sales. The normalized cointegrating equations in vector notation in Table 3 can be expressed as follows:

New Home Construction = Constant - 3.02 Interest Rate + 0.27 Existing Home Sales: normalized with respect to new home construction *(1)*
Existing Home Sales = Constant - 11.14 Interest Rate + 3.69 New Home Construction: normalized with respect to existing home sales *(2)*

Once again, these estimates convey useful information regarding the way new home construction and existing home sales are linked to the interest rate in the long run. In order to identify which housing sub-market, new home construction or existing home sales, is more responsive to monetary policies (or shock), the coefficients of the interest rate variable need to be compared. According to equation (1), when the interest rate (short-term)[3] declines by one unit, the demand for new home construction increases by 3.02 units. However, according to equation (2), the demand for the existing home sales increases by more than eleven units to the same one unit decrease in the interest rate. Thus, this finding concludes that the demand for existing home sales is more responsive to changes in the interest rate than is the demand for new home construction. Hence, when the central bank adopts expansionary monetary policies to stimulate the general economy, the housing market is affected positively as more consumers try to take advantage of lower

financing costs. This will lead to more consumption activity in the housing market. However, as the findings in this study reveal, consumers tend to purchase existing homes more than they construct new homes. As consumers spend more on purchasing existing homes, it is expected that the price of those homes will increase substantially since the supply is fixed. In addition, as consumers invest in existing homes, less construction activities are expected compared to the demand created when consumers invest in new home construction. Hence, this study implies the following:

a) Expansionary monetary policies will affect the housing market positively as more demand for both new and existing homes is expected.
b) The demand for existing homes is greater than the demand for new homes as the coefficient of the interest rate in equation (2) is greater than that of the same interest rate in equation (1).
c) The findings may imply there will be a lower increase in employment within the housing market and relatively higher inflationary pressure in the economy.
d) Federal, state, and local government officials are advised to provide more incentives to consumers and builders to encourage more investment in new home construction.

CONCLUSION

Expansionary monetary policies have a positive affect on the housing market and the economy. Though there have been numerous empirical research studies that have shown the responses of the housing market to policy changes in the economy, few studies have attempted to show how the policies differentially affect housing sub-markets. Addressing these voids in the literature, this study reveals the effectiveness of monetary policies on the housing market by separating the market into new home construction and existing home sales. The information regarding the effectiveness on new home construction and existing home sales, respectively, may provide useful insights to both economic policy makers and housing market agents.

This study finds that the demand for existing homes is more responsive to expansionary monetary policies (or shock) than is the demand for new home construction. Though the labor market will be stimulated in general by expansionary monetary policies, the increase in employment in the housing market

sector will be smaller than if the demand for new home construction exceeds the demand for existing homes. Additionally, the inflationary pressure within the housing market will be greater due to the relatively fixed supply of existing homes.

In this case, economic policy makers should provide more motivation and tax benefits to housing producers to induce more and lower cost new home construction. In addition, economic policy makers should provide more motivation and tax benefits to home purchasers to induce increased levels of new home construction.

ENDNOTES

[1] To conserve space, the cointegration model is not described here as Johansen (1988) and Johansen and Juselius (1990) provide a detailed description of the test procedure.

[2] This paper shows only one cointegrating vector since there is no qualitative difference across the two vectors.

[3] The 3-month Treasury bill rate is used for current cointegration vectors and equations. Furthermore, the finding is robust to remaining types of interest rates with no qualitatively different results across the interest rates.

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AN APPROACH FOR SOLVING THE COMING FINANCIAL CRISIS IN SOCIAL SECURITY

Stephen T. Evans, Southern Utah University
Matthew T. Evans, Brigham Young University

ABSTRACT

Although Social Security contributions have increased by 961-fold since its inception in 1938 (60-fold, even after adjusting for inflation), more retirees, longer life-expectancy, increased benefits, and relatively fewer FICA workers have offset these increases. The projected $560 billion in OASI taxes in 2004 will take care of this year's retirement payments, but demographic reality will result in outflows exceeding contributions by the year 2018 and a complete depletion of the Trust Fund by 2044. Bipartisan commissions have tried to avert the financial crisis by adjusting the policies and formulas, but the "fixes" have been compulsory and not fully effective and have been a disincentive for people who are otherwise compelled to participate. An average worker deferring retirement for one year is better off by $16,411 (considering net wages), and the government is better off by $22,343 for that year (with deferred payments and more taxes). These numbers create large incentive opportunities.

As a solution to the coming financial crisis we propose that the federal government offer upfront cash payments and other rewards for those who choose to defer retirement. Our models show that with only 7% of potential retirees accepting such incentives, the Social Security system would be preserved for an additional 8 years, and 14% would add nearly 20 years of financial viability.

INTRODUCTION

Beginning with the stock market crash of October 29, 1929, the nation's economy spiraled downward at astonishing speed. By 1933 business activity had dropped by 60% of normal, imports and exports had dropped by about 70%, wholesale prices dropped by about one third, the Dow-Jones Industrial average lost about 83% of its value, farm values dropped about one third from already depressed

levels, farm income fell by about 57%, and one fourth of the nation's workforce was unemployed (Faulkner, 1960). To this day it is still by far the greatest depression the nation (and the world) has ever experienced.

It was in these dire circumstances that President Franklin D. Roosevelt addressed the nation in a variety of formats (including his famous fireside chats,) and assured the country that steps were being taken to ensure that Americans would be free from such anxieties as insecurity, fear, and want. Soon afterward, details of the Social Security program were unveiled. The enabling legislation was passed by Congress in 1934 and signed into law in 1935. Payroll deductions began in 1937, and the first Social Security checks were sent to recipients in January, 1940 (SSA History, 2000).

AN EVOLUTION IN PROGRAM PROVISIONS

From its modest beginnings, the Social Security program has evolved significantly over the years. The original Act, for example, provided retirement benefits only to the worker, but a 1939 amendment added benefits for the spouse and minor children. This changed the program from an individual retirement program to a family-based economic security program (SSA History, 2000). Also, Social Security began as a voluntary program. In fact, only about 50 percent of America's workers were covered under the program in 1950 when amendments were enacted to make it a more universal program (SSA History, 2000).

Another evolution related to the fact that there was no provision in the original program for changes in the cost of living. The amount paid in the first month of retirement was the amount received each month for the remaining years of retirement. That was also changed in the 1950 amendment when a cost of living adjustment (COLA) was added to the plan, but increases needed to be approved by Congress. In 1972 the law was changed to make cost of living increases automatic based on the consumer price index (SSA History, 2000). To help pay for many added provisions, a 1983 amendment established the taxation of Social Security benefits to generate additional funds, and that funding source continues today (SSA History, 2000).

AN EXPANSION IN THE NUMBER OF PROGRAMS

Besides the many provisions that have expanded the characteristics of the original program, there have also been many Congressional amendments that have

added new programs to the scope of "social security." For example, from 1954 through 1958 disability components were added to the plan, and these features eventually covered both disabled workers and the dependents of disabled workers (SSA History, 2000). The most significant financial change in Social Security occurred in 1965 when Medicare was added to the program, and over 20 million beneficiaries enrolled in Medicare within the first three years (SSA History, 2000). In 1977, a newly created Health Care Financing Administration (HCFA) was given responsibility for administering the Medicare program, but funding for Medicare continues to come from FICA payroll contributions (SSA Report, 2004).

More recently, a Supplementary Medical Insurance (SMI) Trust Fund was established to pay for physician services, and the significant thing about this program is that the funding comes from the general fund of the Federal Government (which is a significant change in the tradition of keeping "social security funds" and "general funds" separate). And with the recent passage of the Prescription Drug Program, another commitment will be added for "social security" when it is activated in the year 2006. As with previous programs, the hundreds of billions of dollars in projected expenditures will add an even greater burden for the government and, consequently, the American taxpayers.

AN APPROACHING FINANCIAL CRISIS

As is often the case with government programs, size has increased significantly with time. It is always easier for politicians to promise more than to promise less. And so it has been with programs designed for "social security." In the approximately 65-year history of the social security programs, the worker contributions that were 1% of the first $1,400 in the late 1930s have evolved to where contributions by both employee and employer are now 15.3% of the first $87,900 (2004). So instead of a $14 "potential contribution" per year per participant, the "potential contribution" is now $13,449 or about 961 times greater. Even after being adjusted for inflation the "potential contribution" per employee is over 60 times greater than it was in the late 1930s.

Social Security benefits are, of course, more generous than they were in the early years and involve a greater percentage of the population, so the 60-fold increase in "real" payroll contributions is not sufficient to keep up with the future needs of the program. Although more than enough is being paid into the "retirement" trust fund to cover present needs, it is estimated that by the year 2018, outlays will begin to exceed payroll contributions. By 2029, outlays will begin to

exceed the combined amount of both payroll contributions and trust fund earnings, and the trust fund will begin to decline until it is fully depleted in the year 2044. At that point it is estimated that annual payments into the fund will only be 73% of annual benefits (SSA Report, 2004).

While the "retirement" aspects of the program are challenging enough, the "disability" and "medical" aspects of the program make it even more burdensome. It should be noted that of the payroll contribution of 15.3% made to FICA by employees and employers, only 10.6% is made for old age and survivor benefits (OASI). An additional 1.8% is added for Disability Insurance (DI) and 2.9% for Hospital Insurance (HI). While projections show the OASI fund being depleted by the year 2044, the disabilities fund (DI) will be exhausted in 2029. Likewise, expenditures in the HI program (that covers Medicare) will begin to exceed income in 2009, and the fund will be completely exhausted by the year 2019 (SSA Report, 2004). Obviously, something needs to be done.

SEARCHING FOR A SOLUTION

It is not the purpose of this paper to judge the merits of Social Security or to evaluate the social, philosophical, or political underpinnings of the overall program but merely to explore some financial realities and possibilities. The major culprit is, of course, demographics. The "baby boomers" who were born following World War II are approaching their retirement years, and those retiring will live much longer than people a generation or two ago. When Social Security was started, the official retirement age was 65, but those entering the work force were expected to live to about 65 years of age (SSA Online, 2004). Now those entering the work force are expected to live to about 80 years of age (SSA Online, 2004) and that dramatically increases the number of people covered by the program. At the same time, the birth rate is lower than it has been in past decades, so there are fewer people joining the work force to take care of those who are and will be retiring.

In evaluating the problem it has often been stated with mathematical simplicity that either (1) a greater amount of taxes need to be paid into the funds, and/or (2) more returns need to be earned on the trust fund investments, and /or (3) people need to retire at a later age, and/or (4) Social Security recipients need to be given less in benefits, and/or (5) fewer retirees need to receive benefits (i.e., through some form of means testing). Of course, significant opposition comes to the surface when any of these five considerations are discussed. So in analyzing the problems and the potential solutions, what do the experts have to say?

A REVIEW OF THE LITERATURE

There are few things that receive more written attention than the topic of Social Security because the trillions of dollar involved either do or will affect nearly all 290 million Americans. Internet searches, for example, can literally run into the millions of references. While most writers acknowledge that there is a coming financial crisis, there are some who downplay the situation. A recent Newsweek article described the so-called Social Security crisis as "just propaganda, spread by people determined to shake your faith in the government's most popular program" (Quinn, 2004).

Most scholars, however, describe the Social Security situation as very serious. An article in The American Economic Review, for example, emphatically states that "virtually everyone familiar with US Social Security financing understands that the system cannot pay currently legislated benefits for more than another three or four decades without significant, probably politically unacceptable, tax increases. Some analysts predict that the cash crunch will come substantially sooner than that [and] all reasonable measures of the system's finances lead to the same fundamental conclusion that the system's benefits and revenue sources must be significantly rebalanced" (Pozen, Schieber, and Shoven, 2004).

Another article in *The American Economic Review* states that "reforming Social Security to restore its financial balance is one of the most important public policy issues of the 21st century" (Clark, 2004). As to how to solve the approaching crisis, an article in the Harvard Business Review suggests that "the three main alternatives executives might choose to support are…1. increasing contributions to Social Security, 2. decreasing the growth of benefits for more-affluent workers, and 3. increasing investment returns on Social Security assets" (Pozen, 2002).

Another obvious way of balancing the fund—that of deferring the time of retirement—is not dealt with as much in the literature, but an article in International Tax and Public Finance deals with the possibility by showing how "early retirement seems to plague social security systems in a number of European countries [and] delaying retirement may have…positive effects…" (Cremer and Pestieau, 2003).

