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LETTER FROM THE EDITORS

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WHO PAYS FOR CONTRACEPTIVES UNDER THE AFFORDABLE CARE ACT?

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ABSTRACT

The Affordable Care Act (ACA) mandates that employers provide their workforce with health insurance or pay a fee. To reduce unwanted pregnancies and communicable disease, the Act stipulates that this health insurance cover contraceptive drugs and devices without a co-payment by the employee. This provision is objected to by several employers in religious-affiliated institutions on the grounds that it violates their moral teachings.

The proper use of the demand curve permits the Principles of Economics instructor to show that in the standard employer/employee exchange of the value of work for compensation, each side in the exchange pays for what the other side is offering. In the case of the ACA mandate, it is the employee, not the employer, who pays for the contraceptives. This holds true both when the employer contracts with a health insurance company; when the employer self-insures; and even when the employer does not offer insurance as part of the employee compensation but instead pays the fee required under the ACA.

INTRODUCTION

Since World War II, it has been common for employers to include health insurance benefits as part of an employee's compensation package. With a wage freeze in effect during the war, employers relied on "perks" to attract workers to their firms. The wage freeze was eventually lifted, but the practice of employer-provided health benefits continues to this day. The recently approved Affordable Care Act (ACA) mandates that employers provide employee health insurance. Those employers who choose not to do so must pay a fee per employee so that their employees can purchase health benefits through an insurance exchange.

The ACA stipulates that the benefits include coverage for all FDA-approved drugs and devices for contraception and sterilization, including intrauterine devices (HHS Factsheet) and the "morning after pill." Entities with direct religious missions, such as churches and novitiates were exempted, but not religiously affiliated entities such as universities. This stipulation elicited strong objection from Roman Catholic bishops who asserted a conscientious objection to being forced to purchase something they consider to be morally offensive. They argue for an

exemption from these regulations and for the right to define who is a religious employer entitled to the exemption.

This confrontation presents a "teachable moment" for the economics instructor. Students can be shown the power of economic reasoning in resolving issues that are seemingly unrelated to economics. Since the future of healthcare in the U.S. may be dependent on the outcome of these disagreements, the economics instructor should not miss this opportunity to teach students how to think about such an economic issue. Students should know that it is often the case that a public policy argument is won or lost using the simplest tools of analysis (knowing which tool to use and when is essential). In this article, a simple demand curve is employed. The key relationship between the religious employer and the employee is the exchange of the value of work for the value of the compensation. Once this is put into a simple yet powerful economic diagram, students can better evaluate the arguments.

To respond to the bishops and get on with implementing coverage for some 49 million uninsured citizens, the Obama administration introduced an amendment omitting this controversial coverage for hospitals and religiously affiliated anti-poverty operations, universities, schools, and outreach programs. However, their amendment (Statement by HHS Secretary Sibelius) also included a provision enabling an employee of a religious-affiliated organization to apply directly to an insurer for a no-cost rider that would provide this coverage. The Church viewed this as a ruse - a simple rider on an employee health benefit that the Church buys for the employee. This led Notre Dame University and a number of other Catholic universities to file a lawsuit (Notre Dame v. Kathleen Sibelius) requesting that the mandate be rescinded.

THE LAW OF DEMAND DEFINES EMPLOYER/EMPLOYEE RELATIONSHIP

A job is an exchange of work for compensation. This exchange is mutually beneficial: the employer will never knowingly pay more than the value of the work received; the employee will not accept less than the value of the best available alternative employment. Whether the compensation is cash only or a package of cash and benefits, the employee earned the compensation by work.

The standard theory of labor demand found in Principles of Economics texts (Mankiw; Krugman/Wells; and Samuelson/Nordhaus) as well in those focusing on labor economics (Ehrenberg and Smith) describe the demand for labor as a "derived demand." That is, the demand for labor stems from its role in helping to generate profits. The contribution an employee makes to profit (the employee's marginal revenue product) is the value of the work performed.

As with any exchange, each side "pays for" what the other side is offering. In the job setting, the employee is paying for the compensation by performing the work, just as the

employer is paying for the work by providing the compensation. To be clear: the employee is paying for the entire compensation package (including the health benefits) in this employee/employer exchange. Employees buy the insurance with their work just as surely as they buy their wages with their work.

No one forces employees to spend their wages on the offending contraceptives, nor does anyone force the employee to opt for contraceptive drugs or devices even when they are covered under insurance provisions. If the employee does not want to use contraception, the ACA does not force them to change that decision. If the bishops are worried that Church-affiliated hospitals, universities and other employers are "buying" offending products and services when they "buy" health insurance that covers their employees, they can rest easier: the employee buys that non-wage compensation, not the employer, and the employee opts to choose the contraceptives, not the employer.

Figure 1, a conventional demand curve, illustrates the argument. The instructor can demonstrate that the demand for labor is shown with total compensation (not just money wages) on the vertical axis[1] Total compensation is the sum of current compensation (wages and health insurance) plus deferred compensation (pensions and other accumulated assets). This treatment is appropriate since the health insurance in question is a form of current compensation that is clearly separate from wages. As in the conventional analysis of free exchange [2] between buyer and seller, the height of each point on the demand curve shows the employer's maximum willingness to pay the total of wages and non-wage compensation for a unit of employee services. The employer would be unwilling to pay more, but of course would be willing to pay less. The horizontal axis shows labor hired, L, measured in hours while the vertical axis shows compensation per hour worked.

When hiring an employee, the firm must pay total compensation worth at least the employee's opportunity cost. The C line shows that opportunity cost at C dollars per hour worked. The intersection of the C line and the demand curve at point A shows how the firm decides how many worker hours to hire. The firm is just willing to hire worker-hour L when the compensation is C. To the left of point A, the employer derives a surplus, paying the worker less than the firm would be willing to pay. Points to the right represent worker-hours that the firm is unwilling to buy. The key is that the summation of the compensations must equal C, not the individual components of that compensation. Therefore, if the government mandated benefit adds a dollar per hour to compensation while the maximum willingness to pay remains at point A, then other compensations would have to fall by one dollar to leave the total the same as before.

What the employee does with the money earned is separate from and subsequent to the exchange of work for pay. The same holds for the way the health insurance benefit is spent. Suppose the employee decides to spend some of the wages on dinner at a restaurant. It is clear that the employee and not the employer bought the dinner. The same conclusion follows when compensation includes fringe benefits. The benefits are neither a gift nor some form of excessive

compensation. They are part of the employee's earnings, just as are wages. Having contracted to exchange work for a compensation package that includes health insurance, employees are entitled to spend their earnings as they see fit, including choice among the options within their insurance coverage.

Compensation

Figure 1

C

A

Demand Curve

L

Labor Hours
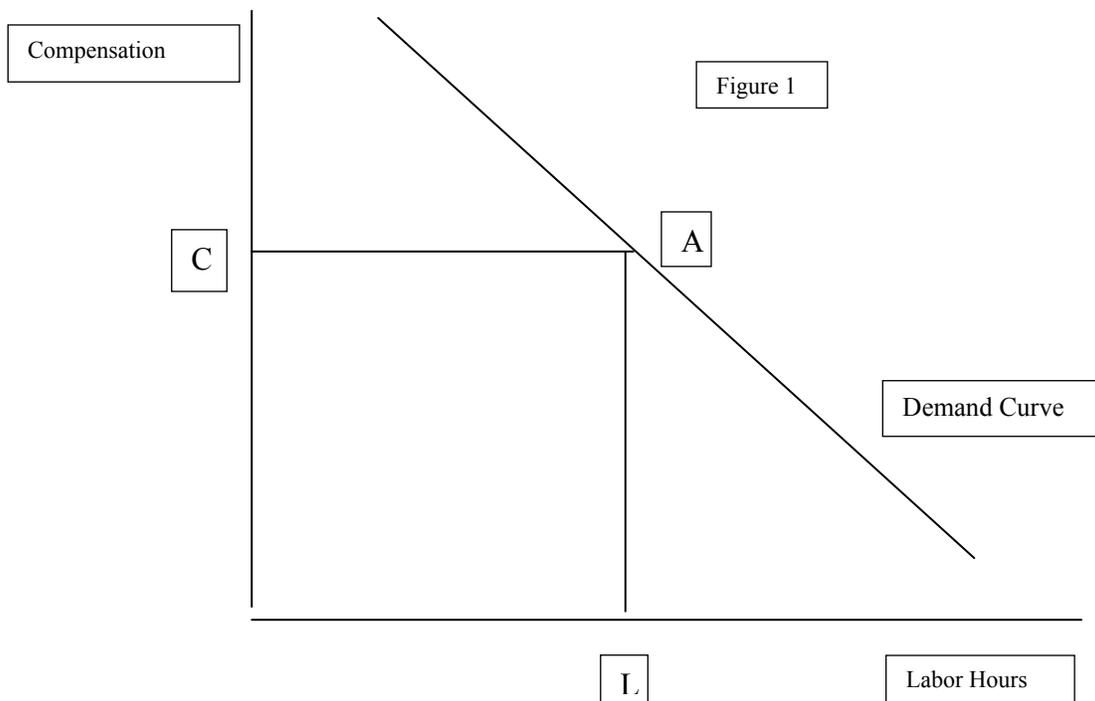
The decision to buy contraceptives financed by their health insurance is separate from and subsequent to the exchange of work for compensation. The decision to use their benefits for birth control is a matter of the employee's choice. The bishops may preach that as a matter of faith they should not engage in the religiously prohibited act, but the contraceptive coverage requirement in the ACA, with or without President Obama's "accommodation", does not change the basic economics: the employee, not the employer, pays for the insurance through the exchange of work for compensation.

THE SPECIAL CASES OF SELF-INSURANCE
AND REFUSAL TO PROVIDE INSURANCE

This conclusion does not change if the employer is large enough to self-insure. For example, if the employer is a well-endowed university with a large number of employees, it may calculate that it is cheaper to simply spread the risk of health costs across its employees than to contract out that risk to an insurance company. The decision to self-insure versus contracting with an insurer is not part of the stated mission of the religious employer; it is simply one of the many business choices any employer makes. Even when the firm decides to self-insure, the employee still pays for the health insurance through the exchange of work for compensation.

As the demand curve further shows, this result does not change when religious employers opt not to provide insurance. In such instances, the ACA requires those employers to pay a fee to the government. The mandate then reverts to the employee who will make an independent insurance purchase in the ACA exchanges. Who pays the employer's fee in this case? Once again, the answer is counterintuitive: the employee pays the fee through the difference between the value of the work performed minus the value of compensation. As before, the worker will be paid a rate of compensation that is at least as great as the worker's opportunity cost. As the demand curve shows, the employer will offer no more in total payments, including the fee, than the value of the work performed, *i.e.*, the summation of the fee plus wages plus other compensations equals the marginal value of the work shown at point A. In this way the value of the work covers both the wages to the employee and the fee to the government, and consequently, once again the employee pays for the health insurance, not the employer[3].

CONCLUSION

Simple demand analysis shows that employers have an upper bound on their willingness to pay compensation for worker services. Workers must be able to earn that compensation with the value of the work they perform. Consequently, they earn both the wages they are paid and the non-wage compensation they receive. The sum of wages and non-wage compensations must meet the market compensation level. When this includes health care benefits, the worker pays for it in the exchange of work for compensation. Just as the worker can freely spend earned wages on things the employer might disapprove of, the worker can spend the privileges provided under health insurance in ways the employer does not approve of. And, for the same reason: the worker paid for it.

ENDNOTES

[1] The demand curve is downwards sloping in both the cases of a competitive labor market, and the case in which the employer has some monopsony power. In the former, the demand is derived as the "value of the marginal product of labor," or VMP. In the latter, the demand is derived as the "marginal revenue product," or MRP. The argument here works in both cases and so the single figure is used, and point A shows what a unit of work is worth to the employer.

[2] Even though the obligation under the ACA is not a "free exchange," but rather a "mandate," the buyer-seller relationship in the labor market is a free exchange.

[3.] A reviewer suggested that this analysis might be confused with tax incidence analysis in which the incidence of a tax is shared by buyer and seller according to elasticities of demand and of supply. There the key is a comparison of pre-tax and post-tax payments and receipts to determine the legal and economic incidence of a tax. These are not the same problem, but there is a crucial similarity. In both the tax-incidence analysis, as well as here, the value of the good or service bought must be at least as great as the total payments made by the buyer, including taxes, or else the buyer would not buy. Here the buyer is the employer, and what the employer is buying is labor services, so the value of those services must be at least as great as total payments made by the employer.

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The University of Notre Dame v. Kathleen Sebelius, in her official capacity as Secretary of the U.S. Department of Health and Human Services; Hilda Solis, in her official capacity as Secretary of the U.S. Department of Labor, Timothy Geithner, in his official capacity as Secretary of the U.S. Department of Treasury; U.S. Department of Health and Human Services; U.S. Department of Labor; and U.S. ; Department of Treasury.

U.S. Department of Health and Human Services, Office of Population Affairs, Intrauterine Fact Sheet: http://www.hhs.gov/opa/pdfs/iud-fact-sheet.pdf

AN EMPIRICAL INVESTIGATION OF THE IMPACT OF AMENITIES ON COUNTY-LEVEL MIGRATION WITHIN THE EAST SOUTH CENTRAL REGION: AN INTRA-MSA STUDY

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ABSTRACT

The existing literature tends to focus on regional migration and the impact of wages, rents, and amenities on location patterns. This study examines inter-county migration within metropolitan statistical areas (MSAs) with a special focus on the role of amenities. In order to examine whether amenities are a driving force behind spatial housing patterns, household migration patterns are analyzed using allocation rates and the spatial equilibrium approach. Contiguous counties within Kentucky, Tennessee, Mississippi, and Alabama MSAs are analyzed. The parameters of an inter-county allocation model are estimated with 1995-2000 migration data from the 2000 Census of Population and Housing and a spatial equilibrium amenity index. The results indicate that the residual-based amenity measure explains county-to-county migration within MSAs and that urbanization is more dominant than suburbanization.

INTRODUCTION

CNN Money.com annually reports the ten fastest growing U.S. counties. Not surprisingly, amenities[1] are consistently among the factors used to explain such growth. In a similar report, American City Business Journal uses twenty statistical indicators to rank 3,141 counties and independent cities across the Unites States. Mobile American households, seeking a better quality of life, are increasingly referring to such reports when assessing potential relocation destinations. Their choice of destination has implications for both origin and destination counties since large population shifts and their associated problems can generate economic and political concerns for many metropolitan statistical areas (MSAs)[2]. A study by Frumkin (2002) discusses urban sprawl and its impact on health (such as mental health, air

pollution, vehicle crashes and fatalities, etc.) in metropolitan areas. The aforementioned issues can negatively impact counties when local governments are unable to effectively plan to accommodate such large population shifts.

In this study, two general forms of within MSA migration are of particular concern, suburbanization – migration from urban counties to suburban counties, and urban gentrification – migration from suburban counties to urban counties. Both forms are garnering national attention, as a stable population base is an indicator of economic stability in an area. Suburbanization and urban gentrification have public policy implications. Both can cause population instability, which results in tax base volatility and strongly affects a county's ability to plan for and provide public services, and to attract and retain residents and businesses.