While much analysis in the academic literature is given to (1) increasing contributions, (2) deferring retirement, and/or (3) reducing retirement benefits, the greatest attention at present seems to focus on increasing the earnings of the Social Security trust funds. One advocate, for example, states that idle tax dollars need to be "earning money through investment [and Social Security needs to be] transformed into a privatized system. It is time the world's foremost market

economy put the market to work for the future of America and all Americans" (Blackwell, 2002).

An article in the *Journal of Asset Management* states that a solution must be achieved by "…gradually shifting from [the current approach] towards a system more like a traditionally funded one--common in the corporate world--under which pensions are funded by the capital accumulated through lifetime contributions, while maintaining the attractive defined benefit structure [but the system must] avoid individual accounts" (Modigliani and Muralidhar, 2003). In contrast, an article in The American Economic Review strongly states that "the optimal structure for Social Security involves a substantial individual-accounts component, even for highly risk-averse participants" (Nataraj and Shoven, 2003).

As implied by the references above, many of the current academic papers seem to embrace the concepts of private investments and free-enterprise economics to solve the problems, but there remains a question of how committed these proponents really are to the concepts of free-enterprise economics. For example, most of the literature is still "governmental" in orientation which means they are compulsory and bureaucratic. Also, there is a scarcity of "social security" literature that deals with motivation and incentives. One such exception is an article in The American Economic Review that suggests it is "…time to make creative use of insights from behavioral economics that have emerged over the years" (Shiller, 2003).

AN OVERVIEW OF THE FINANCIAL PARAMETERS

Having drawn on the insights of the academic literature, we turn our attention to the financial parameters of the "social security" programs. Looking first and foremost at Old Age and Survivors Insurance (and not the disability and medical programs), there were 154 million workers paying into the OASI fund in 2003 with payroll taxes totaling $456.1 billion (SSA Report, 2004). So, on average, each employee (along with the equivalent amount paid by the employer) contributed $2,962 during 2003. In addition, earnings on the Trust Fund and income taxes collected on FICA wages added an additional $569 per worker, so the equivalent contribution per worker was $3,531.

On the recipient side of the equation, there were 39.4 million people receiving OASI benefits, and the recipient benefits during 2003 total $406 billion (SSA Report, 2004). In other words, the average recipient received $10,305 per year or $859 per month. The fact that recipients each receive about three times the

amount that each worker puts into the fund is not a mathematical problem as long as there are more than three times as many workers in the workforce to provide the necessary contributions, but this will not be the case in future years.

Some have suggested that investing the trust funds in investments that provide greater returns will solve the problem, but even doubling the trust fund earnings will only add an equivalent of $488 per year per worker. So more income on the trust fund will not be the answer (although any such earnings will help). The answer must lie in one of the other three categories (more contributions, more working years, or fewer benefits).

ESTABLISHING A FOUNDATION OF THINKING

Before proceeding any further towards a possible solution, it is essential that we first establish a foundation from which an effective solution can emerge. After all, if solid thinking is established in one "ballpark" but it is the wrong "ballpark," then the optimal solution will not emerge. In the case of Social Security, that may be the problem of the past. May we suggest at the outset that free-enterprise-type incentives may be the solution. After all, we often talk of freedom and free-enterprise economics as being responsible for building the American economic miracle—probably the most prosperous country in the history of the world.

We have also watched many countries apply the same economic principles with similar results. A prime example is China which was an economically stagnant communist country having trouble feeding its own people. After several decades observing the United States growing at about 3.5% (Sharp, Register, and Grimes, 2002), it finally replaced its collectivist thinking with a "localized capitalism" a little more than a decade ago (although maintaining some controls at the central level); its population of 1.2 billion people have since been expanding at an impressive annual compound rate of 9.94% (Lee, 2003). But even with such dramatic evidences, there are still people who look toward government bureaucracy as the solution to problems rather than the natural incentives that come with a free-enterprise approach.

THE ROLE OF INCENTIVES

These observations are not to suggest that we abandon the Social Security program or government's involvement in it. But there are government programs that are run like "government programs" (typically with compulsion, lack of

incentives, and ineffectiveness) and there are government programs that are built on free-enterprise principles (with characteristics of personal choice, incentives, and efficiency). Among other things we need to keep in mind that economic incentives and disincentives work, and they work in both positive and negative things. For example, if we increase welfare benefits, we shouldn't be surprised when there are more people on welfare. Likewise, when we want businesses to create more jobs in economically depressed areas, tax incentives frequently induce entrepreneurs to do just that.

In the 1980s, when more jobs were needed in the American economy, the government established more lenient depreciation schedules (the Modified Accelerated Cost Recovery System) that preserved more cash in the businesses in the earlier years when the present value of money was higher, and the results were phenomenal. American businesses significantly increased their investments in new plants and equipment, and the economy went on a "tear" in job creation. Examples of incentives and disincentives that have worked in the past (both economic and non-economic) are shown in Table 1 below:

THE CURRENT SOCIAL SECURITY PLAN IN RELATIONSHIP TO INCENTIVES

Having summarized some common examples of economic and non-economic incentives, how has the Social Security program measured up to these incentives? In approximately the last twenty years, several committees and bipartisan commissions have dealt with the Social Security crisis, and new policies and formulas have been established to help with the problem. Generally these changes have required people (1) to pay more money into the system while they work, (2) to work more years before they retire, and (3) to receive fewer benefits when they do retire.

Other frequently-expressed concerns are that (1) social security trust funds have been continually placed in investments that yield lower returns than those achieved by professional pension managers and (2) the actuarial soundness that has been stated as an eventual goal has never been achieved. What is interesting about the situation is that the government regulates private investment funds to make sure they are (1) actuarially sound and (2) managed with a "prudent investment" mentality. If fund managers are guilty in either of these two categories, they can be forced out by government regulators or even charged with criminal neglect. And yet

some would argue that the government is the greatest violator of these two standards.

Table 1: Examples of the Impact of Incentives		
Primarily Economic:		
	Leading to positive results	**Leading to negative results**
Positive economic incentives (that give more money):	Increasing tax breaks to businesses creates jobs in central cities	Increasing welfare payments results in more people on welfare
Economic disincentives (that take away money):	Increasing fines reduces speeding in highway construction zones	Reducing welfare payments forces many mothers to leave their homes for jobs
Primarily Non-Economic:		
Positive non-economic incentives (that provide more "psychic" benefits):	Increasing patriotism brings more people into the military after Pearl Harbor	Glamorizing violence leads to more violence
Negative non-economic incentives (that take away "psychic" benefits):	Increasing jail time and other punishments reduce various types of crimes	Punishing people leads to bitterness and more undesirable behavior

Defenders of the Social Security program are quick to point out that it is not a typical insurance program but more of a "provider of last resort," and, in fact, the phrase "Social Security Insurance" is more likely to be referred to now by the shorter description of "Social Security." Social Security administrators have made occasional reference to the ultimate objective of achieving "actuarial soundness," but the program has never come close to accomplishing that goal.

Because of these real and/or perceived program deficiencies, there has emerged in recent years a widespread feeling among workers that many, especially those born from 1946 through 1964, will never see the full social security benefits that they have paid for in payroll deductions (TIAA, 2000). Do these examples demonstrate a model of free-enterprise incentives or a model of bureaucratic compulsion and lack of incentives? In Table 2, these realities have been plotted on the same grids that were shown in the previous table, and all are on the side that leads to negative results.

Table 2: Impact of Social Security policies under the current approach ("Structured Plan")		
Primarily Economic:		
	Leading to positive results	**Leading to negative results**
Positive economic incentives (that give more money):		
Economic disincentives (that take away money):		More FICA payments required Fewer benefits when retire Less return on investments
Primarily Non-Economic:		
Positive non-economic incentives (that provide more "psychic" benefits):		
Negative non-economic incentives (that take away "psychic" benefits):		Must work more years until retirement Perceived as unlikely that the benefits will ever be received

POTENTIAL INCENTIVES IN THE SOCIAL SECURITY PROGRAM

While many observers think of social security as a massive bureaucratic program, one would also be hard-pressed to find a program with more potential for free-enterprise incentives. As to the trust funds, for example, the invested funds have frequently earned less than the major stock markets have consistently averaged over the last several decades. While it might be difficult to consistently achieve the same success in Social Security, let us show the mathematics of such a possibility to illustrate the point. Suppose a worker earning $30,000 per year put 15% of his or her salary (including the employer's contribution) into Social Security for 40 years and earned 5% compounded annually, the accumulated funds at the end of the 40-year working career would be $543,600. If the worker had put the same contributions into a private pension fund that earned 10% (and actually it has been greater than that over the last 80 years), the accumulated funds at the end of 40 years

would have been $1,991,655. Under which plan is a better (and perhaps earlier) retirement provided for the recipient?

To further illustrate the power of free-enterprise incentives that potentially exist in the social security program, consider the positive impact that deferring retirement by one year has on both the worker and the government. If we consider a worker who earns $36,000 per year and has a taxable income of $30,000 per year, deferring retirement by one year will mean that the worker gives up about $12,597 in after-tax retirement benefits ($14,400 minus $1,803 in approximate taxes) but will have another $29,008 in net yearly earnings ($36,000 minus $2,754 in FICA and $4,238 in approximate income taxes). The net benefit to the worker in deferring retirement for a year will be $16,411.

As to the government, the benefit is even greater. When the same worker decides to work another year, the government saves $12,597 in retirement payments ($14,400 minus $1,803 in approximate taxes) but also receives another $9,746 in revenue ($5,508 in FICA and $4,238 in approximate income taxes). The net benefit to the government is $22,343. When an investment return on the trust fund is added, the benefit to the government is even greater. Since the government is coming out even better on the deal, couldn't a case be made for paying upfront cash incentives, even generous incentives, to entice potential retirees to defer retirement? And the government already does give higher retirement benefits to those who retire at a later time, so we see natural incentives that could be both added to the program and more strongly emphasized. Table 3, on the following page, shows how these incentives compare to the incentives (and disincentives) shown in the previous two tables. All are on the side leading to positive results.

APPLYING THE CONCEPT OF INCENTIVES

Mention has been made of bipartisan commissions that have been established (especially in the last 20 years) to recommend ways to strengthen the Social Security program. In consequence, many improvements have been made. One of the things that has been done right is the establishment of a "retirement schedule" where people have a variety of options in when and how they retire. They can take fewer benefits if they retire at an earlier age or receive greater benefits if they are willing to extend their working years. For example, a worker wishing to retire at age 62 will receive approximately 75% of full benefits (depending on the year of birth), whereas someone retiring at age 70 will receive about 125% of "normal benefits" (depending on the age of birth

Although on the right track, the problem with this "formula" is fivefold. First, it is not well communicated. Many workers, especially those approaching retirement age, are generally unaware of the options for taking early Social Security retirement or late Social Security retirement. In the official "status statements" that are now sent annually by the Social Security Administration to potential recipients (which began in October of 1999), there are three references to the amounts that recipients might expect under various retirement ages (and this is helpful information), but it certainly isn't a hard-hitting marketing campaign, and the breadth of possibilities is not adequately communicated.

Table 3: Impact of Social Security policies under the proposed approach ("Incentives Plan")

Primarily Economic:		
	Leading to positive results	**Leading to negative results**
Positive economic incentives (that give more money):	Upfront money (progressively increasing) if defer retirement More wages until retire More investment income being earned by the fund Higher benefits (progressively increasing) when retire	
Economic disincentives (that take away money):		
Primarily Non-Economic:		
Positive non-economic incentives (that provide more "psychic" benefits):	More likely to receive full benefits in the future America and Social Security will become stronger	
Negative non-economic incentives (that take away "psychic" benefits):		

The second problem with the options is that they are too complicated. The combination of retirement dates, birth dates, and other factors make it difficult for

the average recipient to comprehend. The third problem is that the numbers are stated primarily as percentages (which many people don't relate to) rather than being in "hard cold dollars." The fourth problem (and perhaps the biggest problem) is that the benefits to be received for delaying retirement are benefits that are deferred well into the future. The very nature of human beings is that they want their rewards now rather than later. That is why car dealers successfully sell cars with a "$2,000 cash back" even though the $2,000 comes out of the amount borrowed by the customers. The $2,000 is "now," but the repayment of the $2,000 is "far" into the future. As Americans we have not only become largely a "me" generation but a "now" generation.

A fifth problem is that nothing is said to appeal to people about their "sense of citizenship" or patriotism—about helping to solve the problem. The same generation that has retired in recent years is the generation that voluntarily signed up by the millions for military service following Pearl Harbor. Americans are patriotic. They respond to needs if they are understood and viewed as "compelling." This same generation (along with many "baby boomers" who are approaching retirement) might yet step forward to solve the problem if the appeal is made. Perhaps working a few more years for a noble cause might be as enticing and rewarding as playing golf and shuffleboard each day.

A TYPICAL PAYOUT UNDER THE CURRENT SOCIAL SECURITY PROGRAM

To illustrate possible ideas for dealing with the eventual insolvency of Social Security (under current projections), we will refer to the current approach as a "structured plan" (as was seen in Table 2). Under this general plan there are some options for potential retirees and some built-in financial reasons for deferring retirement, but the earnings history, age, and other parameters largely determine the dollar amounts. The program possibilities and recommendations that we will be proposing will be referred to as an "incentives plan" because we will be proposing additional incentives and other stimulating features.

Rather than dealing with aggregate numbers that are in the hundreds of billions of dollars, it is initially simpler to illustrate the financial possibilities by considering a single individual who has been making $36,000 per year and who is now approaching age 65 and contemplating retirement. Under the current or "structured plan," this retiree would receive about $1,200 per month or $14,400 per year in retirement payments less an annual income tax on the payments of about

$1,803 (that was added in 1983). If the retiree lives for 20 years (and if we use a present value of 5%), the present value of the benefits received by the retiree over the twenty-year period will be $156,986 (as shown in Table 4). Also shown in Table 4 is the present cost of the Social Security payments by the Social Security Administration (SSA) which is $239,943 for the 20 years.

A TYPICAL PAYOUT IF THE RECIPIENT DEFERS RETIREMENT UNTIL 70

If the recipient waits until age 70 to retire, he or she will continue to enjoy $29,008 in net wages during the additional five years of employment ($36,000 less $4,238 in approximate income taxes and $2,754 in FICA). After the five years, the net retirement from Social Security will be about 30% greater or approximately $15,997 ($18,400 minus approximate income taxes of $2,403). Of course the present value of all payments will be worth less to the retiree because of the need to wait for the money. Table 5 shows that the present value of all payments received by the retiree over the 20 years will be $255,689 or $98,703 more because of the decision to defer retirement by five years. The government also comes out a winner because its present cost will become $102,509, which is $137,434 less than the cost if the retiree chooses to retire at age 65.

A PROPOSED APPROACH FOR BUILDING IN MORE INCENTIVES

As referenced above, what if there were a couple of simple formulas that were well communicated through a massive advertising campaign that gave those at retirement age some upfront cash incentives each year to entice them to defer retirement as well as significant increases in the retirement benefits when the time came that they did retire. If these formulas were designed appropriately (with both recipient and government in mind), both sides would come out major winners. The government would continue to receive more FICA and income taxes as well as defer social security payments; the recipient would benefit from (1) additional years of wages, (2) upfront cash payments for deferring retirement, and (3) increased benefits when the retirement was taken.

Table 4: Social Security calculations with full retirement at age 65 (Under the current or "structured plan")

		Recipient								Government				
Age	Wages	S.S. Pay	Tax	FICA	Net	PV	Value	Tax	FICA	Inv	S.S. Pay	Net	PV	Value
65	0	14,400	-1,803	0	12,597	0.95	11,997	1,803	0	0	-14,400	-12,597	0.95	-11,997
66	0	14,400	-1,803	0	12,597	0.91	11,426	1,803	0	-630	-14,400	-13,227	0.91	-11,997
67	0	14,400	-1,803	0	12,597	0.86	10,882	1,803	0	-1,291	-14,400	-13,888	0.86	-11,997
68	0	14,400	-1,803	0	12,597	0.82	10,364	1,803	0	-1,986	-14,400	-14,583	0.82	-11,997
69	0	14,400	-1,803	0	12,597	0.78	9,870	1,803	0	-2,715	-14,400	-15,312	0.78	-11,997
70	0	14,400	-1,803	0	12,597	0.75	9,400	1,803	0	-3,480	-14,400	-16,077	0.75	-11,997
71	0	14,400	-1,803	0	12,597	0.71	8,952	1,803	0	-4,284	-14,400	-16,881	0.71	-11,997
72	0	14,400	-1,803	0	12,597	0.68	8,526	1,803	0	-5,128	-14,400	-17,725	0.68	-11,997
73	0	14,400	-1,803	0	12,597	0.64	8,120	1,803	0	-6,015	-14,400	-18,612	0.64	-11,997
74	0	14,400	-1,803	0	12,597	0.61	7,733	1,803	0	-6,945	-14,400	-19,542	0.61	-11,997
75	0	14,400	-1,803	0	12,597	0.58	7,365	1,803	0	-7,922	-14,400	-20,519	0.58	-11,997
76	0	14,400	-1,803	0	12,597	0.56	7,014	1,803	0	-8,948	-14,400	-21,545	0.56	-11,997
77	0	14,400	-1,803	0	12,597	0.53	6,680	1,803	0	-10,025	-14,400	-22,622	0.53	-11,997
78	0	14,400	-1,803	0	12,597	0.51	6,362	1,803	0	-11,157	-14,400	-23,754	0.51	-11,997
79	0	14,400	-1,803	0	12,597	0.48	6,059	1,803	0	-12,344	-14,400	-24,941	0.48	-11,997
80	0	14,400	-1,803	0	12,597	0.46	5,771	1,803	0	-13,591	-14,400	-26,188	0.46	-11,997
81	0	14,400	-1,803	0	12,597	0.44	5,496	1,803	0	-14,901	-14,400	-27,498	0.44	-11,997
82	0	14,400	-1,803	0	12,597	0.42	5,234	1,803	0	-16,276	-14,400	-28,873	0.42	-11,997
83	0	14,400	-1,803	0	12,597	0.4	4,985	1,803	0	-17,719	-14,400	-30,316	0.4	-11,997
84	0	14,400	-1,803	0	12,597	0.38	4,748	1,803	0	-19,235	-14,400	-31,832	0.38	-11,997
							156,984							-239,940

Table 5: Social Security calculations with full retirement at age 70 (Under the current plan)

		Recipient						Government						
Age	Wages	S.S. Pay	Tax	FICA	Net	PV	Value	Tax	FICA	Inv	S.S. Pay	Net	PV	Value
65	36,000	0	-4,238	-2,754	29,008	0.95	27,627	4,238	5,508	0	0	9,746	0.95	9,282
66	36,000	0	-4,238	-2,754	29,008	0.91	26,311	4,238	5,508	487	0	10,233	0.91	9,282
67	36,000	0	-4,238	-2,754	29,008	0.86	25,058	4,238	5,508	999	0	10,745	0.86	9,282
68	36,000	0	-4,238	-2,754	29,008	0.82	23,865	4,238	5,508	1,536	0	11,282	0.82	9,282
69	36,000	0	-4,238	-2,754	29,008	0.78	22,729	4,238	5,508	2,100	0	11,846	0.78	9,282
70	0	18,400	-2,403	0	15,997	0.75	11,937	2,403	0	2,693	-18,400	-13,304	0.75	-9,928
71	0	18,400	-2,403	0	15,997	0.71	11,369	2,403	0	2,027	-18,400	-13,970	0.71	-9,928
72	0	18,400	-2,403	0	15,997	0.68	10,827	2,403	0	1,329	-18,400	-14,668	0.68	-9,928
73	0	18,400	-2,403	0	15,997	0.64	10,312	2,403	0	596	-18,400	-15,401	0.64	-9,928
74	0	18,400	-2,403	0	15,997	0.61	9,821	2,403	0	-175	-18,400	-16,172	0.61	-9,928
75	0	18,400	-2,403	0	15,997	0.58	9,353	2,403	0	-983	-18,400	-16,980	0.58	-9,928
76	0	18,400	-2,403	0	15,997	0.56	8,908	2,403	0	-1,832	-18,400	-17,829	0.56	-9,928
77	0	18,400	-2,403	0	15,997	0.53	8,484	2,403	0	-2,724	-18,400	-18,721	0.53	-9,928
78	0	18,400	-2,403	0	15,997	0.51	8,080	2,403	0	-3,660	-18,400	-19,657	0.51	-9,928
79	0	18,400	-2,403	0	15,997	0.48	7,695	2,403	0	-4,642	-18,400	-20,639	0.48	-9,928
80	0	18,400	-2,403	0	15,997	0.46	7,328	2,403	0	-5,674	-18,400	-21,671	0.46	-9,928
81	0	18,400	-2,403	0	15,997	0.44	6,979	2,403	0	-6,758	-18,400	-22,755	0.44	-9,928
82	0	18,400	-2,403	0	15,997	0.42	6,647	2,403	0	-7,896	-19,400	-23,893	0.42	-9,928
83	0	18,400	-2,403	0	15,997	0.4	6,331	2,403	0	-9,090	-18,400	-25,097	0.4	-9,928
84	0	18,400	-2,403	0	15,997	0.38	6,029	2,403	0	-10,345	-18,400	-26,342	0.38	-9,928
							255,689							-102,509

Table 6: Social Security calculations with full retirement at age 75 (Under the new plan)

		Recipient						Government						
Age	Wages	S.S. Pay	Tax	FICA	Net	PV	Value	Tax	FICA	Inv	S.S. Pay	Net	PV	Value
65	36,000	1,200	-6,038	-2,754	28,409	0.95	27,056	6,038	5,508	0	-1,200	10,346	0.95	9,853
66	36,000	2,400	-6,338	-2,754	29,309	0.91	26,584	6,338	5,508	517	-2,400	9,963	0.91	9,037
67	36,000	3,600	-6,638	-2,754	30,209	0.86	26,095	6,638	5,508	1,015	-3,600	9,561	0.86	8,259
68	36,000	4,800	-6,938	-2,754	31,109	0.82	25,593	6,938	5,508	1,493	-4,800	9,139	0.82	7,519
69	36,000	6,000	-7,238	-2,754	32,009	0.78	25,079	7,238	5,508	1,950	-6,000	8,696	0.78	6,813
70	36,000	7,200	-7,538	-2,754	32,909	0.75	24,557	7,538	5,508	2,385	-7,200	8,231	0.75	6,142
71	36,000	8,400	-7,838	-2,754	33,809	0.71	24,027	7,838	5,508	2,797	-8,400	7,742	0.71	5,502
72	36,000	9,600	-8,138	-2,754	34,709	0.68	23,492	8,138	5,508	3,184	-9,600	7,229	0.68	4,893
73	36,000	10,800	-8,438	-2,754	35,609	0.64	22,954	8,438	5,508	3,545	-10,800	6,691	0.64	4,313
74	36,000	12,000	-8,738	-2,754	36,509	0.61	22,413	8,738	5,508	3,880	-12,000	6,125	0.61	3,760
75	0	28,800	-3,963	0	24,838	0.58	14,522	3,963	0	4,186	-28,000	-20,651	0.58	-12,074
76	0	28,800	-3,963	0	24,838	0.56	13,830	3,963	0	3,154	-28,000	-21,684	0.56	-12,074
77	0	28,800	-3,963	0	24,838	0.53	13,172	3,963	0	2,069	-28,000	-22,768	0.53	-12,074
78	0	28,800	-3,963	0	24,838	0.51	12,545	3,963	0	931	-28,000	-23,907	0.51	-12,074
79	0	28,800	-3,963	0	24,838	0.48	11,947	3,963	0	-264	-28,000	-25,102	0.48	-12,074
80	0	28,800	-3,963	0	24,838	0.46	11,378	3,963	0	-1,519	-28,000	-26,357	0.46	-12,074
81	0	28,800	-3,963	0	24,838	0.44	10,837	3,963	0	-2,837	-28,000	-27,675	0.44	-12,074
82	0	28,800	-3,963	0	24,838	0.42	10,320	3,963	0	-4,221	-28,000	-29,059	0.42	-12,074
83	0	28,800	-3,963	0	24,838	0.4	9,829	3,963	0	-5,674	-28,000	-30,511	0.4	-12,074
84	0	28,800	-3,963	0	24,838	0.38	9,361	3,963	0	-7,200	-28,000	-32,037	0.38	-12,074
							365,591							-54,653

In Table 6 we have used an "upfront cash" formula of $100 per month or $1,200 in the first year of deferred retirement, $200 per month or $2,400 in the second year, and have continued this $1,200 per year increase with no maximum cutoff. As to the "increased benefits" formula when retirement is taken, we have used (for illustrative purposes) an even 10% increase in eventual retirement benefits for the first year of retirement, an additional 10% increase in the second year and so on with no maximum cut-off. As shown in Table 6, for example, the recipient who delays retirement for 10 years will receive a retirement benefit of $28,800 starting at age 75 or twice the amount if retirement had been taken at age 65.