Previous studies have focused on the relationship between amenities and regional migration decisions (Treyz, Rickman, Hunt, and Greenwood, 1993; Gale, Pack, and Potter, 2001). However, there exists a scarcity of research on the relationship between amenities and county-level migration patterns. Allocation models of migration have been developed for use in regional and state level migration analysis. However, to our knowledge there is no known study that has developed an allocation migration model with a spatial equilibrium measure for valuing amenities appropriate for county level migration analysis. Developing a county level allocation model will broaden our knowledge of migration between counties and thus has implications for households, entrepreneurs, local governments, city planners and businesses. Households may gain better insight for relocation decisions and entrepreneurs for business location decisions. Local governments, city planners and businesses can better assess the future needs of an area to mitigate political, social and economic issues.

The purpose of this study is to gain a better understanding of county-level migration issues such as suburbanization and urban gentrification. The data obtained in this study were collected from the *2000 Census of Population and Housing, U.S. Census Bureau, and State and Metropolitan Area Databooks*. We investigate the relationship between amenities and inter-county migration within an MSA. We analyze the causal relationship between amenities and migration decisions using 1995-2000 migration data from the *2000 Census of Population and Housing* and a spatial equilibrium amenity index. We develop an amenity-based index in order to investigate the causal link between county level amenities and inter-county migration decisions within U.S. MSAs, and address the following question: Do amenities affect inter-county migration decisions within an MSA?

This study contributes to migration literature by providing empirical evidence on the impact of amenities on county-level migration within MSAs located in the East South Central region of the U.S. The results indicate that the effect of amenities on migration is increased when the move is to an urban county. Also, the parameter estimates suggest that the residual-based amenity measure does explain county-to-county migration within MSAs and that urbanization is more dominant than suburbanization in the East South Central region of the U.S. In addition, high amenity counties tend to attract a disproportionate number of migrants within

this region's metropolitan statistical areas. Overall, the results of this study suggest that amenities significantly influence county-level migration as they do regional migration. The results can assist county officials, households, businesses and other stakeholders in planning for inter-county moves within MSAs.

THEORETICAL MODEL

The rationale for migration being influenced by amenities follows directly from the household utility maximization model. In our model, we assume that a household's expected utility is driven by consumption of housing, wages, and location specific amenities. Here, both housing and wages are implicitly influenced by amenities. When contemplating a move, the household weighs the cost of relocating against the benefits of the amenities in the alternate location. If the benefits exceed the costs, it is expected that the household will migrate.

As in Roback (1982), we formally assume identical households across locations, with indirect individual utility given by $V(r, p, s)$, and the cost function $C(w, r, s)$, where r is the rental cost of land, p is the cost of housing (h), s is the quantity of the location-specific amenity bundle, and w is the wage rate. In spatial equilibrium, individual consumers' wages and rents equalize utility. Let V_s be the partial derivative of the indirect utility function with respect to a change in location-specific amenities ($V_s \succ 0$), and V_w be the partial derivative of the indirect utility function with respect to a change in the wage rate ($V_w \succ 0$), in equilibrium the demand for location-specific amenities is P_s^*, which via Roy's identity is:

$$P_s^* = \frac{V_s}{V_W} = h(dp/ds) - (dw/ds) \qquad (1)$$

where: $h(dp/ds)$ is the housing premium induced by the location-specific amenities, and dw/ds is the wage premium induced by the location-specific amenities.

Thus, in spatial equilibrium, the value of all amenities for an individual in a given location is the difference between amenity-adjusted housing prices and amenity-adjusted wages/incomes. As noted, the rationale for migrating depends on the effect of amenities on equation (1), which is indeterminate a priori. If the household perceives that expected utility, given the cost of moving, is higher in the new location than in the current location, the household will migrate. Equation (1) indicates that the value assigned to amenities, depends on both the income opportunity and housing cost in the new location. However, before the migration decision can be made, the cost of moving must be considered. The relocation/moving cost is assumed to be proportional to distance between the current location and the new location.

Assume that in a given MSA, the difference between a household's expected utility in the potential new county l^1 and the current county l^0 and can be expressed as follows where M represents the net utility value of the new county:

$$M = V^1(r, p, s) - C^1 - V^0(r, p, s) \qquad (2)$$

If $M > 0$, the household would be better off migrating, i.e., moving from l^0 to l^1. Alternatively, if $M \leq 0$ then the household would be better off in its current location. It follows that an aggregate migration model which analyzes differences in the amenity bundles of contiguous counties within an MSA, and wages and/or housing cost, given the cost related to moving, is plausible. If $M_{0,1}^h$, where h = migrating households, reflects the number of households that migrate from the county of origin l^0 to destination county l^1. We would expect $M_{0,1}^h$ to vary directly with the destination county characteristics and inversely with origin county characteristics. Hence, locations with higher associated amenity levels should experience disproportionate levels of in-migration (Cushing 2005).

Since this study is limited to migration within an MSA, distance between counties is an important consideration in the location decision as it constrains the location choice. Thus, only contiguous counties within an MSA are included in our study and distance between counties has been included as an explanatory variable for allocation rates. In the model, we consider conditions in only the destination counties, and only those residents that migrate. As in the allocation models used by Greenwood (1969), Wadycki (1974), Kau and Sirmans (1976), Goss and Chang (1983), and Cushing (2005), we calculate the number of migrants leaving the central city county M_{Sl}^{CC} and moving to each suburban county. We then divide the number of migrants that moved to each suburban county M_{Sl}^{j} by the total number of out-migrants from the central city county. The resulting ratio M_{Sl}^{j} / M_{Sl}^{CC} comprises the left side of the allocation flow model:

$$M_{Sl}^{j} / M_{Sl}^{CC} = \beta_1(s) + \beta_2(\phi(w,r)) + \beta_3(C) + e_j \qquad (3)$$

The allocation rate is a function of county specific amenities $\beta_1(s)$, income/earning opportunities measured by median household income, $\beta_2(\phi(w,r))$, and cost related to moving, measured by distance between counties $\beta_3(C)$. Origin county-specific factors are no longer considered in the model because our focus is on the destination choice of migrants. Cushing (1989) shows that once an individual has made the decision to move, origin characteristics alone are no longer relevant, only destination characteristics and distance from the origin. The allocation rate is a conditional migration rate which only focuses on the subset of the population

that actually migrates during the defined time period. The model is based on the theoretical work of Sjaastad (1962), Glantz (1975), Goss & Chang (1983), Odland and Ellis (1988) and Cushing (1989, 2005) among others who have asserted that household migration follows a form of utility maximization behavior and thus can be explained using allocation rates which indicate that the household expects to be better off in the new location than in the original one.

DATA, THEORY, AND EMPIRICAL MODEL

The sample includes householders age 23 and older, living in one of the U.S. Census defined East South Central MSAs in both 1995 and 2000. Only persons who moved within MSAs during the specified time period are included in the analysis. The dependent variable in the allocation model is an allocation rate of migration. The allocation rate reflects the percentage of all out-migrants from origin county *c* who chose county *c'* as their destination within the metropolitan area from 1995 to 2000. The explanatory variables include distance, direction of move, and an amenity valuation based on the spatial equilibrium approach as used by Glaeser, Kolko, & Saiz (2001). The empirical analysis includes county level migration and amenity value data for U.S. metropolitan statistical areas (MSAs). Data was collected from the *2000 Census of Population and Housing, U.S. Census Bureau, and State and Metropolitan Area Databooks*.

Recall that the objective of this study is to extend our knowledge of migration decisions by developing an allocation model of county level U.S. migration that uses the spatial equilibrium approach to measure amenity values for county level analysis of East South Central MSAs. The allocation rate is most commonly defined as the number of persons moving from the origin county indicated by *c* to destination county *c'* during the time period divided by the total number of out-migrants from origin county *c* during the period (Cushing 2005). The allocation model attempts to explain the migration of households among alternative areas based on amenity values. Allocation models of migration have been developed for use in regional and state level analysis. However, as of today there is no known study that has developed an allocation migration model with a spatial equilibrium measure for valuing amenities appropriate for county level migration analysis. Developing a county level allocation model will broaden our knowledge of migration between counties and thus has implications for households, entrepreneurs, local governments, city planners and businesses.

Empirical Methodology

Econometrically, regression analysis is employed to examine the effect of amenities on allocation rates in 23 East South Central U.S. MSAs. To the extent that the allocation rates are subject to unobserved heterogeneity, perhaps due to omitted variables, regression-based parameter estimates that do not account for unobserved heterogeneity produce biased parameter **estimates** (Abdulai and Tietje, 2007). As such, we estimate both conventional OLS and fixed

effects parameters. The fixed effects parameter estimates are identified under the assumed form of heterogeneity and measure casual effects. A comparison of OLS and fixed effects parameter estimates provides a better determination of the robustness of a particular model specification. With respect to migration, it is likely that there is considerable heterogeneity among individuals regarding how they optimize with respect to amenities, introducing some bias in parameter estimates. Thus, a comparison of OLS and fixed effects parameter estimates enable a determination as to how important amenities are for the within MSA migration decision, as well as their magnitude and significance in the presence of heterogeneity.

The Amenity Variable

The main parameter of interest in this study is the effect of amenities, as measured using the spatial equilibrium approach, on inter-county migration within East South Central metropolitan statistical areas. The spatial equilibrium approach to measuring amenities as used by Glaeser, Kolko, and Saiz (2001) was employed in this study to develop an amenity index. Glaeser et al. demonstrate that in urban metropolitan areas, the residuals that result from an OLS regression of median housing prices on median incomes reflects demand for local amenities and exhibit a positive correlation with population growth and likewise a negative correlation with population reduction. We expect a similar relationship with net migration which is a key component of population change. Roback (1982), Glaeser et. al. (2001), and Granger and Price (2006) assert that the amenities valued by an individual in a particular location in equilibrium can be captured by the residuals of an amenity-adjusted housing price and an amenity adjusted wage OLS regression analysis. U.S. Census data was used to determine county-level median housing prices and income. The residuals from the OLS regression of median housing prices on median household income levels were used to measure amenity values for each county within an MSA. Data from the National Association of Counties and Geobytes, Inc. was used to determine the distance between the central cities in each county. The amenity values and distance are used as explanatory variables in our allocation rate model. The allocation rate is used as the measure of migration between counties.

RESULTS

Migrants between counties within the 23 East South Central United States metropolitan statistical areas (MSAs) as defined by the 2000 U.S. Census constitute the sample for the empirical analysis. Migration data were constructed using the 2000 Census of Population County-to-County Migration file. Data on county-level median housing prices and median household income were also gathered from the U.S. Census. Distance between counties was calculated using data published by the National Association of Counties and the City Distance Tool provided by Geobytes, Inc. The study excludes small metropolitan areas comprised of only

one county. The model focuses on the destination choice of migrants within each MSA. As such, the sample consists of all combinations of possible moves between 93 counties resulting in 416 observations.

Table 1 provides the measurement of the variables and the data source, while Table 2 provides a summary of the statistical data. The dependent variable, ALLRATE equals the number of persons five years of age and over, residing in county c' (destination county) on April 1, 2000, who resided in county c (origin county) on April 1, 1995, divided by the total number of persons, five years of age and over who resided in county c on April 1, 1995 or another county within the MSA on April 1st 2000. The independent variables employed in the model are:

AMENITY$_{c'}$ = Amenity value calculated for county c', the destination county
DISTANCE = Mileage between the county seat of county c and that of c'
URBANMV = Dummy variable to indicate a move to an urban county
SUBURBANMV = Dummy variable to indicate a move to a suburban county

An amenity index was developed using the spatial equilibrium approach as used by Glaeser, Kolko, and Saiz (2001) and discussed above. We include dummy variables, URBANMV and SUBURBANMV to indicate the effect of the type of move on allocation rates. The model includes each of the contingent counties within a particular East South Central U.S. MSA as a possible destination. The gross migration from each of the other MSA counties was analyzed using the allocation rate as a dependent variable and the calculated amenity values, distance, and type of move as explanatory variables.

Table 1 – Variable Definitions and Data Sources		
Variable Name	Description	Source
ALLRATE	The number of persons moving from origin county *c* to destination *c'* between 1995 and 2000 divided by the total number of out-migrants from origin *c* to another MSA county during the period	U.S. Bureau of the Census 2000 U.S. Census of Population and Housing
AMENITY	The residuals that result from an OLS regression of median housing prices on median incomes	U.S. Bureau of the Census
DISTANCE	Mileage between the county seat of county c and that of c'	National Association of Counties and Geobytes, Inc. City Distance Tool
URBANMV	Dummy variable = 1 if the move is to an urban county; 0 = otherwise	U.S. Bureau of the Census 2000 U.S. Census of Population and Housing and National Association of Counties
SUBURBANMV	Dummy variable = 1 if the move is to a suburban county; 0 = otherwise	U.S. Bureau of the Census 2000 U.S. Census of Population and Housing and National Association of Counties

Table 2 – Variable Statistics					
Variable	Observations	Mean	Standard Deviation	Minimum Value	Maximum Value
ALLRATE	416	.209	.265	0	.986
AMENITY	416	1323.961	11324.18	-35009.93	25595.92
DISTANCE	416	33.849	18.534	8	101
URBANMV	416	.231	.422	0	1
SUBURBANMV	416	.769	.422	0	1

Table 2, which contains the variable summary statistics, reveals that approximately 20.9% of migrants moved to counties within the same MSA during the period of 1995-2000. The average distance between counties within an MSA is 33.85 miles. The variable of interest for this study, AMENITY, which examines the value that household which migrate place on the alternate county location has a mean value of $1323.96. The variable URBANMV indicates that 23.1% of the moves were to an urban county and the variable SUBURBANMV indicates that 76.9% of the moves were to a suburban county.

The OLS parameter estimates reported in Table 3 assume a log-linear functional form. This model specification is appropriate for the data because only the dependent variable, ALLRATE, has a theoretical range of zero to 100 (Cushing 2005). All explanatory variables appear in linear form. No violations were found in tests for use of the Classic Linear Regression Model (CLRM). A plot of the observed versus predicted values reflected a symmetrical pattern, thus non-linearity was not evident. Serial (auto) correlation was not an issue as the study uses cross-sectional rather than time series data. Robust standard errors were generated to correct for the presence of heteroskedasticity in the data. Econometric theory shows that robust standard errors are unbiased and efficient when used on relatively large (greater than 50 observations) datasets. Normal probability plots of the residuals confirm normal distribution with no skewness or kurtosis. Thus, we have sufficient support for the log-linear functional form employed in the study.

Due to migration flows of zero in many instances, we eliminated 27 observations from the original 416, in order to use the log linear form, resulting in a final sample of 389 observations. Table 3 shows the parameter estimates for four model specifications (with standard errors and t-statistics in parentheses). All models include the log of allocation rates as the dependent variable.

Specification 1 includes only AMENITY as an explanatory variable, which indicates that the value assigned to amenities, depends both on the income opportunity and housing cost in the new location. The R^2 statistic indicates that the model explains only 1% of the variation in allocation rates. The amenity coefficient is significant at the .001 level and has the expected sign. Although, the results indicate that amenity is significant, the low R^2 indicates that this is not the only variable that a household considers when contemplating a move from one county to another county in a MSA.