In Table 6, notice that the present value of the recipient payments will be $365,591. This is $109,902 more than if retirement is deferred five years (shown in Table 5) and $208,605 more than if retirement is taken at age 65 (shown in Table 4). The present value cost to the government has also decreased to $54,653. This is $47,856 less than the five-year retirement option shown in Table 5 and $185,290 less than the retirement option shown in Table 4 (retiring at age 65). It is significant that the benefits of deferring retirement are so great that significant incentives could be offered by the government to encourage American workers to defer retirement.

PROMOTING THE CONCEPT OF DEFERRING RETIREMENT

Considering the fact that a typical worker deferring retirement for a single year could provide the government with $22,343 in net benefits (as described in the example on page 9), and considering the fact that there are approximately 40 million workers already at retirement age with millions more approaching that age, the financial possibilities are staggering. The government could afford to be lavish in the incentives given and also in the money spent to communicate the message.

The upfront cash payments, for example, that are shown in the third column of Table 6 are a type of reward for non-retirement, and if they were properly communicated and understood, they could become a powerful incentive (like cash-back incentives that car dealers use). The increasing amount for the eventual retirement benefits would also be important, but besides the specific information on financial incentives for deferring retirement, the overall tone of any communication would be equally important.

To accomplish the task of communicating elements of an "incentives plan," a possible advertising communiqué is shown in Table 7 on the following page. Although it is not yet "visually appealing," it contains the primary information that such an advertisement might communicate to the American public. Of the basic

elements that such an advertisement should have, the idea that both the country and the individual citizen would be benefited from such a decision is important. In other words, the idea of "contributing to country and patriotism" should be instilled as much as the financial benefits that would be received by workers choosing to defer retirement.

Table 7: Contents of a Possible Advertising Flyer for a New "Incentives Plan"

Strengthen America and the Social Security Program
And Be Compensated for Doing Your Part

Announcing newly approved
Incentives for Deferring Retirement
Approved by the Congress of the United States
Signed into law by the President of the United States
Administered by the Social Security Administration

Significant benefits for you, Social Security, and the U.S. Government:

Your additional benefits when you defer retirement:
Upfront cash payments that increase each year you defer retirement
Increased Social Security benefits when you do retire
Continuing wages in your job until you retire

Additional government benefits when you defer retirement:
Deferral of Social Security payments
Continued receipts of FICA and income taxes
Additional earnings on the Social Security Trust Fund

Example of a typical worker
(Earning $36,000 per year and approaching 65 years of age)

Upfront cash payments:
Receives approximately $100 per month by check the first year of deferred retirement, $200 per month by check the second year of deferred retirement, and so on with no cut-off point. For example, a 7-year retirement deferral would result in approximately $700 cash payments per month in the 7th year.

Increased Social Security Benefits:
Increases eventual Social Security benefits by approximately 6% for the first year of deferred retirement, 12% for the second year of deferred retirement, and so on with no cut off point. For example, a 7-year retirement deferral would result in an approximate 42% increase in retirement benefits when retirement is taken.

For specific information on your retirement:
Please call the toll free number (800-123-4567) to receive specific information on your benefits for deferring retirement based on your date of birth, yearly earnings, etc.

It should also be emphasized that this new program has been approved by the Congress of the United States and signed into law by the President of the United States. Implied in this message (among other things) would be the idea that the changes are bipartisan in nature and have widespread approval. There should also be examples or specifics about how the individual and government would be benefited by a deferred retirement decision (three such benefits shown for each in Table 7). Equally important would be a clearly communicated example of a typical American considering retirement with specific numbers showing the derived benefits. And lastly, a toll-free number should be given so the person reading the advertising flyer would know how to get additional information. Important in this last idea is the implication that it would be different for each individual depending on date of birth, earnings history, etc.

A SIMULATION MODEL TO TEST THE POTENTIAL IMPACT

To test the possible implications of such an incentive program with voluntary participation, a fairly extensive simulation model was created for the purposes of this study, and dozens of scenarios were tested to evaluate the sensitivity of the individual variables. A fine-tuning of the model eventually made it quite accurate in duplicating the official projections that are published each year by the Social Security Administration in its Annual Report. For example, the SSA Report currently projects expenditures to become greater than contributions in the year 2018, expenditures to become greater than both contributions and trust fund earnings in 2029, and the OASI trust fund to be fully depleted by the year 2044.

In the simulation numbers that are shown in Table 8, a net growth rate of 1.5% per year has been used for the growth in the nation's work force, and a net growth ranging from 2.58% to 3.70% per year has been used for the number of Social Security recipients. The first year (2004) shows earnings on the Social Security Trust Fund at 6.1766% because that was the earnings rate in 2003. In the last five years, the earnings rate has been between 6% and 7% (SSA Report, 2004), but in an effort to adjust for an increasing currency level and to be conservative in projections, an earnings rate of 4% has been used in the model for the remaining years following 2004. That rate is considered sustainable, especially if there is some shift of trust funds into the equity markets (with a proportional reduction of funds in the lower-yielding government securities).

To effectively communicate the mathematical implications of the model, most variables have been held constant including currency valuation. In other

words, inflation has been taken out of the equation by holding all monetary information in 2003 dollars. It has also been assumed that contributions to FICA have remained at 15.3%.

In lines 27 through 45 of Table 8, the mathematical results are shown using the assumptions established for the new incentives program for voluntary deferral of retirement. For this incentives program, it has been assumed that 7% of the potential social security recipients are "in deferred retirement" at any given time. The 7% of the recipient pool is about 2.8 million Americans which is less than 1% of the total population of America. Admittedly, some Americans (currently about 5% of those over 65) are not currently on Social Security (TIAA, 2000), so adjustments would need to be made for these people. But the study and mathematical model are designed to introduce the concept, and adjustments could be made in the assumptions as necessary to adjust for these and other realities.

As shown in lines 27 through 45, the peak in the Social Security Trust Fund comes eight years later in the proposed incentives program than it did under the current program (in 2036 rather than in 2028), and the dollar amount of $4.878 trillion is greater than at any time for the current or proposed programs. Also notice that rather than being in the negative range in 2044, the fund would still have nearly $3 trillion in the Trust Fund. All told, over the 75-year period (which is used by the Social Security Administration as the planning period), the funds generated by voluntary deferral program would generate over $13 trillion just in the OASI Trust Fund (with no inflation in the figures).

Table 8: Financial Projections under the Current and Proposed Social Security Plans (Eight-year increments)

1.	**Calendar Year:**	2004	2012	2020	2028	2036	2044	2052
2.	Percent increase in OASI workers	.0125	.0125	.0125	.0125	.0125	.0125	.0125
3.	Number of OASI workers (millions)	155.8	172.1	190.1	209.9	231.9	256.1	282.9
4.	Percent increase in OASI recipients	.0258	.0258	.0258	.0258	.0370	.0370	.0370
5.	Number of OASI recipients (millions)	40.4	49.6	60.8	74.5	98.5	131.8	176.2
6.	**Social Security (OASI) projections under the "current plan" (adjusted for inflation):**							
7.	Beginning OASI Trust Fund ($ billions)	$1,355.3	$2,230.9	$2,951.0	$3,340.7	$2,885.6	$399.6	-$5,616.8
8.	OASI contributions per worker and employer	$2,964	$2,964	$2,964	$2,964	$2,964	$2,964	$2,964
9.	Total OASI contributions ($ billions)	$461.8	$510.1	$563.3	$622.2	$687.2	$759.0	$838.3
10.	OASI taxes on benefits per recipient	$317	$317	$317	$317	$317	$317	$317
11.	Total OASI taxes on benefits ($ billions)	$12.8	$15.7	$19.3	$23.6	$31.3	$41.8	$55.9

Table 8: Financial Projections under the Current and Proposed Social Security Plans (Eight-year increments)

12.	OASI Trust Fund rate of return	.0618	.0400	.0400	.0400	.0400	.0400	.0400
13.	Total OASI Trust Fund earnings ($ billions)	$75.2	$85.1	$115.0	$132.8	$121.2	$34.7	-$184.1
14.	Total inflow of OASI funds ($ billions)	$549.8	$610.9	$697.6	$778.6	$839.7	$835.5	$710.1
15.	**Status quo outflow to OASI funds:**							
16.	Average OASI payments to recipients	$10,289	$10,289	$10,289	$10,289	$10,289	$10,289	$10,289
17.	Total OASI payments to recipients ($ billions)	$415.9	$509.9	$625.1	$766.4	$1,013.8	$1,355.8	$1,813.1
18.	OASI administrative expenses ($ billions)	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6
19.	Total outflow of OASI funds ($ billions)	$416.5	$510.5	$625.7	$767.0	$1,014.4	$1,356.4	$1,813.7
20.	**Net status quo OASI changes:**							
21.	Net increase in OASI funds ($ billions)	$133.4	$100.5	$71.9	$11.6	-$174.8	-$520.9	-$1,103.6
22.	Ending OASI Trust Fund ($ billions)	$1,488.7	$2,331.4	$3,022.9	$3,352.4	$2,710.8	-$121.3	-$6,720.4
23.	**Calculations on deferring retirement:**							
24.	Workers at the retirement age (millions)	40.4	49.6	60.8	74.5	98.5	131.8	176.2
25.	Percent of potential recipients deferring retirement	0	.07	.07	.07	.07	.07	.07
26.	Number of workers deferring retirement (millions)	0	3.5	4.3	5.2	6.9	9.2	12.3
27.	**Social Security (OASI) projections under the "proposed incentives plan" (adjusted for inflation):**							
28.	Begin. OASI Trust Fund (for deferral assumptions)	$1,355.3	$2,331.4	$3,713.9	$4,646.6	$4,877.5	$3,307.8	-$1,483.2
29.	More OASI contributions per deferred retiree	$0	$3,816	$3,816	$3,816	$3,816	$3,816	$3,816
30.	More OASI total contributions ($ billions)	$0	$13.2	$16.2	$19.9	$26.3	$35.2	$47.1
31.	Less in OASI payments per deferred retiree	$0	$14,400	$14,400	$14,400	$14,400	$14,400	$14,400
32.	Less in OASI total payments ($ billions)	$0	$49.9	$61.2	$75.1	$99.3	$132.8	$177.6
33.	Total OASI positives ($ billions)	$0	$63.2	$77.5	$95.0	$125.6	$168.0	$224.7
34.	**Negative assumptions for the OASI fund:**							
35.	Incentive cash payments per deferred retiree	$0	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400
36.	Total cash incentives paid ($ billions)	$0	$8.3	$10.2	$12.5	$16.6	$22.1	$29.6
37.	Less in OASI taxes received per retiree	$0	$1,803	$1,803	$1,803	$1,803	$1,803	$1,803
38.	Less in total OASI taxes ($ billions)	$0	$6.3	$7.7	$9.4	$12.4	$16.6	$22.2
39.	Total OASI negatives ($ billions)	$0	$14.6	$17.9	$21.9	$29.0	$38.8	$51.8
40.	**Net OASI changes from deferred retirements:**							
41.	Difference in OASI Trust Fund before earnings ($ b.)	$0	$48.6	$59.6	$73.1	$96.7	$129.3	$172.8
42.	Earnings on additional amt. in Trust Fund ($ billions)	$0	$1.9	$2.4	$2.9	$3.9	$5.2	$6.9
43.	Increase in OASI earnings from							

Table 8: Financial Projections under the Current and Proposed Social Security Plans (Eight-year increments)

	deferred retirements	$0	$50.6	$62.0	$76.0	$100.5	$134.4	$179.8
44.	Add in original Trust Fund increase ($ billions)	$133.4	$100.5	$71.9	$11.6	-$174.8	-$520.9	-$1,103.6
45.	New end. balance in OASI Trust Fund ($ billions)	$1,488.7	$2,701.9	$3,847.7	$4,734.2	$4,803.2	$2,921.3	-$2,407.0
46.	**Impact on Trust Fund for DI and HI:**							
47.	More total DI and HI taxes ($ billions)	$0	$5.9	$7.2	$8.8	$11.7	$15.6	$20.9
48.	Earnings on new DI and HI taxes ($ billions)	$0	$0.2	$0.3	$0.4	$0.5	$0.6	$0.8
49.	Net additional DI and HI taxes ($ billions)	$0	$6.1	$7.5	$9.2	$12.1	$16.2	$21.7
50.	**Impact on the Federal Government General Fund:**							
51.	More general taxes from deferred retirements	$0	$14.7	$18.0	$22.1	$29.2	$39.1	$52.3
52.	Earnings on additional general taxes ($ billions)	$0	$0.6	$0.7	$0.9	$1.2	$1.6	$2.1
53.	Net additional general funds ($ billions)	$0	$15.3	$18.7	$23.0	$30.4	$40.7	$54.4
54.	**Total impact of deferring retirements:**							
55.	Total increase in OASI funds ($ billions)	$0	$50.6	$62.0	$76.0	$100.5	$134.4	$179.8
56.	Total increase in DI and HI funds ($ billions)	$0	$6.1	$7.5	$9.2	$12.1	$16.2	$21.7
57.	Total increase in general funds ($ billions)	$0	$15.3	$18.7	$23.0	$30.4	$40.7	$54.4
58.	Total government benefits from deferred retirements	$0	$71.9	$88.2	$108.1	$143.1	$191.3	$255.8

In addition to the funds generated for the old age and survivors program (OASI), successfully deferring retirement for 7% of those eligible for retirement would also provide significant funds for the disability program (DI), for the hospital (or Medicare) program (HI), and for the government's general fund. In Table 8, the total financial benefits received in the respective years are shown in lines 56 and 57, and the total for all three categories (including OASI) are shown in line 58. Although not shown in Table 8, the 75-year benefits (using the planning horizon of the Social Security Administration) would be $13.2 trillion in OASI, $1.6 trillion for DI and HI funds, and $4.0 trillion for the general fund. The total of all three categories for the 75 years would be $18.8 trillion.