Table 3 – Ordinary Least Squares Regression – Metropolitan Counties				
Dependent Variable: Log Allocation Rate				
Variable	Model 1	Model 2	Model 3	Model 4
CONSTANT				
Coefficient	-2.475	-.634	-.1.152	.170
Robust HC3 s.e.	(.082)	(.135)	(.139)	(.146)
t-stat	(-30.07)	(-4.70)	(-8.27)	(1.17)
Prob >|t|	.000	.000	.000	.244
AMENITY				
Coefficient	.000015	.000019	9.92e-06	9.92e-06
Robust HC3 s.e.	(6.20e-06)	(5.14e-06)	(4.86e-06)	(4.86e-06)
t-stat	(2.43)	(3.64)	(2.04)	(2.04)
Prob >|t|	.016	.000	.042	.042
DISTANCE				
Coefficient		-.057	-.051	-.051
Robust HC3 s.e.		(.004)	(.004)	(.004)
t-stat		(-14.41)	(-13.22)	(-13.22)
Prob >|t|		.000	.000	.000
URBANMV				
Coefficient			1.322	
Robust HC3 s.e.			(.118)	
t-stat			(11.18)	
Prob >|t|			.000	
SUBURBANMV				
Coefficient				-1.322
Robust HC3 s.e.				(.118)
t-stat				(-11.18)
Prob >|t|				.000
R^2	.011	.380	.495	.495
F-stat	5.89	115.90	116.98	116.98
Prob>F	.016	.000	.000	.000
Number of Observations	389	389	389	389

Specification 2 includes AMENITY and DISTANCE as explanatory variables. The R^2 statistic indicates that the model explains 38% of the variation in allocation rates. Both AMENITY and DISTANCE are significant at the .001 level. Both variables exhibit the expected sign. The model indicates that a one unit increase in amenity value results in a .0019% increase in allocation rate, which means that as the amenities in a particular area increase, a household is more willing to leave its origin county and relocate to a destination (new) county where amenities are greater. Allocation rates vary inversely with DISTANCE. The results indicate that a one mile increase in distance between origin and destination counties results in a 5.7% decrease in allocation rates. Recall, if the household perceives that expected utility, given the cost of moving, is higher in the new location than in the current location, the household will migrate.

Equation (1) tells us that the value assigned to amenities, depends both on the income opportunity and housing cost in the new location. However, before a household decides to migrate, the cost of moving must also be taken into consideration. The DISTANCE variable serves as a proxy for relocation cost, which is assumed to be proportional to distance between the current location and the new location.

Specification 3 includes URBANMV as an additional explanatory variable. The R^2 statistic indicates that the model explains 49.5% of the variation in allocation rates. All explanatory variables are significant at the .05 level and have the expected sign. The model indicates that amenities have a small but positive effect on allocation rates between counties. Additionally, a one mile increase in distance between counties results in a 5.1% decrease in the allocation rate, and that moves to urban counties occur at approximately a 132% higher rate than alternate moves between MSA counties. Consistent with expectations, amenities positively impact allocation rates, as well, an increase in distance results in a decrease in the allocation rate. These results indicate that the further the distance the less likely a household will move unless the expected utility is greater in the new location. Also, migration to urban counties occurs at a much higher rate than those to suburban counties with an MSA.

Specification 4 includes SUBURBANMV rather than URBANMV as an additional explanatory variable for model comparison purposes. The R^2 statistic is consistent with Model 1 and indicates that the model explains 49.5% of the variation in allocation rate. All explanatory variables were found to be significant and have the expected sign. The regression results indicate that the AMENITY variable is significant at the .05 level, DISTANCE and SUBURBANMV are significant at the .001 level. The results indicate that amenities have a positive effect on migration rates between counties within an MSA. A one mile increase in distance between counties results in a 5.1% decrease in allocation rate. Additionally, moves to suburban areas occur at approximately a 132% lower rate than other moves between MSA counties. When used for comparison purposes, the results are consistent and the coefficients for URBANMV and SUBURBANMV have opposite signs, which confirm that for this sample, migration to urban counties occurs at a much higher rate than alternative moves between counties in this sample.

The R^2, F-statistics, t-statistics, and coefficient signs indicate that Model 3 and Model 4 provide the best fit and show the most significant results for the data. The results for these models indicate that all of the explanatory variables are significant predictors of allocation rates at the .05 level or better between counties within East South Central MSAs. Additionally the models indicate that the effect of amenities on migration is not the only variable that a household considers when moving between counties. In this context, the parameter estimates in Models 3 and 4 are compelling, and suggest that the residual-based amenity measure does explain a large percentage of variation (R^2 = 49.5%) in county-to-county migration within MSAs and that urbanization is more dominant than suburbanization in the East South Central region of the U.S.

Fixed Effects Regression Models

The OLS parameter estimates of the allocation model are identified only if the error term is orthogonal to the regressors. This is unlikely to be the case if; for example, migrants differ in how they optimize on particular amenities across MSAs. It is also possible that each MSA has some amenity, observable by individuals, but not by the econometrician, that matters. In either case, the regressors are not orthogonal to the error term, which undermines identification of the effect that amenities have on within MSA migration.

To account for unobserved heterogeneity in the uniqueness of each MSA, we estimate the parameters of a fixed effects specification of the allocation model. To capture spatial variations in the uniqueness of each MSA, we allow the intercept to vary but assume that the slope coefficients for the remaining variables are constant across MSAs. The Fixed Effects version of the allocation model is specified as:

$$Y_i = B_{0i} + B_1 X_{1i} + B_2 X_{2i} + B_3 D_{3i} + B_4 D_{4i} + u_i$$

The inclusion of the subscript on the intercept term suggests that the intercepts of the 23 MSAs may be different. The differences in each MSA may be due to spatial variations in social, economic, or environmental factors.

Table 4 reports the parameter estimates for the fixed effects allocation rate model with individual MSA effects. The fixed effects specifications assume fixed MSA effects with a log-linear functional form. This model specification is appropriate for the data because only the dependent variable, ALLRATE has a theoretical range of zero to 100. All explanatory variables appear in linear form.

The models were estimated based on the specifications in Table 4. All specifications include the log of allocation rates as the dependent variable. The sample size consists of 389 observations and 23 MSA groups. Again, we note that 27 county-to-county combinations reflected zero migrants and were therefore eliminated from the sample. The fixed-effect parameter estimates in Model 3 and Model 4 suggest that amenities in urban areas are important. When compared to the OLS parameter estimates which do not control for unobserved heterogeneity, the fixed effects parameter estimates are quite similar, thereby confirming that the residual-based amenity measure explains county-to-county migration within East South Central MSAs and that urbanization is dominant in this region.

Table 4 – Fixed Effects Allocation Rate Regression – Metropolitan Counties Dependent Variable: Log Allocation Rate, Group Variable: MSA				
Variable	Model 1	Model 2	Model 3	Model 4
CONSTANT : *Coefficient*	-2.534	-.788	-1.187	-.116
s.e.	(.072)	(.152)	(.151)	(.167)
t-stat	(-35.15)	(-5.17)	(-7.87)	(-0.70)
Prob >|t|	.000	.000	.000	.486
AMENITY : *Coefficient*	.00006	.00005	.00003	-.00003
s.e.	(8.9e-06)	(7.56e-06)	(7.32e-06)	(7.32e-06)
t-stat	(6.71)	(6.16)	(4.22)	(4.22)
Prob >|t|	.000	.000	.000	.000
DISTANCE : *Coefficient*		-.054	-.049	-.049
s.e.		(.004)	(.004)	(.004)
t-stat		(-12.49)	(-12.06)	(-12.06)
Prob >|t|		.000	.000	.000
URBANMV: *Coefficient*			1.070	
s.e.			(.140)	
t-stat			(7.65)	
Prob >|t|			.000	
SUBURBANMV : *Coefficient*				-1.070
s.e.				(.140)
t-stat				(-7.65)
Prob >|t|				.000
R^2*Within*	.110	.378	.463	.463
R^2*Between*	.001	.302	.534	.534
R^2*Overall*	.011	.342	.471	.471
F-stat	45.00	110.12	104.49	104.49
Prob>F	0.000	0.000	0.000	0.000
Number of Observations	389	389	389	389
Number of Groups	23	23	23	23

CONCLUSION

Cities, counties, and metropolitan areas are regularly being compared based on amenities that households presumably value. This study considered the extent to which household county-to-county migration decisions within MSAs can be explained by amenities. We estimated the parameters of a population and migration allocation model with data for household moves between 389 counties within East South Central U.S. metropolitan statistical areas. OLS and fixed effects parameter estimates revealed that urban amenities appear to be a major determinant of household migration decisions. As our amenity measure is based on how households value amenities in spatial equilibrium, our results are an improvement over traditional approaches to amenity measurement that attempt to itemize explicitly what amenities households desire. Our amenity measure captures the value of all amenities—whatever they are—with the idea that in

spatial equilibrium, housing price and incomes capitalize the value of whatever households desire in the location to which they are relocating.

Our parameter estimates suggest that amenities do indeed matter for within MSA county-to-county household migration decisions. In particular we find that for migration to urban counties, amenities are a particularly important determinant of migration. This effect also seems to be robust and well-identified in our parameter estimates, as it is positive and significant in OLS and fixed effects regression specifications of the migration allocation model under consideration.

Our results are potentially important to policy makers, entrepreneurs, and regional planners to the extent that preferences for amenities tend to drive household and firm migration decisions, thereby influencing local growth, economic opportunities, and economic development. We find for example, that for county-to-county within MSA migration, urban amenities are particularly important. To the extent that suburban counties desire to be viewed as livable places that are attractive to households, our results suggest that they should examine the amenity characteristics of their suburban counterparts. While our amenity measure does not itemize which specific amenities households desire, its construction suggests that households are willing to pay for them through some combination of higher home prices and/or lower wages/incomes. Thus, city planners and policymakers may determine what amenities matter for suburban migration decisions by simply estimating comparative suburban/urban hedonic home pricing and income models to determine what particular amenities (e.g, school quality, air quality, traffic congestion) are relatively important.

A notable limitation of this study is that the results are based on county-to-county migration within East South Central MSAs. Future research can explore migration using county-to-county data in other regions of the U. S. Furthermore, the recent economic downturn has affected migration patterns throughout the U.S. Examining the interaction between amenities and business cycles may provide additional insight into our understanding of household migration decisions.

ENDNOTES

[1]   Amenities represent the tangible and intangible features that increase the relative attractiveness and value of real estate and residential structures.

[2]   The National Association of Counties defines a metropolitan statistical area as a county or group of contiguous counties that contains at least one city with a population of 50,000 or more or a Census Bureau defined urbanized area of at least 50,000 with a metropolitan population of at least 100,000. In addition to the county or counties that contain all or part of the main city or urbanized area, an MSA may contain other counties that are metropolitan in character and are economically and socially integrated with the main city.

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INNOVATION AND ECONOMIC EDUCATION: AN INTEGRATION

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ABSTRACT

Almost everyone agrees on the importance of educating a broad spectrum of the public about economics and business. It has been suggested by experts in economic education that universities should place greater emphasis on economics as a general education. The present paper develops a proposal to integrate innovation into elementary economic education that business faculties might use to enrich their general economic education offerings. We believe the proposal can be implemented through the design of a new subject – which may be called the 'Creative Economy' – supported by a method of teaching and learning by successive approximations. The study of innovation as an economic activity would provide useful tools to analyse the modern economy and would make the study of economics more attractive, especially for novices.

JEL code: A22

INTRODUCTION

Almost everyone agrees on the importance of educating a broad spectrum of the public about economics and business. It has been suggested that universities should place greater emphasis on economics as a general education. This point was forcibly made by Salemi and Siegfried (1999). In particular, these economic education specialists assert:

> Sound educational principles and self-interest both dictate that departments should place greater emphasis on their general education courses. Greater emphasis on general education diversifies risks associated with variation in the number of majors. It also creates better-informed citizens and fits the needs of the growing number of students at two-year colleges.Salemi and Siegfried (1999, p. 357)

The be-all and end-all of economic science is to improve the living conditions of people in their everyday lives. This can be attained by improving resource allocation. However, once economic efficiency has been attained, a necessary condition to improve living standards in a sustainable manner is to create new products, new processes and new forms of organization.

Generally speaking, introductory economics textbooks deal with innovation in a very peculiar way. As currently taught, innovation is introduced twice in most economics courses. First, the idea of innovation is introduced in supply and demand analysis as a cost-reducing supply shifter or as a creation of an entirely new market that may shift the demand for related goods. Second, in a macroeconomic context the idea is used to illustrate the importance of technological change to increase an economy's GDP. In both contexts the notion of innovation is a black box presented as some exogenous shock to the economic system.

Simply to know that there are innovations shifting curves tells us nothing about innovation as an economic activity. Furthermore, the *ad hoc* use of the notion of innovation for illustrative purposes appears to convey the message that innovation could not be explained in economic terms, or if it were possible to study innovation as an economic activity, it would be better initially to confine attention to existing products and relegate the treatment of innovation as an endogenous phenomenon to another subject. The promise is always in the future.

Neglecting innovation as an economic activity in the Principles courses prevents students from understanding key aspects of the behaviour of the modern economy such as competition based on innovation, not on prices, as well as the welfare implications of profit-seeking innovation.

Business innovation has become an important and pervasive phenomenon in the corporate economy. It leaps to the eye that one of the striking features of the contemporary economy is the rapid creation, adoption and diffusion of innovation. This has many and profound implications for the demand and supply of university graduates. Employers seek graduates who appreciate the importance of innovation (employers need 'game-changers,' not 'staid-players'). Universities should equip students with the tools to operate in the innovation age. To function effectively in today's world, economics students need a working knowledge of business innovation.

It is reasonable to assume that business students want to see relevance in the economics subject contents. To fulfil their expectations it is not enough to teach them that the demand and supply model is useful to show that when a cyclone hits Queensland, the price of bananas rises; or that a monopolist can be maximizing profits and making an economic loss. We believe that it would also be useful to explain business students why the pulse of change is rapid virtually everywhere in the modern economy.

It is an open secret that many business students find introductory economics subjects uninteresting.[1] There are at least three separable causes for this rejection that may operate singly or jointly. One possibility is that professors try to teach their students far too much. The second reason appears to be related with the form in which economic concepts are conveyed, particularly the use of equations and graphs too abstruse to comprehend. Finally, a third reason lies in the fact that introductory economics textbooks typically confine attention to existing products, and thereby, assume away innovation as an economic activity. Not surprisingly, these causes of rejection also constitute barriers to understanding economics.

As will become apparent, the proposal in this paper may help to overcome the barrier represented by the neglect of innovation as an economic activity in the introductory economics courses. The first barrier to understanding economics –quantity of subject content– is essentially a matter of academic judgement.[2] The second barrier –use of mathematical formalisms in economic education– has been discussed extensively by many authors in the last sixty years and will not be considered here.[3]

Even though one of the distinctive features of the modern economy is incessant profit-seeking innovation, the reality is that innovation as an economic activity is everywhere except in the economics textbooks. Have economics teachers forgotten Schumpeter's (1934) deep insight, namely: no complete understanding of the economy is possible without a thorough grounding in the world of innovation? We believe the answer should be in the negative. The biggest obstacle lies in the difficulties surrounding the incorporation of innovation into elementary economic education as an endogenous phenomenon.

The present paper develops a proposal to integrate innovation into elementary economic education that business faculties might use to enrich their general economic education offerings. We believe the proposal can be implemented through the design of a new subject –which may be called the Creative Economy– supported by a method of teaching and learning by successive approximations. The study of innovation as an economic activity would provide useful tools to analyse the modern economy and would make the study of economics more attractive, especially for novices.

The organization of the paper is as follows. In the next section we articulate a justification for teaching business innovation as an additional problem area of economics. Sections 3, 4, and 5 describe the three approximations that may be fruitful to articulate teaching and learning in the area of innovation as an economic activity. Specifically, Section 3 identifies and outlines three dimensions that lie at the heart of innovation as a field of study; Section 4 presents a collection of interpretative tools useful to gain an understanding of innovation as an economic activity; and Section 5 makes contact with the idea of 'threshold concept,' and provides specific examples of this notion taken from the innovation field. Section 6 provides a rough outline of the proposed new subject. Section 7 concludes by briefly summarizing the gist of the proposal.