While these numbers are staggering in size, the Social Security financial crisis is still not fully solved under the assumptions that were presented. In simplest terms, the 7%-retirement-deferral assumption (and related assumptions) would "buy" about eight additional years before the fund would be completely depleted. With a 14% deferral rate, nearly 20 years of financial viability would be added to the program. Other changes in the variable values could be used to fully balance the

inflows and outflows over time. The Social Security Administration (SSA) has thousands of employees who do such planning, and the "tweaking" could be done. But it does seem that good old-fashioned free-enterprise incentives, if properly turned loose, could "breath" additional health and life into a system that is not yet demographically or actuarially sound. Such an approach would go a long way towards solving what is certainly one of the greatest problems facing America in the 21st century.

SUMMARY

The evaluation of the approaching financial crisis in Social Security and several possibilities for solving the crisis has yielded the following observations:

(1) Payments into the Social Security program have increased by 961 times since its inception in 1938. Even adjusted for inflation, there has been a 60-fold increase in annual contributions by the American workers.

(2) More than offsetting the 60-fold increase have been (a) greater numbers of retirees, (b) greater life expectancy for the retirees, (c) greater benefits per retiree, and (d) proportionally fewer workers entering the workforce to pay for the retiree benefits.

(3) The trust fund for Old Age and Survivors Insurance (OASI) will see (a) expenditures exceeding contributions in the year 2018, (b) expenditures exceeding both contributions and trust fund earnings by 2029, and (c) a depletion of the fund by 2044.

(4) Although government commissions have instituted changes in the Social Security programs to help avert the financial crises, these compulsory programs of higher taxes, later retirement, and fewer benefits have not yet brought viability to the program.

(5) Presented in the paper is a voluntary, free-enterprise incentives program consisting of upfront cash payments and other motivations to entice workers to defer retirement, and the approach would be a win-win situation for government and retirees.

(6) In the simulation model that was presented, an assumed retirement deferral rate of 7% of eligible retirees would "buy" an additional eight years before the OASI retirement fund would be depleted, and a 14% deferral rate would add nearly 20 years of financial viability to the program..

(7) With a different combination of variable assumptions, a long-term balance between Social Security inflows and outflows could be accomplished and done so with little if any compulsion by government.

CONCLUSION

The main conclusion of the study is that the United States Social Security Program is on a collision course that will completely deplete its funds by the year 2044. With natural incentives consisting of upfront cash payments and other enticements, enough workers could be motivated to defer retirement which would bring about a long-term balance between inflows and outflows and bring the program into long-term viability.

A PARTING WORD

In searching for a solution to the projected Social Security crisis, the possible use of a voluntary, free-enterprise approach laced with a little patriotism and capitalism should be taken quite seriously. The basic situation is not substantially different from the severe financial crisis that Americans faced trying to finance the war effort of World War II. The "war-bonds approach" of that era provided a classic success around which such a Social Security program could be modeled.

As proved to be the case, (1) the crisis was compelling enough, (2) the "war bonds" program credible enough, and (3) the promoters effective enough that the nation rallied around the program with amazing commitment. "When an estimation of the cost of a nationwide, multi-media campaign for a year reached $4 million, the Committee elected to solicit space donations for bond advertisements. This decision proved highly successful. Over a quarter of a billion dollars of advertising was donated in the first three years of the Defense Savings Program. After one month

alone, over 90% of Americans polled were aware of the Payroll Savings Plan part of the campaign" (Ad Access, 2003).

From May 1941 through the end of 1945, war bonds designed to yield approximately 2.5% were offered to a nation of approximately 139 million people, and by the time the last proceeds were deposited on January 3, 1946, over 85 million Americans (more than 61% of all men, women, and children) had purchased over $185.7 billion in war bonds (Ad Access, 2003). That was at a time when prosperous Americans were making about $2,000 per year (Kugel, 2003), and the greater prosperity and greater population base of today would easily lead to similar or better results under current circumstances.

Considering that inflation has resulted in an 11-fold increase in prices since World War II, and adjusting the 1940's population base of 139 million to the current population of about 290 million people, the current equivalent of the World War II experience would be about $4 trillion or roughly $1 trillion per year. Even if only one third of that success could be achieved, the $1.3 trillion would be approximately equal to the entire Social Security Trust Fund at the present time.

Finally, considering (1) that cash payments would be upfront instead of deferred, (2) that the overall benefits would be far superior by multiples (as evidenced by the present value analyses of Tables 4 - 6), and (3) that the program would likely be for many years beyond the four-and-a-half-year bond campaign, the Social Security program could be extended significantly beyond current projections. And beyond any personal benefits, Americans have proven that they will rally around a compelling cause when the need is effectively communicated.

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FOREIGN DIRECT INVESTMENT IN THE UNITED STATES: COUNTRY ANALYSIS

Greg Leopold, Sam Houston State University
Balasundram Maniam, Sam Houston State University

ABSTRACT

Multinational corporations (MNCs) throughout the world must make critical business decisions in determining when and where to expand internationally. Foreign Direct Investment (FDI) refers to the investment in an asset(s) in a foreign country or market. The United States experienced a drastic increase in FDI throughout the 1980's and continues to expand in numerous industries and states. Firms must make several important decisions when undertaking a FDI including location, mode of entry, objectives of the FDI, and the degree of risk involved. The United States offers several positive characteristics for MNCs that will be explored throughout this paper. The purpose of this paper is to explore the factors that may lead a foreign firm to pursue FDI in the United States. Specific factors will be analyzed including the process firms undertake in choosing a location in the US, role of technology for a variety of industries, industry specific characteristics and risks involved.

INTRODUCTION

Since the beginning of the 1980's, the United States has remained attractive to foreign investors and foreign firms interested in expanding their operations. Over the last two decades, the number of foreign firms conducting business within the US has nearly tripled (Grosse and Trevino, 1996). This attractiveness is motivated by factors such as the large market size of the US, potential lower wages (depending on the home market of the firm), avoidance of import trade barriers and others. FDI serves as a foundation for continuous improvements in economic development both globally and domestically in the United States. The underlying goal of any FDI is to produce a profit utilizing efficient and effective resources. FDI is normally conducted when a firm has developed a product of differentiation enabling the firm

to establish a sustainable competitive advantage (Chung and Alcacer, 2002). The United States experienced dramatic growth in foreign direct investments (FDI) during the 1980's and continues to provide a substantial percentage of capital into the US market. There are several areas of interest in regards to FDI in the US.

Foreign firms that are wholly or majority owned US subsidiaries comprise the vast majority of FDI in the US (Graham, 1991). Those countries that are heavily industrialized provide the largest percentage of FDI in the US throughout the past several decades (Grosse and Trevino, 1996). In 2002, the United Kingdom and France had the largest number of total outlays in the US, with $12.9 billion and $15.6 billion, respectively (Anderson, 2001).

When it comes to foreign direct investment in the US, firms are faced with several critical decisions, which will ultimately determine the success or failure of the investment. Firms may undertake foreign investment for several reasons, including the low cost factors of production, technological advancements or advantages, economies of scale in the production processes, and many others. The United States has experienced fluctuations in the amount of FDI expanding into the country. The attractiveness of the US market in terms of size and stability are potentially the two leading indicators of foreign investments. As export barriers evolve in the US, foreign firms recognize the benefits of investing in the US.

What factors do foreign corporations analyze when determining a location for the US affiliate? There are a wide range of variables that comprise the decision in determining the state location of the US operation. These factors will be explored throughout this paper and will assist in developing a location decision methodology. The location decision often varies by the type of industry in which the corporation will be involved.

Domestic firms operating in the US are faced with increased competition from foreign corporations and must identify competencies that establish competitive advantages. These firms are demanding stricter regulations that could potentially restrict foreign firms from entering the US market. As corporations expand into the global market, the level of risk will increase; however increased risk is generally positively correlated with a higher return. This paper will discuss numerous risks that must be analyzed when executing FDI in the US.

The basis of this paper is to determine what motivates foreign firms' decisions to locate their assets in a particular location within the US. Factors that lead to foreign firms undertaking FDI in the US are evaluated. The risks faced by foreign firms' are explored in the next section and finally, an analysis of the trends and future of FDI in the US are documented.

LITERATURE REVIEW

Coughlin, Terza, and Arromdee (1991) illustrate the location decisions of foreign corporations utilizing a Conditional Logit Model (CLM) during the early 1980's when an increased flow of FDI began to take place. The model was based on the firm's ability to maximize profits within a given location. The study involved identifying potential factors that impact the decision of a foreign firm to enter into the United States. More specifically, the authors analyzed the determinants of manufacturing firm's entry into the individual states. During the period of 1981 to 1983, 736 manufacturing firms entered the US. An examination of numerous characteristics assists in determining the location decision of a foreign manufacturing firm as well as those factors that affect profit. The characteristics explored include: 1.) Quantity of available site locations; 2.) State per capita income; 3.) Manufacturing density; 4.) Wage rates; 5.) Availability of labor; 6.) Union activity; 7.) Unemployment rate; 8.) Transportation infrastructure; 9.) State taxation. Based on the combination of these factors, the authors conclude that the importance each characteristic when undertaking an FDI in the US varies. The number of sites available within a state is a significant factor, higher wages were a negative factor; however high unemployment drove FDI into the state, and taxes have a direct impact on location decision. Finally the authors conclude that foreign manufacturing firms are attracted to states with highly developed transportation infrastructures.

Chung and Alcacer (2002) discuss the extent to which firms locate to another country to utilize new or existing technology. The authors coin the term "knowledge seeking" as a description of the expansion of firms abroad to capitalize on technology or capabilities that do not exist within their home market. This is often facilitated by the exploration of R&D facilities located throughout the US and more importantly within specific industries. Within the technological context, the paper discusses the state location decision for manufacturing firms from 1987-1993. Technological advancements provide a positive level of attractiveness to the country in which the technology is located. The paper illustrates the outcome of the author's study of whether firms that are lagging in technology or those firms with leading technical centers have a higher probability of exploring investment opportunities in the United States. Not only do firms lagging in technology locate to areas that are technological centers, but firms that operate in leading technological centers will locate to the US in search of continued technological information. An examination of a multiple variables is conducted to determine the causation of FDI inflows into

the US. Knowledge seeking is most prevalent in R&D intensive industries where obtaining information in the way of technology or personnel is critical to the firm's success.

Ulgado (1996) conducted a study comparing the location traits of American and foreign manufacturing firms. The report discusses the importance of location attributes and how they are different between the domestic manufacturer and the foreign firm undertaking FDI. Not only do location decisions vary by industry, but they also vary between domestic firms and foreign firms. This may come as a surprise, since one would conclude that foreign firms would locate in an area in close proximity to domestic firms that are successful in that particular industry. Ulgado's study found that foreign firms are influenced by a variety of factors that are not parallel with those of domestic firms; however the trend is gradually decreasing and foreign firms are showing signs of reflecting similar patterns of domestic firms. The study concluded finding that foreign firms considered factors such as trade issues, the environment of the community, and transportation when determining a location decision; whereas domestic firms concentrated more on the financial implications such as taxes and availability of capital.