TEACHING AN ADDITIONAL PROBLEM AREA OF ECONOMICS

There are at least two acceptable ways to characterize a scientific discipline. First, it is a common practice to define a field of study by pointing out a common denominator which is central to the discipline. For example, economics is the study of how society manages its scarce resources. Second, we can characterize a scientific discipline by identifying its object of study and presenting a list of the most important problem areas. For example, economics studies the economy and addresses the following problem areas: resource allocation; income distribution;

unemployment; inflation; economic growth; globalization of the world economy; environmental protection; human development; and economic institutions. New areas of concern may emerge over time.

Generally speaking, teaching a particular discipline means to impart an understanding of the main problem areas associate with its object of study. To justify the claim that a particular (additional) problem area should be taught to undergraduate students at least two conditions should be met: first, the proposed problem area has to be linked to the object of study of the discipline in a fundamental way, and second, there has to be a teaching method that enables students to understand the problem area in a systematic manner.

Business Innovation

It is fairly easy to show that business innovation is a problem area of both macro and microeconomics using the line of reasoning inaugurated by Schumpeter (1934). Economics is the study of the economy, and the economy is a complex evolving system. This implies that economic change is an integral part of economics. In turn, endogenous economic change is brought about by business innovation. Consequently, nothing could be plainer than the proposition that innovation is a problem area in a macroeconomics context.

It is also evident that business innovation is an important and pervasive phenomenon at the microeconomic level. Economic behaviour refers to that part of human behaviour which is connected with the material elements of well-being. Somewhat roughly, people act economically when an opportunity for gain is presented to them and they take it. Two simple examples of economic behaviour are as follows. First, when the activity of producing *existing* products signals prospective profits some people will engage in the business of producing those products. Second, when the creation of *novel* products opens the opportunity for making money some people will undertake innovative activities.

Business innovations are new ideas created with the intention of making money. These new ideas are materialized in new products or process as well as new forms of organizations. It should be clear that successful business innovations are indistinguishable from profitable new ideas. What may not be as obvious is that we can conceive a stylized ideas-driven economy revolving around new ideas with economic value. Specifically, we can envisage a *creative economy* defined as one in which the increase in the standard of living of its residents is primarily based on the production of profitable new ideas. Understanding the factors conducive to successful business innovation is of absolutely fundamental importance for any country that aspires to promote a creative economy.[4]

The Methodology of Three Approximations

Innovation is a vast and complex field of enquiry where multidisciplinary interaction takes place. For example, the interaction between economics, law, management, and marketing is essential in the process of gaining an understanding of business innovation. What is needed is a methodology simple enough for instructors and students to visualize how the pieces of the jigsaw fit together.

The methodology proffered here consists of three successive approximations that can be briefly sketched as follows. The first approximation is a background model which breaks the domain of business innovation down to three dimensions –creativity, intellectual property and innovation environment– that interact in a meaningful way. The second approximation looks into the basic dimensions of innovation using interpretative tools such as core concepts, insights and conceptual frameworks. Finally, the third approximation differentiates between interpretative tools that enhance our understanding of the topic without provoking deep learning impact and those that represent a significant change in the perception of the subject matter.

The reader familiar with recent developments on the teaching and learning front will quickly recognise that the third approximation focuses on the difference between 'core concepts' and 'threshold concepts.' This distinction has profound implications for teaching and learning. The role of threshold concepts in engendering deep learning is currently under active investigation. An excellent introduction to the growing literature on this area –with particular regard to economics– can be found in the editorial paper by Davies and Guest (2009).[5]

Background model

In order to understand complex phenomena it is often necessary to construct simple models. One way to proceed in studying business innovation is to provide a grand view of the innovation landscape. For lack of a better term, we call this grand map the *background model*. The background model reduces the complicated details of the innovation world to manageable essentials and asserts that to understand business innovation one needs to explore a triad of dimensions:

❶ Creativity, because there would be no new ideas without innovators using their personal creative energies; in particular, the vast majority of new ideas emerge because people and organizations want monetary gains from their creative efforts;

❷ Intellectual property rights, because the act of innovation typically creates intellectual property; innovators protect their new ideas using patents, copyrights, trade secrets, and trademarks; and

❸ Innovation environment, because innovators need a fertile milieu to produce and commercialize new ideas; in particular, innovation as an economic activity requires cross-cutting institutions supporting innovativeness throughout the economy.

We next sketch the distinguishing features of this triad of dimensions.

Dimension❶: Creativity

An innovation is a new idea and the generation of a new idea involves a creative act. Unfortunately, the creative act is a phenomenon imperfectly understood. The formulation of a new idea may take years of hard work or arrive in a flash of insight as in the case of Harry Potter.[6] In essence, the creative act is a black box in the sense that there is no generally accepted explanation about the workings of the brain of an innovator. One of the few things that we know about the creative act is that it consists of the reconfiguration of old ideas in new ways to produce new ideas.

Apparently, there is a capacity for generating new ideas that it is better developed in some people than in others. This capacity is not necessarily associated with a rare combination of gifts. Would-be innovators look, ask, listen, and above all, use creative thinking. There are three main categories of creative thinking –logical thinking, lateral thinking and imaginary thinking– that support the creative act.

Logical thinking can be either logical inference or reliable inference. Logical inference (or deductive reasoning) is an inference in which, granted the truth of the premises (or assumptions), the conclusions *must* be true. In reliable inference, the conclusions do not *necessarily* follow from the premises (or assumptions) but there are reasons to believe that the conclusions are correct.

Lateral thinking emerges from the limitations of logical inference to generate new ideas. Getting new ideas from a *given* set of assumptions tends to become increasingly difficult (it is like drilling deeper for oil in the same hole). Lateral thinking is a way of thinking which seeks the solution to a problem by making associations with unrelated areas, rather than by pursuing deductive reasoning. Logical thinking "is digging the *same* hole deeper; lateral thinking is trying again elsewhere." de Bono (1968, p. 26).

Imaginary thinking is based in mental images that do not exist in reality or in facts that did not occur. For example, the kind of reasoning used by Joanne Rowling when writing about Harry Potter falls into the category of imaginary thinking. Another example is science fiction, that is, a fiction which draws imaginatively on scientific knowledge and speculation in its theme.

Sometimes innovators combine the three types of creative thinking. This may happen when the would-be innovators posit: "What would have happened if … had happened (or not had happened)." The core elements in counterfactual reasoning are the identification of a situation

that did not exist, the formulation of a set of alternative paths, and the logical analysis of the implications of these alternatives.[7]

Dimension❷: Intellectual property

Well-defined property rights exists when three basic elements are present: (a) to every property is assigned a well-defined owner with exclusive rights of ownership; (b) to the owner of the property goes the residual income accruing to the assets; and (c) the owner has the right to control the existing assets. These elements refer to both tangible and intangible assets. The existence of well-defined property rights is viewed as a basic presupposition to the proper functioning of a capitalist market economy.

The rewards to producing innovations are reduced by imitations. Governments introduce intellectual property rights to encourage the production of new ideas with economic value. There are four types of protection of intellectual property rights: patents, copyrights, trade secrets, and trademarks. The existence of intellectual property can be thought of as a barrier to entry into the market and has been extensively studied in the economics literature.

Dimension❸: Innovation environment

The explanation of the last dimension requires a comprehensive conceptual framework consisting of (a) a macro component or *innovation infrastructure* (cross-cutting institutions such as universities, patent and copyright laws, etc. influencing innovativeness throughout the economy); (b) micro components or *clusters* (geographical agglomeration of interconnected companies in particular fields together with suppliers, related industries, and specialized institutions); and (c) the *links* between components.

We call this catch-all conceptual framework the *Nelson-Porter framework* because it originates from two (distinct) scholarly strands associated with Richard R. Nelson and Michael E. Porter to name only the most prominent contributors. Indeed, first is the concept of innovation infrastructure emerging from the immense national innovation systems literature, associated with Nelson (1993) among many others. Second is the cluster-based model of international competitive advantage based on an understanding of industrial clusters, a research agenda primarily developed by Porter (1990).

A pictorial description of the background model can be seen in Figure 1. We take for granted that any aspect of interest concerning innovation as an economic activity lies in at least one of the three dimensions shown in Figure 1.

Figure 1: The Background Model for teaching and learning innovation as an economic activity
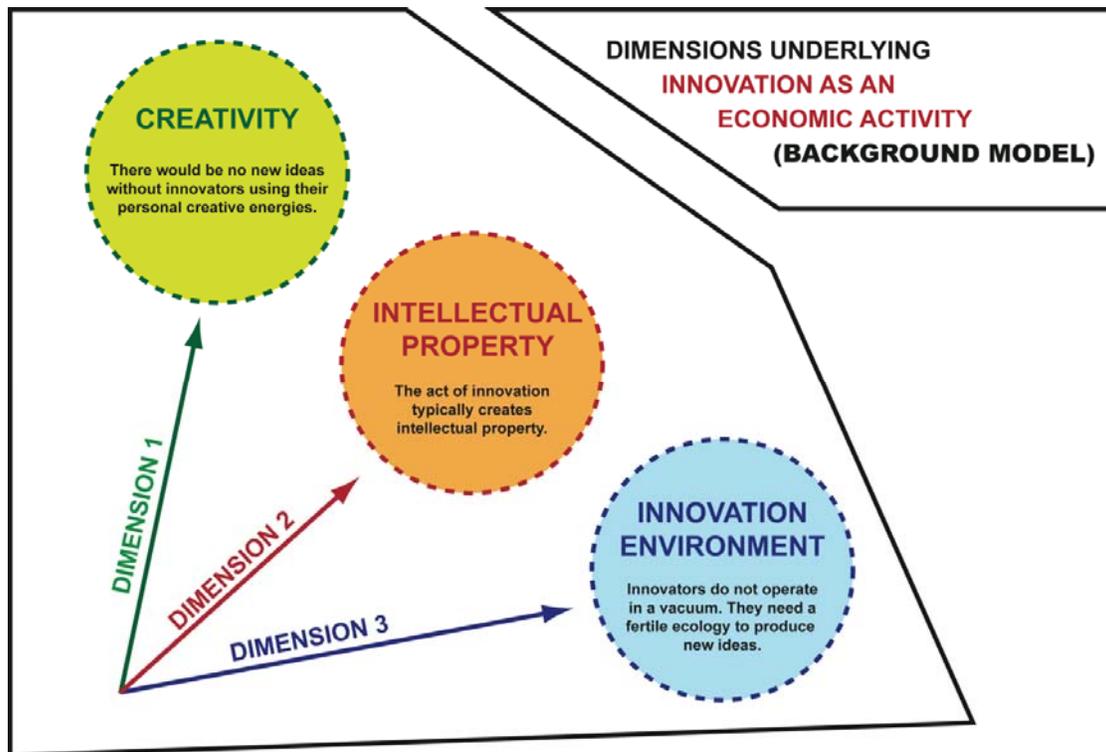
INTERPRETATIVE TOOLS

The second approximation examines the basic dimensions using interpretative tools which summarize what researchers and practitioners have learnt about business innovation. There are seven interpretative tools that can be found in the intellectual tool-kit of business innovation. They can be described and exemplified as follows.

While *first principles* are statements suggested by the empirical evidence that we do not propose to challenge (for example, innovations occur and creative people react to incentives), *core concepts* are essential building blocks used to undertake analytic effort such as innovation costs, profitable new ideas and creative destruction.

Insights are penetrating mental visions that guide scientific research. There are at least five insights inextricably linked to the notion of a creative economy. These are:

Insight #1:   *The act of innovation consists of reconfiguring old ideas in new ways to produce new ideas,* Schumpeter (1934, p. 68);

Insight #2:   *Commercial innovation is essentially an economic activity,* Schmookler (1966, p. 208);

Insight #3:   *The act of innovation is typically imperfectly appropriable,* Nelson (1982, p. 467)*;*

Insight #4:   *The existence of intangible inputs renders increasing returns inevitable,* Romer (1990a); *and*

Insight #5:   *Ideas and human capital are inherently different products,* Romer (1990b).

Conceptual frameworks constitute intellectual constructs for organizing thinking about a problem. For example, if we ask what is an appropriate environment for the creation of profitable new ideas? the Nelson-Porter framework enables the development of a satisfactory answer. All conceptual frameworks have *underlying assumptions* –such as there exists economic freedom and self-interest predominates– which are not continually repeated but they are required for the validity of the arguments.

Paradoxes or statements seemingly contradictory but explicable as expressing a truth are a special type of interpretative tool. For example, the efficient firm's dilemma (namely: the more an efficient firm strives to remain the way it is today, the more probable is that it will fall away) reflects the truth that confining attention to efficiency may not be enough for survival in the modern economy. Finally, the last type of interpretative tool is given by *ongoing debates* on different views concerning a particular awkward question such as is DNA patenting acceptable? or does economic evolution always proceed slowly and gradually or make leaps from time to time?

Threshold concepts

Educators and students are familiar with terms such as first principles (e.g. people respond to incentives), core concepts (e.g. 'monetary price,' 'quantity demanded' and 'quantity supplied'), insights (e.g. 'the invisible hand of Adam Smith' and 'competition as a discovery procedure' due to Hayek (1978)), and conceptual frameworks (e.g. 'demand and supply model,' 'input-output model' and 'ISLM model.' The term 'threshold concept' is relatively new. It has been introduced to emphasize that the impact of some notions on our understanding of a particular discipline is deeper than others.[8] A *threshold concept* is a transformative gateway that leads to the understanding of deep ideas in a field of enquiry.

The notion of threshold concept is being developed within many disciplines (see for example the papers in Land et al, (2008). But economists have been quite prominent in this field. For instance, Davies and Guest (2007) show that the notion of threshold concept sheds new light on the problems of teaching and learning economics and present evidence that it is useful to think of threshold concepts in terms of a web. More recently, interesting connections have been established between threshold concepts and metalearning capacity in economics. Meyer et al. (2009).

Examples of threshold concepts in pure mathematics and economics are easy to find. The concept of a 'derivative' leads to a transformative way of looking at the slope of a curve and

constitutes a crucial stepping stone to enter the area of subtle mathematical ideas such as the notion of a 'tangent bundle' in differential topology. 'Opportunity cost,' 'comparative advantage,' 'elasticity,' 'partial equilibrium' and 'ISLM model' are threshold concepts in economics. Learners who are able to absorb threshold concepts will come to a new level of understanding crucial to the discipline.

Which interpretative tools in the study of innovation as an economic activity should be regarded as threshold concepts? Three conceptual understandings that appear to have a transformative effect on novices are: 'non-rival products,' 'creative destruction' and the dichotomy 'sustaining/disruptive innovation.' These threshold concepts were introduced by Romer (1990b), Schumpeter (1950) and Christensen (2003), respectively.

A product is *non-rival* if its use by one person does not reduce the ability of another person to use the same product. Specific examples of non-rival products are a *design* (because the use of the design by one person does not preclude the simultaneous use by another person, or even by many people) and a *firm's knowledge capital* (because the firm can use its knowledge capital simultaneously in multiple domestic and foreign locations).

In some economic sectors such as the information technology sector, competition through innovation tends to be more important than price competition. *Creative destruction* illustrates a particular case of competition through innovation. The process of creative destruction can be described as follows. Profit-seeking innovators try to achieve market power by creating a better product than their competitors. Over time (some) new products replace old ones, earn abnormal profits for some period of time, and are replaced in turn.

One obvious question immediately suggests itself. What kind of innovation is involved in the process of creative destruction? 'Disruptive innovation.' *Sustaining innovations* improve the performance of established products. The archetypal example of sustaining innovation is Toyota's innovation philosophy of Kaizen or continuous improvement, namely creative workers are constantly proposing small changes that perpetually bring the manufacturing process close to perfection. A *disruptive innovation* is a new idea that constitutes a significant shift from everything that has come before. For example, the personal computer was a disruptive innovation relative to the typewriter.

Or to add one more example of transformative conceptual understanding which by no means exhausts the list of possibilities, we mention the difference between 'ideas' and 'human capital' introduced by Romer (1990b). Everyone agrees that 'idea' means any conception (for example, an opinion, view or belief) existing in the mind. However, in economics 'idea' has a different meaning. *Ideas* are knowledge or information stored outside the human brain in places such as a book or a DVD. *Human capital* is the accumulation of education, training and experience stored in the human brain. Historically speaking, the separation between ideas and human capital goes back at least to the invention of writing to represent the spoken word (circa 3500 BC).

It is not inconceivable that the insights of 'procedural threshold concept' and 'discipline threshold concept' introduced by Davies and Mangan (2008) could be of great importance in the area of business innovation. However, this refinement of the third approximation will not be attempted here.

Design of a new subject

It is fairly obvious that the study of innovation as an economic activity requires the introduction of a whole new subject. This subject may be called the Creative Economy. Before going into the salient features of the Creative Economy it is well to emphasize that we do not deny that some universities currently offer specialized subjects on 'economics and innovation' where the *assumed* knowledge includes intermediate micro and macro, and at least rudiments of econometrics and mathematical economics. Furthermore, our subject proposal does not imply that we are decrying the importance of, or indeed the eventual necessity for, advance courses on the economics of innovation. The audience that we envisage for the new subject is undergraduate business students possessing very limited command of economics tools.

The overall purpose of the Creative Economy would be to assist business students in gaining a working knowledge of the contemporary economy from the angle of business innovation. Its mode of delivery would preferably be with adherence to a discursive, non-mathematical style. One would expect that the Creative Economy combines intrinsic intellectual interest with extrinsic practical application.

The literature on innovation as an economic activity is extensive, and therefore, it would not be difficult to compile a list of references for the Creative Economy. It is true that some references will contain mathematical models but it is true, also, that we can always translate the essence of the formal models into the verbal language.

As to the specification of the subject design, we mention only three components: subject description, subject content, and a general idea about the development of the lectures.

Subject Description

The centre of gravity of the economy has shifted from tangible to intangibles resources, such as ideas with economic value. As a result, no complete understanding of the contemporary economy is possible without a thorough grounding in the world of innovation as an economic activity. This subject develops the interpretative tools necessary to understand the multiplicity of factors that govern a creative economy and provides a new lens for viewing and interpreting an important part of the economic reality in which you live.

Subject Content

Innovation as an integral part of economics; ideas and human capital as different economic products; creative destruction, disruptive innovations and market power; distinguishing features of the venture capital market; increasing returns to scale and increasing returns to feedback; innovation infrastructure; intellectual property rights (patents, copyrights, trade secrets, and trade marks); research and development and innovation externalities; new ideas and international competitive advantage; innovation policy.

Development of Lectures

We believe that the methodology of three approximations should be presented in the first lecture. This would allow students to know from the very beginning the approach for teaching and learning underlying the forthcoming lectures.

Initial Lecture

The main purpose of the initial lecture is to provide a bird's eye view of the essential distinguishing feature of a Creative Economy, namely: the creation of ideas with economic value. This lecture would introduce the three successive approximations (background model, interpretative tools, and threshold concepts) and show how some key aspects of commercial innovation would move through the various dimensions and the three approximations along the following lines.

When creativity is applied to producing intangible products such as a design for a diamond ring we are located on Dimension 1 of the background model. We may move along this dimension by using interpretative tools such as innovations occur (first principle), the creation of new ideas consists of combining existing ideas into different new ideas (Insight #1), and the production of ideas involves innovation costs (core concept). The distinctive feature of the notion of 'innovation costs' is that the cost of creating a new idea is a one-time cost because the idea needs to be created once. This implies that the innovation costs incurred to produce the first unit of the new product tend to high in comparison with the cost of subsequent units. For example, the first disk of Windows to go out the door cost Microsoft $50 million, the second and subsequent units cost just $3.00. Furthermore, there is a singular characteristic displayed by intangible products which is not shared by physical products. What is distinctive about ideas as economic products is that they can be used simultaneously by many people, that is, ideas are always non-rival products.

The foregoing points would help students to perceive the importance of ideas as economic products from the very first lecture. Next, we can identify concepts that change their understanding of the topic forever and implement the third approximation. Concepts such as

'innovation costs' and 'non-rivalry' are interpretative tools that not only enhance our understanding of the economics of ideas but also provoke a significant change in our perception of the topic itself.

Given the inherent complexity of innovation as a field of study, it is not surprising that there are numerous byways inducing us to contemplate the other two dimensions. Protecting economic ideas is vital to stimulate creativity (if the innovations can be easily imitated without penalty, self-interested individuals will not have incentives to innovate). Ideas as economic products are at least partially excludable. This is an issue inextricably linked to Dimension 2 (Intellectual Property). The appropriate type of protection (patents, copyrights, etc.) depends on the preferences of the innovators.

If there is a lesson to be learned from the history of innovation, it is that the 'national circumstances' can contribute to or detract from commercial innovation. The Dimension 3 (Innovation Environment) of the background model captures the national circumstances in a stylized manner. The Nelson-Porter framework is an interpretative tool that works exceedingly well to organize thinking about the national circumstances that are compatible with a creative economy.

Forthcoming Lectures

The specific topics included in the subject content would be taught and learnt in the forthcoming lectures. It should be noticed that the initial lecture provides not only a view of the subject landscape "from above" but also a vision that can be used by both the instructor and the students throughout the delivery of the subject. For example, given any particular topic students would be able to (a) allocate the topic to one or more of the triad of dimensions involved in the background model; (b) identify the interpretative tool/s they are using; and (c) recognize that there is always an innovation environment surrounding profit-seeking innovation.

SUMMARY

One of the striking features of the modern economy is the existence of incessant business innovation. Few economists would presumably disagree with the importance of business innovation as a crucial determinant of the rate of economic growth or with the practical relevance of competition through innovation. However, there is no easily available instructional design to impart an understanding of innovation as an economic activity.

The unifying theme of this paper is that rudiments of profit-seeking innovation should be taught to business students by economics teachers. There are at least two advantages emerging from our proposal. First, graduates would be better equipped to develop professional activities in the innovation age, and second, the study of economics would become more attractive to novices.

We have shown that the proposal is both scientifically and educationally sound. We can confirm straightaway that innovation is an integral part of economics by noting that endogenous economic change is brought about by business innovation in a fundamental way. Business people are the conceivers of the bulk of innovations of the contemporary society. Furthermore, we have demonstrated that there exists a method for teaching and learning business innovation that can be used to assist students in grasping the essentials of innovation as an economic activity. A major attraction of this method is that it efficiently enables novices to deal with the formidable amount of information about commercial innovation.

The best way to look at the method of successive approximations is through an analogy. Teaching and learning business innovation is like ranging over a distant planet for the purposes of discovery. The approach would involve successive approximations. The background model is a telescopic view of the planet 'business innovation' where students are exposed to the fundamental dimensions of the field of enquiry. A closer –or satellite view– occurs when students learn how to analyse issues related to business innovation. The third approximation –or helicopter view– happens when students come to a new level of understanding of the essence of profit-seeking innovation. This analogy is pictorially described on Figure 2 and may be useful for helping students to connect with the suggested pedagogical approach.

Figure 2: Teaching and learning business innovation by successive approximations
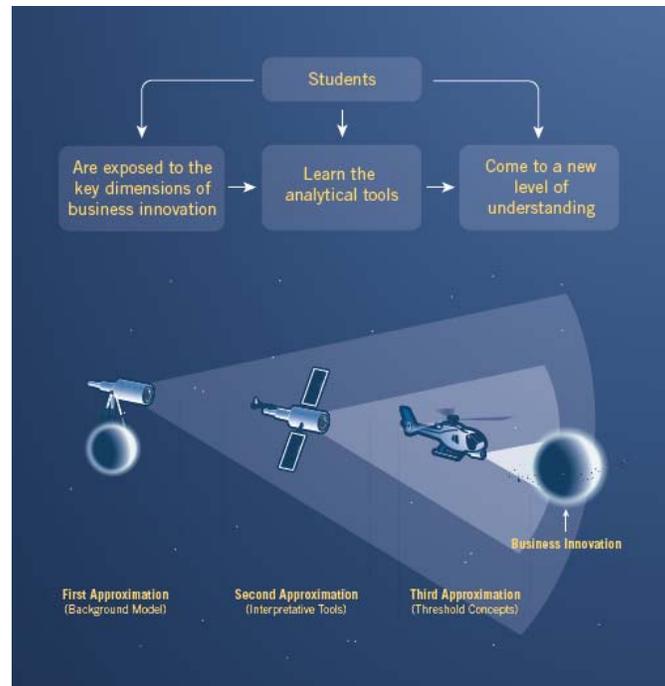
We believe that the methodology of three approximations would provide a coherent guidance for the study of the Creative Economy. It is important to present at the very beginning the overall approach underlying the development of the subject because in that way the teacher and the students are working in the same manner to get better results in the learning process.

Finally, it should be emphasized that the Creative Economy would complement – not substitute – the traditional offerings that can be found in a typical economics program within a faculty of business. Some colleagues may be inclined to believe that few academic economists would be interested in teaching an entire subject on innovation as an economic activity. But that perception remains to be tested. It is not inconceivable that young assistant professors would see the task of teaching innovation from an economic perspective as a challenge to prevail over rather than an insurmountable barrier.

AUTHOR'S NOTE

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ENDNOTES

[1] Anecdotal evidence abound. See, for example, Frank (2007).

[2] Useful guidance in this connection can be found in Salemi and Siegfried (1999, esp. pp. 357-358).

[3] The psychological problems associated with the use of mathematics in economics were first analysed by Samuelson (1952). For a discussion of the place of mathematics in economics, see the symposium in the *Review of Economics and Statistics*, vol. 36, No.4, November 1954 which includes Samuelson (1954).

[4] The first mathematical model of an ideas-driven economy is due to Romer (1990).

[5] More on 'threshold concepts' later in Section 5.

[6] " All of a sudden the idea of Harry just appeared in my mind's eye. I can't tell you why, or what triggered it. But I saw the idea of Harry and the wizard school very plainly." Smith (2002, p. 107).

[7] The most well-known example of the counterfactual approach (among economists) is Robert W. Fogel's scientific breakthrough on the role of the railways in the American economy. Fogel (1964).

[8] The notion of 'threshold concept' was first proposed by Jan H. F. Meyer. See Meyer and Land (2006).

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CELEBRITY WARDROBE MALFUNCTIONS: ECONOMIC EFFICIENCY, PROPERTY RIGHTS ASSIGNMENT, AND LIABILITY IN POPULAR CULTURE

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ABSTRACT

During the halftime show of Super Bowl XXXVIII in February of 2004, popular American entertainers Janet Jackson, P. Diddy, Nelly, Kid Rock and Justin Timberlake put on a show that many television viewers later complained was filled with "inappropriate" and "sexually explicit" content. What most were referring to was the end of the live show, when Timberlake removed of a portion of Jackson's bustier, exposing her breast to a worldwide television audience. Later in her own defense, Jackson coined the term "wardrobe malfunction" to describe what occurred during her live performance with Timberlake. The wardrobe malfunction phenomenon is now so well known in American culture that instructors in law and economics and/or intermediate microeconomics courses could integrate it into their classroom presentations, particularly in sections dealing with economic efficiency, property rights assignments, regulation and liability arrangements.

"The only thing worse than being talked about is not being talked about."

Oscar Wilde

INTRODUCTION AND BACKGROUND

During the nationally televised halftime show of Super Bowl XXXVIII in February of 2004, popular American entertainers Janet Jackson, P. Diddy, Nelly, Kid Rock and Justin Timberlake put on a show that many viewers later complained was filled with "crude," "inappropriate," "lewd," and "sexually explicit" content. That halftime show concluded with what the U.S. Federal Communications Commission (FCC) later described as ". . . Mr. Timberlake's removal of a portion of Ms. Jackson's bustier, exposing her breast to the [Columbia Broadcasting System (CBS)] camera[s] . . ." that were delivering the spectacle to hundreds of millions of viewers worldwide.[1] While the Super Bowl XXXVIII halftime show was in some ways taxing to Viacom, as explained in section 2 below, it represented a boon to popular culture and entertainment media, particularly after Jackson coined the term "wardrobe

malfunction" to describe what had occurred during her performance with pop star Justin Timberlake. Although the Jackson-Timberlake episode appeared to be staged, accidental bodily exposures do occur during live entertainment television, and many in the entertainment media began to also use the term "nipple slip," or "nip slip" for short, to describe situations wherein a woman's breast or breasts become exposed accidentally. Tracking these occurrences has been akin to a cottage industry for entertainment/tabloid media such as TMZ.com, PerezHilton.com, and *Us Weekly* magazine, and for some celebrities, thus providing support for the adage often attributed to the late Oscar Wilde – "There is no such thing as bad publicity."

Further support for Wilde's quip comes from the frequency of wardrobe malfunctions. As Table 1 indicates, over a six month period in 2011 (April through September), four episodes involving three different national television networks and four very popular television shows occurred. The first, in April of 2011, involved popular actress, Eva Longoria, and *Late Night with David Letterman*, a nightly talk show airing on CBS, hosted by David Letterman. The most recent episode involves talk show host Nancy Grace and ABC's highly successful *Dancing with the Stars* series. Sandwiched between these two are episodes occurring on Fox News' *Fox and Friends* and ABC's *Good Morning America*, both morning talk shows watched by millions of television viewers.

Table 1: Wardrobe Malfunction Episodes, 2011			
Celebrity	Network	Show	Date
Nancy Grace[a] *Talk Show Host*	ABC	*Dancing with the Stars*	September, 2011
Nicki Minaj[a] *Singer/Pop Star*	ABC	*Good Morning America*	August, 2011
Khloe Kardashian[a] *Reality TV Star*	Fox News	*Fox and Friends*	June, 2011
Eva Longoria[b] *Actress*	CBS	*Late Show with David Letterman*	April, 2011
[a]TMZ.com [b]hollywoodlife.com			

The wardrobe malfunction phenomenon is so well known in American culture that instructors in law and economics (or intermediate microeconomics) courses could integrate it into their classroom presentations. This phenomenon encompasses law and economics concepts such as economic efficiency, property rights assignments, regulation, and liability arrangements, which are in large part rooted in the Coasian (1960) theory of social costs – a theory that is familiar to many economics principles students – and has branched into the literature on the economics of product safety, regulation, and tort law that has spanned more than four decades

(Calabresi, 1968 and 1970; Calabresi and Malamed, 1972; Cooter, 1982; Shavell, 1984; Cooter, 1985; Posner, 1986; Landes and Posner, 1987; Kaplow and Shavell, 1996; Brooks, 2002; Polinsky and Shavell, 2010).