Grosse and Trevino (1996) utilize macroeconomic approaches in explaining the flow of FDI into in the US during the years 1980-1991. The study conducted by the authors included a comprehensive analysis of economical, political and geographical variables. From the economic standpoint, the authors concluded that the greater amount of exports into the US, the increased probability that the firm would undertake FDI. On the other side of the coin, the authors found that those countries that import a large quantity of products from the US into the country are less likely to undertake FDI. Countries with a greater amount of distance from the US were found to have a smaller percentage of FDI than those countries in closer proximity to the US. The results of the study also indicated that firms operating in a risky home market are more likely to undertake FDI in the US in order to reduce the amount inflicted.

The influence of FDI into the US due to home country risk is evaluated in a study conducted by Tallman (1988). While factors such as market size and expected return are factors in attracting foreign investments into the US, Tallman expresses that home country variables might exert a level of force leading firms to invest abroad. The study analyzed the relationship between two countries from a political and economical perspective and found that the tighter the relationship from these two perspectives, the higher the level of FDI between the two countries. The opposite holds true. When two countries are in conflict with one another, it would

be expected that the result would be a negative impact on the flows of FDI. Domestic conflict leads to an unstable and fractured business environment. Upon conclusion of the study, Tallman found that economically developed countries are more apt to consider and engage in US FDI. As the political and economical infrastructures develop for a given country, the US should expect to witness increased flows of FDI.

THE FDI DECISION PROCESS AND DECISION FACTORS

Formulating a decision regarding FDI is often tedious and costly. Extensive research accompanied with international barriers leads to an exhaustive decision process. However, once the initial development phase of the FDI is completed, and assuming it was the appropriate decision, the firm can experience the fruits of success. The size of the US market and economic opportunities provide a majority of the rationale regarding the undertaking of FDI in the US (Ulgado, 1996). Along with attractive size of the US market, foreign firms explore additional motives when investing abroad. The opposite impact lies true as well. As the attractiveness of the US economy declines, the level of FDI is expected to decline as well.

In 2002 FDI in the US, measured by total outlays, was $52.6 billion, while just a year earlier total outlays measured $147.1 billion. This is a 64% decrease in FDI outlays in just one year (Anderson, 2003). The underlying factor: the economy. With the US market in a downturn throughout the latter part of 2001 and into 2002 (mainly due to the events that took place on September 11th, 2001), foreign investors and firms are apt to reduce the level of investment due to the uncertainty of market conditions. During this same time period, corporate scandals began to surface with the implosion of Enron. With falling stock market prices on top of the volatility of the stock market as a whole, foreign investors continued to reduce the level of firm acquisitions within the US (Anderson, 2003). The weak economy during this time period, as experienced by FDI, can be analyzed by examining net income. In 2002, the net income was a negative $2.5 billion as compared to a positive $1.0 billion in 2001. With sales highly correlated to income, newly established foreign firms experienced poor performance within the market (Anderson, 2003).

The decrease in FDI in the US can also be explained from the standpoint of foreign country development. Overtime, countries become more developed thereby increasing the resources the economy has available. With the development and technological advancements of foreign countries, the effect can have multiple

dimensions (Tallman, 1988). The US market is competitive, leading firms to differentiate their products, thus firms located in highly developed countries have an increased probability of succeeding in the US market. Foreign economic development can be illustrated by analyzing a few statistics. When compared to the 25 largest firms in the US in 1969, there were only 6 foreign firms equal in size. As foreign markets developed this number continued to increase. In 1974, the 25 largest firms in the US had been surpassed by 26 foreign firms when evaluating sales (Tallman, 1988).

In addition to market size, foreign firms are attracted to the US by a higher expected rate of return. Firms and investors operating in countries with low return rates recognize the potential to increase profits by acquiring or developing businesses in countries offering higher returns, all else constant. Factors such as risk must be evaluated when analyzing the expected rate of return (Grosse and Trevino, 1996). Higher rates of return are generally represented by a positive correlation to increased risk. A firm operating in their home market maintaining a low expected return is likely to be in a low risk category. While the profits and expected return may increase with the FDI in the US, the firm must be prepared to take on additional risks.

The ultimate goal of any FDI whether it is facilitated in the US or any other country is to maximize profits. As stated earlier, industrialized countries have been the leading sources of FDI flow into the US. During the years 1980 to 1992, Japan's annual growth rate was 31.3 percent. Beginning in 1980, Japan had invested 4.2 billion dollars in FDI stock in the US and by year-end 1992, Japan's FDI stock in the US was a staggering 96.7 billion dollars. While substantially lower, in terms of dollars, Australia experienced the largest annual growth rate percentage during this time period with 36.9 percent. Australia's FDI stock in 1980 was a mere 3 billion while in 1992, the FDI stock had jumped to 7.1 billion dollars (Grosse and Trevino, 1991).

Throughout much of the 1980's and 90's, the manufacturing and information industries lead the way in terms of FDI outlay in the US. In 2002 manufacturing outlays totaled $17.3 billion, while information investment totaled $14.2 billion (Anderson, 2003). In the proceeding section (Location Decisions), an emphasis will be placed on the manufacturing industry.

Factors of production are a leading variable in developing or acquiring a business in the US. Lower wages, availability of workers and availability of land are a few that will be explored throughout this paper. In 2002, FDI employed

182,000 people with manufacturing accounting for 74,000 of the workers (Anderson, 2003).

Trade & Distance as Factors

The common type of trade between countries continues to be direct exports. Country A demands a product from Country B thereby creating a simplistic direct trade model. The level of trade between two countries is often dictated by the products produced within a given country and the degree of production taking place within the home country. Countries exporting large quantities of products into the US are generally identified as having a high percentage of FDI within the US. Firms are posed with a three-decision model. 1.) Continue to produce a product in the home market and export to the US; 2.) Transfer production to the US via FDI, thereby eliminating exports into the US; or 3.) Produce a percentage of a product in the home market, exporting it to the US and produce a percentage of the product in the US (Grosse and Trevino, 1996). With this in mind, a positive correlation exists between exports into the US from a given firm or country and the level of FDI undertaken in the US. Those countries with large amounts of exports to the US are expected to have increased levels of FDI in the US.

While higher percentages of exports lead to increases in FDI, the distance between the home country and the US is a factor in evaluating the FDI decision. The costs involved in transferring or developing an international business can be astronomical. Firms spend millions of dollars on research and development (R&D) in an effort to determine the impact of an international expansion decision. The cost of obtaining information related to the US market is expected to increase the farther the researching firm is located from the US (Grosse and Trevino, 1996). For example, when analyzing the "big picture," the costs of obtaining information and conducting market research would be minimal for Canada when compared to the costs for a country such as Australia. When seeking out new technologies or knowledge firms must be able to rapidly transfer information from the host country to the home market. In order to achieve the rapid transfer, the two countries must be in close proximity to one another. The further the two countries are from one another the longer the time lag resulting in dated information (Chung and Alcacer, 2002). Therefore the conclusion can be drawn that distance is a factor when evaluating entrance criteria of foreign firms into the US.

Similarly, the size of the home market is correlated to the amount of FDI undertaken in the US. A country with large, healthy economies is a direct result of

the firms existing within that economy. Let's look at an example. Japan is a large economy with numerous large-scale firms, while on the other hand the Middle East, taken in the general context, has a small unstable economy comprised of a few small scale-manufacturing firms. As the research indicates, the firms located in Japan are poised to invest or expand their operations abroad. Small firms in weak economies simply do not have the investment power to engage in an international market setting (Grosse and Trevino, 1996).

INFLUENCE OF RISK IN PURSUING FDI IN THE US

Conflict and instability within a home market leads a firm to seek investment opportunities abroad in an effort to avoid the negative consequences imposed on the home economy. The opposite holds trues as well. When a home country is stable and experiencing economical growth, domestic investment within the home market is likely to improve reducing the probability of investment abroad (Tallman, 1988). While economic factors produce risk, other factors such as domestic labor instability and strict governmental policies impact firms in pursuing international expansion. A high degree of political risk is correlated with greater FDI into the United States. Government instability or the policies created and enforced by the governmental body directly impact business activity within the home market (Grosse and Trevino, 1996). Policies aimed at strict regulation of the business environment leads to dispersion of foreign firms into the international market. Foreign firms must weigh the costs of undertaking FDI in the US with the risks and conflicts that exist within the home market. In the event the risks existing within the home country outweigh the costs of undertaking the FDI, the firm should pursue the FDI, ceteris peribus (Tallman, 1988).

WHAT FACTORS AFFECT THE LOCATION DECISION OF FDI IN THE US?

Foreign firms expanding into the global market must first determine a host country to establish their enterprise. In this study, we will assume the host country chosen is the US. The location decision does not stop with the determination of the host country. The firm must identify a site within the US to develop the new firm infrastructure. There are numerous variables that assist in evaluating and finalizing a state in which to locate the firm. States continue to battle each other for foreign firms to position their business in their state (Grosse and Trevino, 1996). Foreign

firms evaluate variables such as market size, access to surrounding markets, and cost of production. States must market themselves against one another by offering attractive features of the state to the foreign firm. States offering increased and more attractive incentives will win the location battle. Therefore what we see overtime is a continued trend to increase the visibility and attractiveness of state incentives (Ulgado, 1996).

During the period of 1987-1992, the distribution of employment for foreign owned manufacturing firms was concentrated in the Southeast region of the United States. Newly established FDI were generally located in parts of New England and Southeast. With Texas, Louisiana, Missouri and Illinois have high concentrations of manufacturing establishments (Shannon, Zeile, and Johnson, 1999).

The identification of site locations will vary depending on the type of firm undertaking the FDI and the industry in which the firm is involved. Firms may be seeking locations that are flourishing with technological incentives, locations with a greater amount of labor availability, or locations with tax advantages (Chung and Alcacer, 2002). If a firm is lagging in technology improvements or knowledge, the firm will commonly seek a location that offers a greater availability to advancements. The country from which the foreign firm is from also has an influence on the location decision. Both cultural and economic factors play a role in determining where a foreign firm will locate. The importance of state incentives also differ between countries (Ulgado, 1996).

> *"Japanese firms put factors such as attitudes of local government, attitudes of local citizens, transportation services availability, and employee training incentives at the top of their list, while German firms focus on level of unionization, labor turnover rate, attitudes of local government and transportation services availability when compared to domestic US firms"* (Ulgado, 1996).

Foreign firms analyze factors associated with the costs of production when determining site location. The following seven components comprise the cost of production for each state (Chung and Alcacer, 2002):

Land Availability	Percent of population employed
Unemployment Rate	Presence of right to work laws
Average Weekly Wage	Percent of unionized workers
Tax as a percent of income	

A few of these will be explored in greater detail throughout the remainder of this section. In several industries, including that of manufacturing, the firm must have access to labor (workers). Firms that require an abundant amount of labor will locate in states where labor is readily accessible. In addition to labor availability, the firm must pay the employees. Again, firms will locate in states with lower wage rates (Coughlin, Terza, and Arromdee, 1991). This may vary by the level of quality the company desires. More educated and experienced workers require higher wage rates. However, in the manufacturing industry, lower wages are acceptable due to the type of work performed, generally factory workers that tend to be less skilled. Foreign firms are likely to pay higher wages in industries where higher degrees of technology are required or significant levels of R&D are to be conducted (Chung and Alcacer, 2002).

As would be expected, states with a large number of potential site locations have an increased likelihood that the state would be selected when compared to those that have a smaller number of potential site locations, all things equal. This is often referred to as the "dartboard theory." (Coughlin, Terza, and Arromdee, 1991). In other words if you took a dart a threw it on a map of the United States, the probability of the dart hitting a state with a large land mass, such as Texas is higher than hitting a state with a small land mass, such as Rhode Island. The state with the larger land area for site location offers FDI the ability to expand in the future.

Sophisticated transportation systems within a state attracts FDI. Manufacturers must be able to ship products quickly and effectively, whether it is by ground, air, or water. Availability of these types of transportation systems in critical in competing in the US. States with more highways and airports have a higher probability of attracting more FDI (Coughlin, Terza, and Arromdee, 1991).

INFLUENCE OF TAXATION

Taxation on both foreign and domestic firms involves a hierarchy of levels. Local and state taxes are found at the bottom proceeded by corporate income taxes and federal income taxes. Foreign firms are faced with the additional tax burden posed by the firm's home country (Coughlin, Terza, and Arromdee, 1991). Firms undertaking FDI examine the various taxes and tax incentives offered by states within the US. Again, the degree of emphasis placed on taxes will vary by industry. When comparing the amount of state taxes paid between foreign firms and domestic firms it is generally the same (Hines, 1996).