Law and economics textbooks, such as Cooter and Ulen (2012), include discussions of the concepts of economic efficiency, property rights assignment, and liability. In an intermediate microeconomics text with a law and economics focus that also references Cooter and Ulen (1998), Ekelund and Ault (1995) provide a number of examples to explain the role of rights assignments in promoting economic efficiency in liability law. For example, Ekelund and Ault consider liability issues related to inappropriate credit card use. If misuse occurs due to theft/loss of the credit card, liability rests with the credit card issuer. If the misuse occurs due to malfeasance on the part of friends and associates of the credit card owner, liability rests with the owner. The central idea is that the credit card issuer is in the low-cost position of preventing any and all use of a stolen or lost card, whereas the credit card's owner is in a low-cost position of preventing a friend's misuse of a borrowed credit card (Ekelund and Ault, 1995; Cooter and Ulen, 1988).

Ekelund and Ault (1995) also explain that differences in liability law between the U.S. and some European countries with regard to good-faith purchase of stolen property results in differences in resource flows, and thus different economic costs. For example, in some European countries, liability laws allow good-faith purchasers of stolen property to retain the property. This provides incentives for property owners, those with a lower cost of preventing transactions involving stolen property, to work to prevent property theft. Again, economic efficiency is promoted (Cooter and Ulen, 2012). Lastly, Ekelund and Ault (1995) also include a question for review/discussion pointing out that in most U.S. states, farmers are liable for damages if their livestock wander onto highways and are struck by vehicles. However, in some western states, motorists are liable in collisions such as these. Again, the idea for students is that in some cases farmers are in the low-cost position of preventing the collision, while in others it is the motorists who are in the low-cost position regarding collision prevention. This particular story is a twist on that in Centner and Griffin (1998), which discusses fence-in and fence-out laws, the former of which requires ranchers to pay for fences that prevent their cattle from wandering onto neighbors' property, while the latter requires ranchers' neighbors to pay for fences that prevent the ranchers' cattle from wandering onto their own property.[2] Many students, particularly those in an undergraduate course in law and economics, are familiar with the applicability of Coasian logic in these situations.[3]

The central topic of this paper can be illuminated using the history of livestock trespass laws or other historical episodes that economists find fascinating (Chadwick, 1862; Ekelund and Ault, 1995; Ekelund and Hébert, 1990; Ekelund and Price, 2012).[4] However, we would argue that the celebrity wardrobe malfunction example presented here is a timely story from American popular culture (i.e., "Americana") that is likely to be more interesting to today's economics students.[5] The next section provides additional details related to the wardrobe malfunction

example so that instructors (and, perhaps, textbook authors) can integrate it into a law and economics or intermediate microeconomics course. Discussion of an alternative reality in property rights assignment and liability follows.

GOVERNMENT REGULATION OF INAPPROPRIATE TELEVISION CONTENT

It is currently a violation of federal law in the U.S. to air obscene television programming at any time of the day, or to broadcast on television indecent or profane programming outside of the "safe harbor" hours of 10:00 p.m. and 6:00 a.m. local time (http://transition.fcc.gov). The authority to enforce federal law pertaining to television programming was given by the U.S. Congress to the Federal Communications Commission (FCC), an agency that has the authority to: (1) impose civil money penalties, (2) revoke licensure, and/or (3) deny licensure renewal to violators. Assisting the FCC are the U.S. District Courts, which have the power to impose fines and/or up to two years of imprisonment for violations of federal law related to television broadcasting of inappropriate content (http://transition.fcc.gov). Administration of FCC enforcement of federal law in this area generally falls to the Consumer and Governmental Affairs Bureau (CGAB) or the FCC's Enforcement Bureau (EB), although investigations and subsequent determinations by the FCC must originate from the general public, through informal and formal complaints submitted to various branches of the FCC.

During the first six months of 2006, the most recent data available from the FCC, there were 327,198 complaints from the general public regarding indecent/profane and/or obscene programming. These complaints involve well over 1,000 programs, with more than 800 (300) of these including television (radio) programs. These complaints resulted in seven pending liability cases, with fines and forfeitures totaling almost $4 million. In one case in December of 2004, CBS was cited for depicting a teenage orgy during an episode of its primetime drama, *Without a Trace*. This case resulted in a $32,500 financial penalty for each affiliate that failed to prevent the scene from airing, ultimately costing CBS more than $3.6 million (http://transition.fcc.gov). In response to the complaints about the aforementioned Super Bowl XXXVIII incident in 2004 involving Janet Jackson and Justin Timberlake, the FCC levied a $27,500 fine on each Viacom affiliate/station that failed to prevent the visual from reaching the airwaves. That per-station fine resulted in a $550,000 penalty for the global entertainment company (http://transition.fcc.gov).[6]

With hundreds of thousands of public complaints reaching the FCC each year, radio and television broadcasting companies always face the risk of fines and forfeitures. This risk results in significant investment in legal and public relations services, either through market contracts or vertical integration, and, possibly, in investments in technology that are capable of preventing indecent programming from ever reaching listeners and viewers. Dotinga (2004) points out that a variety of episodes of inappropriate broadcasts in radio have boosted the demand for a 40-seconds delay technology, which makes it possible for station employees to intercept inappropriate language before it hits the airwaves. Even the industry standard "7-second delay

technology isn't cheap for small [radio] stations," as prices from the two main suppliers of the equipment, Symetrix and Eventide, run into the thousands of dollars (Dotinga, 2004). For television, various "blurring" technologies, or technologies that allow for insertion of pre-production video, are also necessary for use with delayed signals.[7] Clearly, the costs associated with acquiring and supporting (e.g., engineer/technician support, maintenance, etc.) these types of technologies in radio and television are substantial to many radio and television broadcasting companies.

PROPERTY RIGHTS ASSIGNMENT AND LIABILITY IN AN ALTERED REALITY

The entertainment industry's expenditures on legal services, public relations services, and technology could perhaps be avoided if the FCC's penalties for inappropriate television content were, instead, imposed on the performers. In this circumstance, celebrities have an incentive to avoid wardrobe malfunctions and similar problems during live performances. Hale (2011) offers five inexpensive solutions that would virtually eliminate wardrobe malfunctions if implemented by celebrities. Three of these solutions are given in Table 2.[8] They include (1) using toupee tape, (2) wearing a bra and (3) using safety pins.

Table 2: The Costs of Avoiding Wardrobe Malfunctions		
Suggestions[a]	Cost	Retail Source
Use Toupee Tape	$5.88 (1 pack of 50 strips)	www.amazon.com
	$5.99 (1 roll)	www.sallybeauty.com
Wear a Bra	$15.88 (*Fruit of the Loom* Stretch Cotton Extreme Comfort Underwire Bra)	www.walmart.com
		www.amazon.com
	$27.95 (Nike Women's Pro Compression Sports Bra)	www1.macys.com
	$30.00 (Nike Top Pro Combat Sports Bra)	www.victoriassecret.com
	$34.50 (VSX Sexy Sport *Victoria's Secret* Sports Bra)	www.victoriassecret.com
	$42 to $50 (Body by Victoria Full Coverage Bra)	
Use Safety Pins	$7.99 (*Singer* Assorted Sizes, 225pk)	www.kmart.com
	$10.00 (Bohin Curved Safety Pins, 65pk)	www.walmart.com
[a]Hale (2011)		

Table 2 also includes estimates of the expenditures required to implement these solutions. In every case, a small expenditure would eliminate the possibility of FCC penalties.[9]

Celebrity wardrobe malfunctions like that occurring with Nancy Grace on *Dancing with the Stars* are perhaps the most difficult to avoid. Even so, use of Hale's (2011) second suggestion (see Table 2) – "wear a bra" – could help, particularly if a brand of *sports* bra were selected. The 2011 celebrity wardrobe malfunctions of Eva Longoria and Khloe Kardashian involved the absence of a bra. When appearing on *The Late Show with David Letterman*,

Longoria wore a fitted tuxedo top. In this particular case "wearing a bra" would have prevented the "malfunction" that occurred when Longoria leaned forward during her interview with Letterman. Longoria's wardrobe malfunction could have been avoided by wearing a Nike sports bra (two styles are included in Table 2 and either can be acquired through amazon.com and macys.com from $27.95-$30). However, given that Longoria would likely want to maintain her "sex appeal," use of a Nike sports bra may not be practical.[10] In that case, Victoria's Secret offers "sexier" versions of the Nike products at prices ranging from $34.50-$50. These small costs are associated with measures that a celebrity, such as Longoria or Kardashian, could take in order to avoid a wardrobe malfunction.[11] A "toupee tape" or "safety pin" solution would be even more cost effective. For example, an expenditure of $5.88-$5.99 for toupee tape, or $7.99-$10 for safety pins, could have prevented Nicki Minaj's 2011 wardrobe malfunction on ABC's *Good Morning America*.[12] Thus, in an alternate reality wherein FCC penalties for inappropriate television content, such as wardrobe malfunctions, are imposed on the celebrities instead of the broadcasting companies, the costs of avoiding wardrobe mishaps are much lower than in the current reality.

FROM JOURNAL TO CLASSROOM: SOME THOUGHTS ON PEDAGOGY

Discussion of integrating aspects of American pop culture into the economics classroom as a way to capture student's interest in the subject is quite timely, given the recent publication by Hoyt and McGoldrick (2012) of the *International Handbook of Teaching and Learning Economics*. This volume discusses the state of the field of economic education, with a significant emphasis on teaching. Of particular relevance to this essay are entries from Conway (2012), Hansen and Salemi (2012) and Buckles, Hoyt and Imazeki (2012). Conway (2012: 37) discusses the use of cases in economic instruction, noting that, according to Boehrer (1994: 4), "[a] teaching case is essentially a story, a brief account, for example, . . . [that] presents a conflict, typically the tension between alternative courses of action that bring different viewpoints, interests, and values in contention and that must be resolved by a decision." Our essay provides an example of an issue amenable to case-based instruction such as that described by Conway (2012) and made famous by the Harvard Business School.[13] Conway (2012: 42-45) adds that the case method helps student achieve higher-order mastery of economic concepts by (1) enhancing enthusiasm for learning, (2) facilitating discussion, debate and shared learning, and (3) facilitating assessment, including self-assessment.[14]

In what they refer to as "two-way talk," Hansen and Salemi (2012) discuss "how instructors can make discussion an integral part of their instructional approach." Two-way talk offers a variety of ways that students can become more actively involved in the classroom learning process, two of which represent methods that this essay can be integrated into classroom discussion. Hansen and Salemi (2012: 68) note that "two-way talk can be part of the teaching plan . . . [when i]nstructors . . . initiate questions and field responses during their lectures, a

technique useful in checking on student understanding and in breaking lectures into smaller chunks." The wardrobe malfunction story offers just such a "smaller chunk" that, after getting some instruction on issues surrounding property rights, regulation and other subjects highlighted above, instructors can offer questions about and field responses to during a portion of that day's class time. A second option involves "instructors and students . . . participat[ing] in a formal discussion of some reading assignment [such as the present essay] for the purpose of gaining a deeper understanding of what the author[s are] saying and exercising their power to think." Given that an upper-level undergraduate course such as law and economics, and perhaps intermediate microeconomics, will often include a brief reading list, adding this essay to the list as a discussion item is a simple matter.

With the widespread use of large lecture halls in economics instruction, or what Buckles, Hoyt and Imazeki (2012) refer to as "the large-enrollment course" engaging to students is a common concern for instructors. As Buckles et al. (2012: 118) state,

> "[a]n increase in class size is a common cost-saving response when state budgets tighten and endowments shrink. Yet when conditions improve, classes do not necessarily return to their previous sizes. This chapter provides advice and guidance for economists who find themselves called upon to teach large introductory, intermediate or elective classes, in which creative course design, effective delivery, and self-assessment of teaching techniques become increasingly important."

Both authors of the present essay have, on many occasions, been "called upon to teach large . . . classes." That experience has led each of us to make use of novel and oftentimes timely topics in the classroom, as well as to focus some of our attention to economic education scholarship that advances this process for others (see Mixon, 2000; Mixon and Green, 2000; Mixon, 2001; Caudill and Hicks, 2005; Mixon, Salter and Withers, 2006; Box and Caudill, 2009; Mixon, 2010; Crisp and Mixon, 2012).[15] Fortunately for "large enrollment [and other] course" students around the globe, this work has, in some cases, been preceded by, and, in other cases, supported (followed) by, other economic education essays (see Boyes and Happel, 1989; Scahill, 1990; McClure and van Cott, 1995; Miller and Felton, 2002; Leahy, 2008; Dilks, Thye and Tayler, 2010; King-Adzima, 2010; Mateer and Stephenson, 2011). Buckles et al. (2012: 121) suggest that instructors in large sections facilitate exploration of diverse and compelling topics such as those listed above by "break[ing] a typical lecture into short segments of between 8- and 15-minute segments, separated by a variety of activities . . . [which] might include simply telling a story, giving an example, or asking a question."

If this approach is implemented, Buckles et al. (2012: 121) add that "an engagement trigger" – which is anything "that captures student attention, helps to engage students in the classroom experience, and initiates an effective interactive lecture segment" – be employed to

facilitate segment change. Buckles et al. (2012: 121) state that "[g]ood options for triggers are things that have evocative visual and audio appeal and that might be of unique to students, such as . . . textual passages read aloud or displayed in some way, and clips from the news . . . or television." As pointed out above, altered photographs of the various wardrobe malfunctions are easily located in the internet, as are news clips (see youtube.com) and other video feeds. These, along with portions of this essay, can be visually displayed in large lecture hall classes. Of course, instructors should take care to preview the photos and/or videos before class, as suggested by Mateer and Stephenson (2011: 29), in order to ensure that they have been sufficiently altered to prevent displaying the temporary, partial nudity that these episodes entail.[16]

Each of the pedagogical approaches described above, which are included in the recently-published *International Handbook of Teaching and Learning Economics*, provides economics instructors with a larger toolbox for reaching economics students at all levels in the educational process. Our essay, which builds on the growing tradition in economic education of providing both unique and timely topics for classroom discussion, is amenable, in some way, to employing each of the above approaches, as are the myriad other essays cited in this section. The only additional ingredient needed is the "interest in . . . teaching" that Becker (2004) describes so eloquently.

CONCLUDING COMMENTS

As intermediate microeconomics and law and economics texts point out, different property rights assignments lead to different incentives and different outcomes on the economic efficiency front. This note reviews many such situations, from property rights assignments and liability arrangements involving the use and misuse of credit cards, the good-faith purchase of stolen items, collisions between automobiles and livestock, and even the transportation of British prisoners to Australia during the 1800s. We also provide a more contemporary, steeped-in-Americana, example from popular culture, often referred to as a "wardrobe malfunction," that is arguably more appealing to today's students of economics.

Dating back to Super Bowl XXXVIII in 2004, wardrobe malfunctions have led to an explosion of tabloid chatter along with a spike in viewer complaints of inappropriate behavior to the Federal Communications Commission. Since 2004, a veritable cottage industry has developed around commercializing these episodes, so that most students of economics are familiar with them. As such, they offer a simple, familiar illustration that the economic costs of achieving a desired outcome depend critically on the liability assignment.

AUTHORS' NOTE

ENDNOTES

1. The quotes are contained in the FCC's official report on the incident (http://transition.fcc.gov). Appropriately altered photos of Jackson's wardrobe malfunction are easily located on the Internet.

2. Holderness (1989) adds to the traditional cattle trespass story by examining the effects of entry into the industry that is represented by the Coasian party to which the property right has been awarded.

3. Vogel (1987: 161) states that "[t]here is probably no instance in American legal history that better approximates the conditions of the Coase theorem . . . than the example of cattle trespass. There is also probably no example of cattle trespass law more suitable for an analysis of the predictive power of the Coase theorem than the situation that emerged in nineteenth-century California." Vogel (1987) provides a history of cattle trespass legislation during the last half of the nineteenth century in California.

4. Ekelund and Hébert (1990) provide details of the policymaking efforts of Edwin Chadwick, who advised the British government that *ex post* payments to ship captains who transported British prisoners to Australia during the 1800s would result in lower in-voyage mortality rates than would *ex ante* payments. The example of Chadwick's policymaking efforts has also been used to discuss the efficacy of congressional term limitations in the U.S. Congress (Mixon, 1996). A recently-published volume by Ekelund and Price (2012) offers a more in-depth analysis of Chadwick's understanding of economic incentives.

5. As Becker (2004: 5) writes, "[t]hroughout the world, economists have observed student lack of interest in pursuing the study of economics. Characteristically, the trend in the proportion of U.S. bachelor's degrees awarded in economics has been negative since the 1950s, with a steep decline following a relative cyclical high in 1988 . . . Most recently, however, there is evidence of a turn-around in the number of degrees awarded in economics. Intriguingly, along with this recent increase in U.S. degrees awarded in economics, there has been an increase in academic economists' interest in their teaching . . ." It is our contention that a part of instructors' increased interest in their teaching is a keener awareness of the types of subjects that are of most interest to their students.

6. As this study went to press (in June of 2012), the U.S. Supreme Court vacated a lower court's ruling that the FCC's enforcement of its indecency rules was unconstitutional (Flint, 2012). The FCC's indecency rules were challenged by ABC in 2008, in response to the FCC's 2003 decision to fine ABC $1.4 million for airing the exposed buttocks of an actress in an episode of ABC's drama *NYPD Blue*. The Fox Network, which was censured by the FCC for cursing incidents occurring during live awards shows in 2002 and 2003, also brought a case against the FCC (Flint, 2012). In its ruling, the U.S. Supreme Court tied the two cases together. The U.S. Supreme Court sided with ABC and Fox in its ruling that the FCC did not provide adequate due process to the networks in enforcing its indecency standards. However, U.S. Supreme Court Justice Anthony Kennedy noted in his written summation that "because the Court resolves these cases on fair notice grounds under the Due Process Clause, it need not address the First Amendment implications of the Commission's indecency policy (Flint, 2012)."

7. The aforementioned wardrobe malfunction involving Nancy Grace and ABC's *Dancing with the Stars* provides an example wherein a television broadcaster combined time-delay technology with video capability in order to insert pre-production video of the show's audience over the inappropriate scene involving Grace. The pre-production video that was chosen – one of a docile audience – was, however, broadcast at a time when television viewers expected audience applause, leading many viewers to conclude

that the live audience was not impressed with Grace's performance. This clumsy attempt to prevent an inappropriate visual meant that ABC had to offer additional explanation to its viewing audience during the subsequent episode of the show.

8.   The two suggestions by Hale (2011) that are not listed in Table 2 are (1) avoid ill-fitting clothing, and (2) do not "tweet" about one's wardrobe malfunctions after they occur.

9.   The possible expenses listed in Table 2 were gathered by the authors.

10.   It is also debatable as to whether toupee tape would have prevented Longoria's mishap, given the weight of the tuxedo jacket she was wearing during the interview.

11.   Kardashian appeared on *Fox and Friends* wearing a sheer blouse. Thus, toupee tape and/or safety pins would not have been practical. The only wardrobe malfunction prevention method, among those listed by Hale (2011), would have been to wear a bra.

12.   Minaj appeared on *Good Morning America* wearing what appeared to be a thin, cotton blouse. Though low-cut, the near-weightless feature of the top would have likely been conducive to using toupee tape to avoid the wardrobe malfunction that occurred.

13.   For more on case-based teaching and learning, see Christensen and Hansen (1987).

14.   The orders of mastery referred to in Conway (2012) are those described by Bloom, Englelhart, Furst, Hill and Krathwohl (1956) and that are commonly referred to as "Bloom's taxonomy."

15.   These essays provide economic analyses of (1) the Salem witch trials, (2) the Pope's 1960s decision to relax fasting rules outside of Lent, (3) cartel-like behavior on the popular television show *Survivor*, (4) campus fraternity/sorority organizations as cartels, (5) the buying and selling of jerseys across sports franchises in professional sports, (6) public support for professional sports stadiums, (7) Hollywood films about the Third Reich (and modern bureaucracy theory) and (8) the rise and fall of the Southwest (college football) Conference, respectively.

16.   Mateer and Stephenson (2011) provide an excellent checklist for using a video clip during an economics lecture. They also discuss copyright laws surrounding use of videos for educational purposes.

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APPLYING MECHANISM DESIGN THEORY TO ALLOCATION PROBLEMS IN UNIVERSITIES

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ABSTRACT

The Assignment Problem in Economics analyses situations where a particular number of goods or services have to be assigned among a particular (though not necessarily the same) number of consumers. Examples include the assignment of jobs to workers, of rooms to housemates, of time slots to users of a common machine, all of which would be a capacity constrained problem of assignment. In such a situation, an auction mechanism, where consumers have to bid and win the auction according to defined standards to be able to consume the good or service, may be used to solve the problem. We look at some practical examples where such auctions have been used in universities and colleges for a variety of allocation problems. They include auctions and other similar mechanisms to allocate courses amongst students, as well as auctions that have been used to allocate prime parking spots in crowded campuses, and have also been used as one of the instruments to ensure efficient allocation of post graduation job interview slots at business schools. We describe each allocation situation and also analyze the characteristics of the mechanisms used in the case of course allocation.

NTRODUCTION

The 2007 Nobel Memorial Prize in Economics was awarded to Leonid Hurwicz, Eric Maskin and Roger Myerson for their pioneering contributions to Mechanism Design Theory. The term "mechanism design" understandably has engineering connotations where a machine has to be designed to conform to some set standard. However social and economic decision making can also be easily incorporated into the term "mechanism design" because in essence the phrase "a designed mechanism" can just as easily be applied to providing and sharing the cost of public goods as an example. Initially also referred to as the principal agent problem, mechanism design theory in economics is associated with the concept of a principal or planner designing a "mechanism" by which a set of agents with productive capacities or consumption needs will interact with one another to allocate resources. In this case the principal or planner needs to design a mechanism of interaction among the economic agents such that an appropriate efficient allocation of resources is achieved. An example of an economic system would be the decentralized price mechanism where goods and services are allocated based on prices determined by demand and supply, with the outcome of the allocation being efficient or "Pareto Efficient" as is the standard economic term. In this economic system, a planner could design a

mechanism that would alter the decision making authority and the allocation of rewards, in which case it would resemble a socialist economic system. An auction is a designed mechanism that in many ways seeks to replicate the outcomes of a decentralized price mechanism, although the rules of the game are designed differently. Among the more popular auctions that have been used to allocate resources have been the English auction, the First Price auction, the Second Price or Vickrey auction and the Dutch auction (For an excellent description of these auctions and their uses see Cox, Roberson and Smith (1982)). Even though it is theoretically complex, mechanism design has provided a number of useful and important economic applications in recent years in the design of auctions to allocate spectrum bandwidth to mobile phone providers (see Crampton (2002)), auctions to allocate pollution permits to industries to alleviate the problems of acid rain (see Crampton and Kerr (2002)) , managerial compensation and incentives (see Melumad, Mookherjee and Reichelstein (1995), voting systems (see Gibbard (1973)), regulation and antitrust policies (see Baron and Myerson (1982), tax systems (see Mirrlees (1986)), lotteries for allocation of students to schools (see Abdulkadiroglu and Sonmez (2003)), and labor and credit contracts (see Bolton and Dewatripont (2005).

As we see from the examples above, the applications of mechanism design are widespread and quite relevant to the functioning of any modern day economy, no matter what the economic system being pursued. In addition to the examples given above, for academics associated with universities and colleges, there is a growing field of practical usage of auctions right in their workplace. Educational institutions usually place limits on the number of students in a particular class. This can lead to an inefficient allocation process since there are always students that are not allocated to their first choice courses, in fact this problem can become serious for students that are at the end of their college education process and need certain classes to graduate, and may find themselves unable to get into that class. Students in many cases also need to take courses in a specific order to satisfy the prerequisites of certain upper level courses, and being unable to get into one of these courses can hinder the progress of the student towards completion of their degree within the standard timeframe. Thus university and college administrators have a special responsibility to ensure that course allocation mechanisms are designed such that students can get into their appropriate courses. The use of auctions and similar mechanisms have become quite popular as a means to ensure efficient allocation of courses, specially in large universities where the constraints of class space is a lot more serious than in small and medium size educational institutions. Auctions and similar mechanisms have also been designed in educational institutions to serve purposes other than allocation of students among class sections e.g. allocation of office and parking space to name a few. In this paper we concentrate on mechanisms that have been designed with applications in universities and colleges i.e. allocation of various products or services in academic institutions that have been implemented by specifically designed mechanisms. As the various examples will show, allocation of students to classes in an efficient manner would be an important feature of these mechanisms. However in this paper, we also provide examples of mechanisms that are used to

allocate other goods and services in an academic institution e.g. parking slots and campus interview spots among others. Boyes and Happel (1989) describe a situation where an auction mechanism was designed to allocate office space in the School of Business, Sonmez and Unver (2010) and Krishna and Unver (2008) describe a course bidding system in place to allocate courses amongst students, while Budish and Cantillon (2009) describe a somewhat different mechanism to allocate courses. Apart from describing and explaining the above mechanisms, in this paper we also look at a somewhat different course allocation auction at Columbia University, an auction to allocate parking spots at Chapman University as well as the use of an auction as a partial allocation mechanism for interview spots for students at the University of Chicago. The author feels that this exposition of the use of auctions in educational institutions serves a dual purpose, namely it provides as a fairly comprehensive survey of the mechanism design applications literature in the higher education industry and can also provide college and university administrators with the tools and examples needed to implement some variation of these mechanisms in their own educational institutions.

THE ASSIGNMENT PROBLEM

The classic assignment problem as discussed in the mechanism design literature is an allocation problem whereby agents are assigned a single unit of a product or service according to a devised mechanism. Examples include assignment of rooms to housemates, schools to students and timeslots to workers etc. (see Abdukadiroglu and Sonmez (2003), Roth (2002) and Sonmez and Unver (2010)). However such assignment problems do not necessarily have to involve single unit allocations i.e. where only one unit of a good or service is allocated to one person, they could be multi-unit assignment problems. Examples include assignment of tasks within an organization, allocation of shared scientific resources amongst users, drafts for sports teams, allocation of airport takeoff and landing slots and division of heirlooms amongst heirs. As is appropriate in the mechanism design literature, allocation mechanisms are designed to implement some form of an optimal solution, which would assign the goods and services to the agents. This allocation mechanism may or may not make use of money as a means to the allocation. In this paper, we will discuss the applications of mechanism design theory to the problem of assigning multiple goods or services among a number (though not necessarily the same number) of consumers. In particular we will consider practical examples of educational institutions that have applied particular mechanisms to solve the assignment problem. As mentioned above we will look at allocations of courses to students using a "draft-like" mechanism at Harvard University, as well as allocation of courses using auctions at the University of Michigan and Columbia University. We will also discuss the use of auctions to allocate parking spots at Chapman University and to allocate office space at Arizona State University. We also look briefly at an allocation mechanism used at the University of Chicago to assign interview slots for graduating students.

ASSIGNMENT MECHANISMS FOR ALLOCATING COURSE

Specifically designed mechanisms have become quite popular at many educational institutions to allocate courses amongst its students. Typically, in any educational institution there is a class size limit, thus creating an allocation problem for administrators in the sense that some or all students may not be able to choose their most preferred courses or classes. This would be especially true in the more "popular" classes where you would expect to see a binding capacity constraint being enforced. These types of classes could be popular for a variety of reasons: because of the class itself, or because the instructor is popular, or it could be part of an educational core that is compulsory for all students, or it could be offered at a popular time relative to other similar classes or sections of the same class. In this section we will briefly describe three types of mechanisms used to allocate students to classes. The first is the Draft Mechanism that is used at the Harvard Business School. The other two are auction mechanisms that are used at the University of Michigan and Columbia University. In the analysis below the three different mechanisms are described with the help of examples and some of the differences between them are also made clear.

The Harvard Business School Draft Mechanism

The Draft Mechanism works as follows: Students are randomly assigned a draft number, and choose courses in ascending and descending orders of the assigned draft numbers in respective rounds. Prior to being assigned a draft number, students submit a rank order list of courses. At the time of a particular student's choice of a course, the mechanism allots that student their most preferred course according to their Rank Order list which they have not received and is not at capacity. Once the student's choices have been made and the round is completed, the mechanism will reverse the random number of assignments and continue allotting the students their remaining preferred course. At this time additional course scheduling constraints would be imposed where a student would not be assigned their most preferred course even if the course is below full capacity if the schedule conflicts with the students previously chosen course schedule. There is an add drop segment at the beginning of each semester that allows students to drop courses previously selected and add courses not at capacity. It does not allow trades amongst students. The example below provides a glimpse of how the draft mechanism would work.

Example 1

Suppose there are Five students: 1, 2, 3, 4, 5; and Six courses: Economics (E), Statistics (S), Management (M), Business Law (B), Accounting (A) and Finance (F). Each course has four seats in the class, and student preferences are as follows:

1: E, S, M, B, A
2: M, F, A, B, S
3: M, E, B, S, F
4: A, E, B, F, M
5: F, A, B, S, E

Thus for Student 1, E is preferred to S is preferred to M and so on. To make things easy in this example we have limited preferences to the top 5 choices, and assume that none of the course times conflict with each other. There are four rounds, and a student will take 4 courses. Rounds 1 and 3 are in ascending order of students (i.e. Student 1 chooses first, then Student 2 etc.) while rounds 2 and 4 are in descending order. The course assignments occur in order as follows:

Round 1: 1E, 2M, 3M, 4A, 5F.
Round 2: 5A, 4E, 3E, 2F, 1S.
Round 3: 1M, 2A, 3B, 4B, 5B.
Round 4: 5S, 4F, 3S, 2B, 1A.

Note that in Round 4 after Student 2 is assigned B, Course B is full, thus Student 1 whose assignment comes next is denied and gets their next choice A. Courses B and A are full, while the other 4 courses have 3 students each. The course loads for each of the students are: 1(E, S, M, A), 2(M, F, A, B), 3(M, E, B, S), 4(A, E, B, F) and 5(F, A, B, S).

As pointed out by Budish and Cantillon (2008), the Harvard Business School draft like mechanism has some key attractive properties. It is procedurally fair i.e. all students ex-ante are treated fairly, as opposed to a course allocation system which is determined, for example, by the number of credit hours already completed thus making it possible that a student completes his or her course allocation before another student has a chance to pick their top preference. It is also ex-post efficient. However the mechanism also provides an incentive for students to choose their preference lists strategically rather than honestly reporting their true preferences. This can have negative efficiency effects on the students as well as the process since students tend to over report (preferences) for popular courses and underreport for less popular ones, as shown in the example below.

Example 2

In this example, let there be 3 students who each will be assigned to 2 courses with 2 seats in each. Let the student preferences', using the same course prefixes as in Example 1, be given by:

Student 1: E, M, A, B
Student 2: M, E, A, B
Student 3: E, A, B, M

The course assignments would occur as follows:

Round 1 (ascending order of student number): 1E, 2M, 3E. Thus E is full.
Round 2 (descending order of student number): 3A, 2A, 1M.

Note that in round 2 as a result of class E being full, student 2 is denied their current top preference of E, and is given A instead. Student 2 could have rearranged their preferences to read E, M, A, B and been assigned course E. Thus, student 2 would have a strategic incentive to choose the most popular course E as their top preference.