A number of states have implemented unitary taxation in which, the firm is taxed on a worldwide taxation system. The use of unitary taxation has been found to have a negative impact on employment growth within foreign firms as well as a negative impact on FDI into the US as a whole. Firms are against the implementation of unitary taxation as they argue that they are the victims of double taxation. Firms operating under a unitary taxation system are faced with complex accounting practices, as they must separate regional profits from the worldwide organization (Coughlin, Terza, and Arromdee, 1991). In addition to a unitary taxation system, several countries offer tax credits to firms operating in the US. This is beneficial to states with high tax rates, because firms recognize that taxes applied in the US can be used against taxes from the home country (Hines, 1996).

Taxes are often increased in a given state due to government spending on state infrastructure, such as educational and highway systems. States anticipate that increasing the attractiveness of the state's infrastructure will attract FDI. Government spending is positively correlated to attracting FDI (Coughlin, Terza, and Arromdee, 1991).

As taxes increase in a given state, the FDI in that state will decrease, ceteris paribus. The same applies for those states utilizing a unitary taxation system. Firms will deter from locating in a location utilizing this type of tax system. When all else is constant, foreign firms will locate their operations in states with low tax rates (Hines, 1996).

COMPETITION AND CONCERNS OF FDI IN THE US

Economically, FDI generally tends to have a positive impact in the US. As the level of FDI increases, the economic effects increase thus leading to a positive correlation. However, accompanied with increases in FDI, comes an increased level of competition. (Graham, 1991). While competition is a key factor in establishing a healthy market, market saturation can occur causing domestic firms to lose market share. Domestic firms are threatened by FDI as the competition level is increased. While FDI leads to increased competition, domestic firms must enable the proper safeguards to avoid losing their unique capabilities. This can be enacted on a country basis as well. The US maintains certain unique advantages over other countries, such as technology advancements. If the level of FDI is unregulated, foreign firms enter the US seeking these advancements resulting in the loss of the unique advantages due to foreign duplication (Chung and Alcacer, 2002).

Considerations involving national security have been researched by US government policymakers to determine the level of restrictions placed on FDI. The US has implemented laws and policies governing the establishment of foreign firms engaging in sensitive business activities, namely the defense industry. The problem arises when US control over who enters the country becomes to involved and they begin restricting foreign firms from entering the country that should be allowed in (Graham, 2001). A foreign firm restricted from entering the US due to national security reasons, results in animosity towards the US and could potentially have a negative impact on trade and other economic conditions between the US and the home country. The President of the US has the executive power to block foreign entrance into the US in the event national security is threatened. As of 1991, only one foreign investment into the US has been blocked (Graham, 1991). F D I creates positive impacts on the US economy by establishing new jobs and technologies that may not be utilized in the US. "This assists in improving the global competitiveness of domestic industries" (Graham, 1991).

CONCLUSION

The United States experienced dramatic increases in FDI during the 1980's and continues to witness FDI inflows today, although China is becoming their biggest competitive for foreign funds. In fact, in 2003, China received more FDI than the US for the first time in its history. Many believe that this trend will continue in the near future as China open up their economy and relaxed their rules and regulations concerning foreign ownership of assets in China.

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ECONOMIC ANALYSIS AND POLICY IMPLICATIONS OF FERTILITY IN MIDDLE EAST AND NORTH AFRICAN COUNTRIES

Azmat Gani, University of Quatar
Christopher Ngassam, Virginia State University

ABSTRACT

This paper attempts to provide an economic analysis of fertility interrelationships using pooled cross-country data from the Middle East and North African region, 1982-2000. Regression results provide strong confirmation that family planning, urbanisation and female labour force participation rates are inversely related to fertility rates. Income, infant mortality rates and female education are found to have a strong positive correlation with fertility. The results of several variables are also consistent with the results obtained in earlier studies involving countries and regions other than the Middle East and North Africa. Some policy implications are drawn.

INTRODUCTION

The twenty countries in the Middle East and the North Africa (MENA) region had a combined population of approximately 283 million in 1997 (The World Bank, 1999, Table 1), contributing to approximately 4.9 percent of world total population. The majority of the countries are in the middle-income and medium human development categories (Table 1). The overall level of economic development of MENA is comparatively much better than many regions elsewhere (UNDP, 1999, Table 1). The level of achievement in per capita incomes and human development is largely attributable to several of the MENA countries rich natural resource base. Theoretically, as countries become rich, they tend to go through a demographic transition in which fast-improving medical conditions and high birth rates combine to give rapid population growth, a phenomenon that characterised

most of Asia almost thirty years ago (*The Economist*, September 13, 1997). Demographic indicators provide evidence of similar demographic transitions taking place in several of the MENA countries (Table 2).

Table 1: Development Indicators - Middle East and North African Countries

Country	GNP per capita - $US 1997	HDI value – 1997	Population (Millions – 1997)	Population growth rate (1990-97)
Algeria	1490	0.665	29	2.3
Egypt	1180	0.616	60	2.0
Jordan	1570	0.715	4	4.8
Morocco	1250	0.582	28	1.9
Oman	4950	0.725	2	5.0
Saudi Arabia	6790	0.740	20	3.4
Syria	1150	0.663	15	2.9
Qatar	11570	0.814	0.675	…
Tunisia	2090	0.695	9	1.8
Kuwait	22110	0.833	1.6	…
United Arab Emirates	17360	0.812	3	4.9
Bahrain	4514	0.832	0.619	…
Yemen	270	0.449	16	4.5
Iran	1780	0.715	60	…
Middle East and North Africa	3880	0.626*	283	2.5
Lower Middle Income	1230	0.637**	2285	1.2
Upper Middle Income	4520	…	571	1.5

Note: * - refers to Arab states; ** - refers to all developing countries; and … indicates that data is not available.
Source: The World Bank (1999) and United Nations Development Program (UNDP, 1999).

Although the indicators of per capita income and human development look satisfactory for MENA, the population and population growth rate give cause for concern. Although MENA ranks the lowest in terms of the share of total world population, such is not the case in terms of the growth rate (World Bank, 1999, Table 1). MENA annual average population growth rate of 3.0 percent during 1990-2000 period was the highest when compared with East Asia and the Pacific, Europe and Central Asia, Latin America and Caribbean, South Asia and Sub-Saharan

Africa. Although annual average population growth rate declined to 2.5 percent in the 1990-97 period, it was second to that of Sub-Saharan Africa which recorded a growth rate of 2.7 percent (The World Bank, 1999, Table 3) during the same period. Almost all MENA countries experienced higher population growth rates than 1.5 percent, the world average (Table 1).

Table 2: Fertility Rate - Births Per Woman

Country	Total Fertility Rate				
	1975	1980	1985	1996	% Change 1975-96
Algeria	7.3	6.7	5.8	3.4	53.4
Egypt	5.4	5.1	4.6	3.3	38.9
Jordan	7.8	6.8	6.5	4.4	43.6
Morocco	6.3	5.4	5.1	3.3	47.6
Oman	7.2	7.2	7.2	7.0	02.8
Saudi	7.3	7.3	7.2	6.2	15.1
Arabia	7.5	7.4	7.0	4.0	46.7
Syria	…	…	…	…	…
Qatar	5.9	5.2	4.4	2.8	52.5
Tunisia	6.3	5.3	4.3	…	31.7*
Kuwait	5.9	5.4	5.0	3.5	40.7
UAE	5.7	5.3	5.0	…	12.2*
Bahrain	7.1	7.9	7.6	7.2	1.4
Yemen	6.2	6.1	6.3	…	1.6*
Iran					
MENA	…	6.1	…	4.0	34.4**
LMI	…	3.1	…	2.2	29.0**
UMI	…	3.8	…	2.6	31.6**

Note: … indicates that data is not available; MENA = Middle East and North Africa; LMI = Lower Middle Income; UMI = Upper Middle Income; * refers to 1975-85; ** refers to 1980-1996.
Source: The World Bank (1992 and 1999).

While it is noted that the transition from a less developed economy to one which is more developed is not only feasible and can be attained in a relatively short period of time (Stiglitz, 1996), the MENA high rate of population growth can have a retarding effect on the pace of the development process. Of main importance is the

high fertility rates in MENA. High rates of fertility can have several direct effects on a country's long-term development: contribute to lower standard of living; reduces per capita land and resource availability; greater under-employment and open unemployment; demand pressures on social capital like education, health and housing; increases dependency; environmental destruction and contributes to inequalities in income distribution (Ghatak, 1995, pp. 231-233).

Table 3: Descriptive Statistics

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Fertility Rate	90	6	1.1	3.6 (Tunisia)	7.4 (Syria)
Income	90	4001	3841.0	600.0 (Egypt &	14500.0 (UAE)
Infant mortality rate	90	62	23.4	Iran)	119.0 (Egypt)
Female education	90	88	18.5	23.0 (UAE)	117.0 (Tunisia)
Urbanisation	90	54	20.1	53.0 (Oman)	83.0 (Bahrain)
Female labour force participation	90	13	5.8	7.9 (Oman) 5.4 (UAE)	24.4 (Tunisia)

Data in Table 2 shows MENA fertility rate trends. For the high-income countries, the fertility rates in 1980 were above 1.9, the average for all of the high-income countries (The World Bank, 1999, Table 7). In 1996, after a span of fifteen years, the average fertility rate for high-income countries was 1.7 (The World Bank, 1999, Table 7). In the same year, for United Arab Emirates, the fertility rate was 3.5, many times higher than 1.7. While the fertility statistic for 1996 is not available for Qatar and Kuwait, it is quite likely that they followed similar patterns as noted for the United Arab Emirates.

For the three upper-middle-income countries (Oman, Saudi Arabia and Bahrain), fertility rates in 1980 and 1996 have been many times higher than 3.8 and 2.6, respectively, the average for upper-middle-income countries (The World Bank, 1999, Table 7).

For the seven lower-middle-income economies in Table 2, the fertility rates have again been many times higher in 1980 compared to 3.1, the average for all the lower-middle-income economies (The World Bank, 1999, Table 7). In 1996, the trend remained the same with fertility rates higher than 2.2, the average for all lower-middle-income economies (The World Bank, 1999, Table 7).

While the fertility rates are high for all countries in Table 2, compared with the average for all countries in similar income categories, one common feature has

been a declining pattern in fertility rates as shown in the percent change 1975-96 column of Table 2. Algeria and Tunisia have made tremendous progress in reducing their fertility rates while Iran, Oman and Yemen have made least progress.

Attention needs to be focussed towards controlling high levels of population growth. Of vital importance is a close check on fertility rates because they can be a strong factor contributing to a speedy rate of decline in population growth. Such forms of checks on population growth can improve the quality of human capital, in particular through improving maternal productivity. It is noted by Shultz (1997), that any investments able to increase individual lifetime productivity can contribute to economic growth and socio-demographic development.

In this spirit, this paper aims to provide an economic analysis of fertility inter-relationships on the basis of pooled cross-sectional data for the MENA region. The next section presents a theoretical discussion of the channels through which fertility is affected. Sample size and data are discussed in section three followed by empirical regression results in section four. A conclusion is presented in section five.

CHANNELS THROUGH WHICH FERTILITY IS AFFECTED

This section presents a discussion of several economic and non-economic factors that are likely to influence MENA high fertility rates.

Income

The level of income can influence fertility rates. Economic choice models (Becker and Lewis, 1973; Schultz, 1976) argue that if babies are regarded as consumption goods than their demand will compete against the demand for other consumption goods. Therefore, the benefits of having babies must be outweighed against the cost: the allocation of parental time for raising the babies and the possible associated loss of income. In particular, a rise in real income would tend to reduce the fertility rate as rising income means children are needed less as producer and investment goods. In a similar vain, Temple (1999) notes that if people perceive that incomes are likely to rise, and possibly the returns to human capital, they may decide to have a fewer children. Thus, theoretically, the demand for babies and eventually fertility should be inversely correlated with income.

Infant Mortality Rates

The relationship between fertility and infant mortality rates is likely to be bi-directional, that is, infant mortality may affect fertility and fertility may affect infant mortality (Rosenzweig and Schultz, 1983 and Schultz, 1993). In this study, high infant mortality rates are hypothesised to influence fertility rates, that is, if large numbers of children die, parents must have large numbers of children to ensure at least some survive.

Female Education

Educating females is one of the best investments for future socio-economic welfare (The World Bank, 1980) and is found to be associated with lower fertility (Barro, 1991 and Schultz, 1993). Greater female literacy could reduce fertility rate in several ways: (1). Literate women are more likely to know how to plan family size; (2). Literacy confers status on women, and women can use this higher status in the family to advance the interests of the family, including size; (3). The acquisition of education delays the age of marriage; and (4). Education also complements the effectiveness of family planning programs and the opportunities for work. Hence, higher education is expected to reduce fertility as educated women are likely to comprehend more clearly the logic of fertility control including a re-think of age-old customs resulting in a change of attitudes and motivations (Ghatak, 1995). It is also noted that educated mothers would be expected to value more highly education for their children, and would more likely make a conscious trade-off between quality of life and the number of children (Dasgupta, 1993). Thus, female education is hypothesised to promote decline in fertility and to act as a force behind the demographic change.

Urbanisation

Urbanised populations have lower fertility rates than rural populations in developed nations (Eberstadt, 1980 and Schultz, 1993). Urbanisation is expected to depress aggregate fertility rates as the level of awareness of the consequences of higher fertility rates is expected to be greater. Urban areas provide better access to education, wider employment opportunities, higher incomes, more comprehensive information flows, and offers family planning services. Therefore, these factors

contribute positively towards parental decision making with an expected smaller family. Thus, fertility should be inversely correlated with urbanisation.

Female labour force participation rate

A factor that is likely to influence the rate of fertility is the status of women. A change in status of women can be brought about through education and their levels of participation in the labour market. With greater participation in the labour market, it is likely that young, married couples are in a better position to bargain over family size, where *smaller* is better, eventually influencing the fertility rates.

Family Planning

Schultz (1997) notes that the capacity to avoid unwanted fertility is a form of human capital which enhances female market productivity by allowing women to continue their education, to migrate to where their skills are most valued, or to allocate time to their most rewarding work. An active family planning service is expected to influence fertility as it brings about greater awareness of birth control and is effective in helping eliminate inefficiency with the introduction of modern contraceptive methods. This should result in a drop in fertility rates. Effective family planning programs are known to result in longer birth spacing and a reduction in infant mortality (Dasgupta, 1993).

DESCRIPTION OF DATA

The countries chosen in this study for the empirical work comprises a sample of ten MENA countries: Algeria, Bahrain, Egypt, Iran, Morocco, Oman, Saudi Arabia, Syria, Tunisia and United Arab Emirates. While there are twenty countries in the MENA region (The World Bank, 2003), the choice of these ten countries was solely dictated by the availability of published data on variables of interest as discussed in section two. Unfortunately, not all MENA countries have a consistent set of data, and where data is available the time span is limited. Since the sample time frame for the dependent variable has to be consistent with the explanatory variables, all variable measures were restricted to 1990-2000, with all data taken from the World Bank World Development Indicators CD-ROM (2003).

In terms of variable measures, fertility rate is the average number of children that would be born alive to a woman in her lifetime. Income is measured by real per

capita GNP. Infant mortality rate is the number of infants per thousand live births, in a given year, who die before reaching one year of age. Female education is measured by gross enrolment of females of all ages at primary level as a percentage of children in the country's primary school age group. Urban population as a percentage of total population measures urbanisation. Female labour force participation is female labour force as a percentage of total labour force. Because measures of family planning are deficient across MENA countries, a dummy was used. A value of *one* was allocated to Algeria, Egypt, Syria and Tunisia, supported by the fact that these countries revealed contraceptive prevalence rate. For example, the contraceptive prevalence rate during 1990-96 was 51 percent in Algeria, 48 percent in Egypt, 40 percent in Syria and 60 percent in Tunisia (The World Bank, 1999). It was assumed that contraceptive prevalence rates existed in these countries even prior to 1990 but perhaps at a lower rate. *Zeros* were allocated to countries other than Algeria, Egypt, Syria and Tunisia. This means absence of effective family planning programs.

EMPIRICAL REGRESSION ANALYSIS AND RESULTS

The model is estimated using SHAZAM 7.0 Econometrics Computer Program (White *et al.,* 1993) following the model outlined by Kmenta (1986). Descriptive statistics are provided in Table 3 while the regression results are reported in Table 4.

Table 4: Results

Variable	Coefficient	Standard Errors	T- Value
Constant	3.750	0.301	12.440
Income	0.00118	0.000167	7.065
Infant mortality rate	0.0284	0.00207	13.700
Female education	0.0233	0.00286	8.141
Urbanisation	-0.0389	0.00266	-14.630
Female labour force participation	-0.0271	0.0131	-2.066
Family Planning	-0.307	0.0923	-3.325
Buse R-square = 0.86., F – Statistics = 71.4., Durbin Watson = 1.57, Jarque Bera = 0.48.			

The model performs highly satisfactorily. Its robustness and adequacy based on diagnostic statistics is considered to be satisfactory for models utilising cross-sectional data. In terms of coefficient of determination (Buse R-square), the six explanatory variables

explain over 86 percent of the variation in MENA fertility rates. Given the use of pooled data, such an outcome is considered to be highly satisfactory. The F-Statistics is established as significant. This led to a conclusion that there exists a strong statistical relationship between the six-predictor variables and the criterion variable at alpha 0.05 level. Of critical importance is the issue of heteroscedasticity. The Engle's conditional test on residuals did not reveal any serious heteroscedasticity problems. The coefficients are statistically significant at the 1- percent level. The signs of the regression coefficients have several implications as discussed below.

An issue crucial to the findings obtained for the MENA countries is an attempt to shed some light on the discussion of results from previous studies addressing similar issues thus providing some comparisons. However, comparisons are difficult, for a whole host of reasons: differences in countries economic structures, variable selection, measurements, the sample size, the choice of countries and the methods of estimations. Thus, only those aspect that are most comparable and appropriate in this context are discussed.

The coefficient of *income* is surprising and does not meet priori expectations. It is positive and statistically significant, providing strong evidence that MENA fertility rate positively correlated with income: increases in incomes are associated with increases in fertility rates. This result contradicts the arguments of the economic choice models (section 2), including Becker and Lewis (1973) and Shultz (1978). Studies involving other countries and regions have shown an inverse relationship between fertility and income (Gani, 1999). However, in an earlier study, Eberstadt (1980) noted that nations like Mexico, Brazil and Philippines, with relatively high-income levels and growth rates, showed little sign of fertility decline. Today, of course, it is obvious that fertility has declined rapidly in these three countries. It seems that individual decisions on family size in MENA countries have much to do with the level of income. The results of the income variable leading to the conclusion higher average incomes mean more resources available to support large families, thus, a higher demand for children.

The coefficient *infant mortality rate* is, as expected, positive and most significantly related to fertility. The results provide confirmation that high fertility rates are associated with high infant mortality rates. The results indicate that in the MENA region the chances of child survival are less in comparison to developed countries. For example, the current, average infant mortality rate in high-income countries is 6 per 1,000 live births, while in low-income countries it is 59 per 1,000 live births (The World Bank, 1999, Table 7). MENA countries have high infant mortality rates. In 1980 the average infant mortality rate in the MENA region was 96 per 1,000 live births and in 1996 it had declined to 50 per 1,000 live births, still higher than the average for low and middle-income countries in 1980 and 1996, respectively (The World Bank, 1999, Table 7). The result obtained for infant mortality rate is consistent with earlier studies involving different countries and regions. Blau (1986), Rosenzweig and Schultz (1985 & 1993) and Gani (1999) show infant mortality rate and fertility rate in developing countries is significantly positively correlated.

The coefficient, *female education*, is positive and statistically significant and inconsistent with our a priori expectations. Barro (1991), using data for 100 countries, shows that high school enrolment rates contributed to lower fertility rates. Similarly, Shultz (1993) found that female education is also associated with lower fertility. High levels of female education is also found to be negatively correlated with fertility in a cross-section of Pacific Island countries (Gani, 1999). The results obtained here for the variable female education is not surprising given low female literacy rates. For example, current average female literacy rate for Arab states is 46.4 percent, much lower than 62.9 percent, the average for all developing countries (UNDP, 1999, Table 2).

Evidence of a fairly strong impact of *urbanisation* on fertility was found. The coefficient urbanisation is consistent with theoretical expectations. At the standard 1 percent level of significance, the coefficient of urbanisation is negative and statistically significant; giving strong evidence that urbanisation is inversely associated with fertility. Urban areas provide better accessibility to health, education and gainful employment.

The coefficient for *female labour force participation* rate is consistent with *a priori* expectations, negative and statistically significant, providing strong evidence that increases in female labour force participation rate is associated with lower levels of fertility. The trend in the developing world is for women to become better educated. While MENA female literacy and employment rates are still lower than their male counterpart, the gap is gradually narrowing. As MENA women gain skills and abilities, this is likely to shift their position in the labour force. The increase in female participation in the MENA labour force is revealed in the participation rates. For example, the average MENA female percent of the labour force in 1997 was 26 compared to 24 in 1980 (The World Bank, 1999, Table 3). Although this number is lower than the average for the low and middle-income economies, the existing level of female involvement in the labour force is a positive development in terms of improving the status of women.

Family planning as measured by dummy variable is consistent with *a priori* expectations; the negative and statistically significant coefficient providing confirmation that family planning services are associated with lower fertility rates. The results are consistent with that of Shultz (1993) and Gani (1999) where the association between family planning and fertility is found to be negative.

SUMMARY AND CONCLUSION

This study provided economic analysis of fertility interrelationships in MENA, and has helped to identify the relative contributions of the different influences reasonably well. Our results provide strong evidence that family planning, urbanisation and female labour force participation are confirmed as inversely related to fertility rates. Surprisingly, a strong positive association is found between fertility rate, incomes, infant mortality rate and female education. Several outcomes of the empirical analysis are similar to results obtained by earlier studies involving non-MENA countries and regions. The analysis presented has some

policy implications. One reservation is that while cross-sectional regression analysis as adopted in this study is a popular method, the appropriate policies will depend on a country's particular demographic situation.

The important policy outcome is to allow improvements in the status of woman, which could contribute to improvements in human capital and thus economic development and demographic improvements. Expanding the opportunities for women in the educational system, participation in the out-of-house labour market, infant and general health care services, and access to family planning programs should be a matter of priority among the MENA policy makers. This may also bring about beneficial externalities as a healthy population with higher levels of education and income-earning opportunities can also lead to increases in the marriage age. To reduce infant mortality, public expenditure on infant health care is an obvious area for improvement: more resources should be devoted to primary health care facilities, increasing the number of health care personnel and establishing maternal education programs directed toward health, nutrition and basic hygiene, coupled with effective, population responsive, family planning programs. Family planning is an important health policy instrument and awareness of its benefits should be increased enabling parents to make the right decisions in terms of achieving their fertility targets and family size. Public resources effectively directed towards family planning programmes can provide vital information about birth control, enabling a woman to avoid unwanted pregnancy and enhancing their market productivity. Generally, this will lead to lower desired fertility. It is not surprising that family planning is viewed as a means to *empower* women because it is likely to increase their economic opportunities.

While several studies on fertility concerning the developing world have made important contributions in the past, the conclusions of earlier studies may not be applicable in current times to the developing world given the economic and demographic transitions several developing countries have experienced or are going through. For example, in an earlier study on fertility in less developed countries, Eberstadt (1980) concluded that there is "no economic evidence to show that rapid population growth stifles economic growth, or even per capita economic growth, that models generate meaningless numbers and if there is any international correlation between population growth and per capita economic growth in LDC's, and many are not convinced there is, it would be positive, not negative".

While such conclusions may have had their place some two decades ago, it should be noted that tremendous advancements have taken place in both theoretical and applied economics over time and several nations have a good statistical records on economic and demographic variables. As a result of such advancements, studies of recent times provide convincing outcomes of the correlation's between population and economic growth that makes conclusions of earlier studies like Eberstadt (1980) redundant. With much certainty, high fertility rates may have negative consequences on overall level of growth and development. In recent times researchers have noted negative (although weak) correlation between population growth and growth of per capita income (Mankiw, Romer and Weil, 1992). Other effects of high population growth are also noted. There is some evidence of

students in countries with higher population growth recording lower achievement (Hanushek, 1992), and a weak negative relationship between population growth and changes in total factor productivity (Temple, 1999), who further notes that some researchers have looked at the link from fertility rates to subsequent growth, sometimes finding a negative correlation.

In general, achieving an improved fertility rate depends to a great extent on achieving economic development, which in turn depends upon sound and effective economic and social policies and fiscal expenditure. As such, fiscal expenditure directed toward the welfare of women should be increased and insulated from cuts within the development budget.

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