The University of Michigan Auction Mechanism

The University of Michigan (Business School) course allocation system is a subset of a broad class of auctions used among others by Columbia Business School, Haas School for Business at Berkeley, Kellog at Northwestern, Princeton and Yale School of Management. The University of Michigan mechanism provides students with a bid endowment to be used in the auction process across courses that the student desires. All bids are processed one at a time starting with the highest bid, and honored for a student if they haven't filled out their schedule and the course has available capacity. The students bid their valuations of courses. There are a fixed number of courses that students can win – it is possible that a student is successful in a larger number of courses than allowed – in that case the last course(s) won will be denied. Once all the bids are in, the bids are arranged in descending order of valuations for all courses. A bid would be deemed successful if the course still has unfilled seats, the student has unfilled slots, and the course does not conflict with the schedule of the student at that point. The lowest successful bid is the market clearing price for a course that is full, while for a course that has seats the market clearing price is zero. Bid endowments do not carry over from semester to semester.

The students also have prior beliefs about the market clearing bids for each course. These prior beliefs are based on historical data about the market clearing prices that are provided by the University. As we shall see, these prior beliefs may provide an incentive to students to bid higher than their true valuations for the courses in order to win a seat at a popular course.

Example 3

Let each course have 3 seats while each student can take a maximum of 2 courses. Suppose there are 5 students bidding for 4 courses, with a maximum total bid amount of 1000 per student such that their bids are represented by the matrix below:

	Course 1	Course 2	Course 3	Course 4
Student 1	600	375	25	0
Student 2	475	300	225	0
Student 3	450	275	175	100
Student 4	200	325	350	125
Student 5	400	250	170	180

Bids are assigned highest to lowest in the following manner:

(Student 1, Course 1): 600, Student 1 is assigned Course 1.
(Student 2, Course 1): 475, Student 2 is assigned Course 1.
(Student 3, Course 1): 450, Student 3 is assigned Course 1; Course 1 is full.
(Student 5, Course 1): 400, Unsuccessful since Course 1 is full.
(Student 1, Course 2): 375, Student 1 is assigned Course 2; Student 1's schedule
                is full.
(Student 4, Course 3): 350, Student 4 is assigned Course 3.
(Student 4, Course 2): 325, Student 4 is assigned Course 2; Student 4's schedule
                is full.
(Student 2, Course 2): 300, Student 2 is assigned Course 2; Student 2's schedule
                is full; Course 2 is full.
(Student 3, Course 2): 275, Unsuccessful since Course 2 is full.
(Student 5, Course 2): 250, Unsuccessful since Course 2 is full.
(Student 2, Course 3): 225, Irrelevant since Student 2 has a full schedule.
(Student 4, Course 1): 200, Irrelevant since Student 4 has a full schedule.
(Student 5, Course 4): 180, Student 5 is assigned Course 4.
(Student 3, Course 3): 175, Student 3 is assigned Course 3, Student 3's schedule
                is full.
(Student 5, Course 3): 170, Student 5 is assigned Course 3, Student 5's schedule
                is full, and Course 3 is full.

All 5 students' schedules are full at this moment, and all Courses except for Course 4 (with 1 student) are full. Thus the assignment ends here.

If there are ties, for example if two or more students bid the same for a course, the tie is broken by a predetermined lottery; or a student may bid the same for two or more courses in

which case the tie is broken by the order of the bids. However, the one negative effect of this mechanism is that since individuals do not submit a preference listing of courses (something that the Harvard Business School Draft Mechanism did), there could be overbidding on popular courses and underbidding on less popular courses. However, submitting a preference listing as in the Harvard mechanism doesn't really solve the problem; as we explained in the previous section students could still strategically misreport their preferences.

Example 4

Continuing from Example 4, we can see that Student 5 is unsuccessful at getting either of their top two choices. Thus it is conceivable that the student will formulate a strategy of bidding higher for the most popular courses and bidding lower for the less popular courses. The bidding would thus be independent of student's actual preferences for the courses, which could lead to inefficiencies. Consider a student that has utilities (or willingness to pay) of 150 for Course 1 and 100 for each of Courses 2-6 (see Sonmez and Unver (2010) for the complete example) and has prior beliefs about the winning prices for each course. Specifically they believe that the market clearing price for Course 1 will be 0 with probability 1, the market clearing price for Courses 2-6 will be 200 with probability 0.7 and 250 with probability 0.8. The optimal bid vector has been derived (see Sonmez and Unver (2010)) as Course 1 = 1, Courses 2- 6 = 200 each. Thus assuming that the student is successful in their bidding, for any maximum number of courses allotted of 5 or less, the student will be denied a place in Course 1, their most preferred course and be allotted a weak subset of Courses 2-6. For example if a maximum of 5 Courses are permitted, the student will be allotted Courses 2-6 (assuming that their bid is higher than the lowest market clearing bid for each of the courses), if a maximum of 4 is allowed, the student will get a subset of the 5 courses and so on. The student will suffer an efficiency loss (a negative surplus calculated by the difference between the market clearing price and the maximum the student is willing to pay) for each course, as long as the market clearing price for each course is greater than or equal to 101.

The Columbia University Auction Mechanism

The Auction mechanism at the Columbia University Graduate School of Business is quite similar to the University of Michigan mechanism, the major difference is that bidding takes place in several rounds. Bid points are given to students based on their status in the program (i.e. the number of credits they have completed); they are given initially and carry over through the course of a student's life at the University. The bids are not time dependant i.e. they can be changed for a course as long as it is before a round expires. The bidding mechanism allows overlap, which is the responsibility of the students to fix before or during add-drop, and allows a student to choose one or all sections of a course while being charged each sections clearing price.

The Bids are processed at the end of each round, with the lowest successful bid for a course becoming that course's clearing price. After the first round, students can see open seats on courses prior to the beginning of the second round. Prior to round 3, students can drop unwanted courses (or sections) and get points back – there are no points refunded during add-drop. The add-drop segment requires no points (of course not all sections or courses may be available for adding. There is also a Swap option, whereby students can exchange courses with other students. If a course is full a waitlist is organized by bid amounts, the lowest bid being the clearing price in case space becomes available. All ties are broken by random lotteries.

At the beginning of their curriculum, students are given a total of 1000 points per elective requirement, and in order to provide an incentive for students to take elective courses after the first term there are extra bonuses.

There are a couple of important differences between the two bidding systems in Michigan and Columbia. Firstly at Michigan an open course is charged 0 while in Columbia it is charged the lowest bid. A more important distinction that could lead to lesser efficiency losses under the Columbia bidding system is the mechanism of multiple round bidding with students given the option until Round 3 to drop unwanted courses. This could lead to a selection more in tune with the students actual preferences compared to the Michigan system.

Example 5

Consider again, Example 3. In the case of Columbia University's bidding rules, a student is allowed to have overlaps that they may resolve before or during the add drop period. Additionally for each semester there are three full rounds that a student can bid for courses. However a student can only bid for a maximum specified number of courses, let us assume from Example 3 that the number is 2. For student 5, they can prioritize on getting their top two choices based on information gleaned from previous semester market clearing bids. Thus they have the option to bid high for Course 1 and Course 2, or they could keep their Course 1 bid the same as in Example 3, but increase the Course 2 bid to 350. Given the restriction on the number of courses they can bid on, this would be the total number of bids for Student 5 in round 1. They would be successful in getting Course 2 but unsuccessful in Course 1. The bid matrix in Round 1 would look like this:

	Course 1	Course 2	Course 3	Course 4
Student 1	600	375	-	-
Student 2	475	300	-	-
Student 3	450	275	-	-
Student 4	-	325	350	-
Student 5	400	350	-	-

Thus, Student 1 would get Course 1 and Course 2; Student 2 would get Course 1, Student 3 would get Course 1, Student 4 would get Course 2 and Course 3 and Student 5 would get Course 2. Bid points would be refunded for unsuccessful bids. The market clearing price for Course 1 would be 450, for Course 2 would be 325 and for Course 3 would be 350. After the first round and before the start of the next round, all students would get a chance to review their courses, and could drop them at the start of the next round if they are not satisfied with the price that they paid. Thus Student 5 could reconsider paying 325 for Course 2, and Student 3 would probably definitely reconsider paying 350 for being the only bidder for Course 3. Unless some students withdraw their bids for Course 1 and Course 2, both of these are full. Thus Course 3 and Course 4 would be the only ones offered in Round 2, and assuming Student 4 withdraws their bid for Course 3, Students 2, 3, 4 and 5 would each bid for the one remaining course on their schedule. Each would be permitted one bid, or they could wait till the add drop period when they could get into a course free of points, since there are bound to be empty seats in at least one of these two courses. We would still have the problem of overbidding for popular courses and underbidding for not so popular ones, but the students in this bidding scheme have an opportunity to reconsider their bids and opt out of a class if they feel they have paid too high a price in points. Thus they have a chance to limit their loss of surplus. Additionally since there are multiple rounds, it is likely that the clearing prices for the same course section could be different in different rounds. This adds a further strategic element to the bidding process of students.

An interesting future endeavor would be to look at actual data from course allocation auctions conducted by an academic institution and compare the winning bids over time to give us an idea about average bids and also success of the auctions. While it would be interesting to look at the costs and benefits of these auctions, in a practical sense it would be extremely difficult to get these types of data. The costs are just eh administrative costs of getting the students used to a different course allocation system from the standard course registration systems they have always used. This may involve some amount of training for the students but would otherwise involve little cost (in fact a glance at the Columbia University website reveals a variety of information available to students with the intention of not only providing training for them but also provide them with earlier winning bids for courses so they can formulate an optimal bid strategy (see https://boss.gsb.columbia.edu/registrar-student/Home.tap). The only other cost would be to have appropriate servers to handle the bids and process them – again with colleges and universities relying on online courses and materials for delivery of a significant part of their education these server capacities are pretty readily available. It is also true that a number of academic institutions especially the ones with large enrollments that usually have a problem with inefficient allocation of courses among its students have been the ones at the forefront of experimenting with these new mechanisms to allocate courses. In the follow up paper we describe how the Columbia University bidding system evolved over time and the changes that they have made, in addition to statistically analyzing the bidding. In an article in the Chicago Tribune (see Harris(2011)), the bidding mechanisms at Northwestern and Kellog are explained in

detail as well as an explanation of an interesting resale feature of the bidding mechanism used at UPenn Wharton. The presence of this type of write up in a non academic setting signifies the permeation of these auction mechanisms into the consciousness of the general business media, rather than just being relevant in academic journals.

OTHER EXAMPLES OF AUCTIONS IN ACADEMIC SETTINGS

Auctions for Interview Slots

In this section, we briefly look at the allocation mechanisms for interview slots at Business Schools. This has been done in one of two ways: the traditional way of doing it is to leave the interview invitations completely to the employers. However there have been some Universities, for example Michigan, Chicago and UCLA where a proportion of the interview slots (a specific number) are closed and candidates are invited by companies, the remaining slots are open and graduating students can bid for those slots. However, unlike course bidding, there are no capacity constraints for students who can be scheduled for as many interviews as their bids allow. At the University of Chicago the bidding mechanism that is used is as follows: the companies have both an invite and a bid component i.e. they can choose a fixed number of interviewees themselves (based on their own preferences) while a fixed number is allocated to the highest bidders among interviewees. Both these numbers vary based on the number of interviews a company plans to hold.

For a schedule consisting of 13 half-hour interviews, companies get to choose interviewees for 9 slots while 4 slots are filled by the top 4 bidders for interviews with that company. Similarly if a company chooses to have 45 minute interviews, they get to invite 6 interviewees while 3 interviewees come from the bids. Other interview formats are 60 minutes (with 5 invites and 2 bids) as well as back to back pairs of interviews with similar bid and invite ratios. Typically the students have 1000 points that they can bid for interviews with companies. Since this is a one-shot game, the leftover points cannot be carried over to another. Thus students that have NOT been selected for interviews by a company (based on the company's preferences) get to bid for interview slots with that company. The number of bidders having the highest bids (not including ties) equal to the number of bid slots available wins the auction and get to interview with the company. Once the auction is completed the school uses a complicated algorithm to allocate the schedules.

Auctioning Faculty Offices at Arizona State University

In this application the major difference from the previous cases discussed is the use of money used as an allocation medium. However the basic mechanism still remains an auction. The background story in this application (Boyes and Happel, 1989) is that due to a rebuilding of

the College of Business at ASU in 1983, a reallocation of faculty offices was necessitated. Offices were distinguishable based on whether they had a window or not – having a window would imply a superior office space. Different Options were exercised at the different departments within the College of Business. The Management Department (as well as the Marketing and Accounting Departments) opted for the Seniority option whereby the more senior faculty got the offices with windows. Predictably junior colleagues complained that the senior faculty was precisely the ones that were less productive because they were tenured so in fact the administration was punishing productivity. The Finance Department Chair decided to have a sign up sheet posted without prior warning with the order of allocation determined by the order of names on the sign up sheet. Again, faculty who remain devoted to research inside their offices were at a disadvantage, while faculty that wandered the hallways often would have an advantage, arguable again rewarding the relatively non productive faculty. The Economics Department Chair, realizing the inefficiencies in the mechanism used by the other departments to allocate offices, came up with the idea of using an auction mechanism. Since the idea was to avoid rent seeking and transaction costs, rather than gathering revenue, the department settled on a first price sealed bid auction (which has been shown to be revenue deficient to both the English auction and a second price sealed bid auction (see Coppinger, Smith and Titus (1980) and Cox, Roberson and Smith (1982) for analytical explanations of this) though it is easier to implement than either of them). The revenue collected from the auction was divided up among student scholarship funds, and faculty travel funds. Subsequent vacancies were filled up by similar auctions.

Auctioning Parking Spots at Chapman University

Chapman University in Southern California chose a novel way to approach the perennial problem of parking especially at urban campuses namely there are too few prime parking spots and too many cars jostling for these spaces. That inevitably means that commuters spend a lot of time driving around the prime parking spaces in the hope that someone will leave and they will get the spot. This is obviously inefficient as it leads to losses of time and fuel, not to mention causing more environmental pollution than necessary.

The allocation of parking spaces around the academic institutions in the country are normally done in one of two ways – use of a differentiating mechanism - chronological i.e. the earliest applicants get the best spots, or seniority i.e. in the case of students seniors get the first pick followed by juniors followed by sophomores etc. Another interesting idea is the use of differentiated pricing for different parking lots i.e. the most convenient and hence popular parking lot is the most expensive and so on. This can be either decided by a central University agency like Public Safety or can be decided by an auction which is what Chapman University has chosen to do.

The Auction works as follows: the parking spots are auctioned as a premium over base rate. There are some parking lots that cost just the base rate (usually the farthest or the least convenient ones) so students that do not want to pay extra for a premium spot can avail of these. The auction is designed as a decreasing price auction; it starts at the highest possible premium. Students and Faculty/Staff bid the maximum premium they are willing to pay, after a specific time (30 minutes) premiums decrease by a specific amount ($2). The market clears when you have the same number of parking spots and the same number of bidders at a price (or higher), which is the market clearing price. Thus bidders have the option to wait for a lower price as time goes by, but also have a higher risk of losing out on prime parking lots. On the other hand, since they do not get penalized for being the first ones to bid when the premiums are the highest on account of the market clearing price being the lowest price at which the number of spots and bidders are equal, bidders may choose to bid at high premiums, not willing to take the risk of losing out on prime spots. However, if a sufficient number of bidders bid at a high premium, there is a chance that a parking lot could be filled and the bidders pay a price higher than their optimal price. Any ties at any point are settled chronologically.

Example 6

Let the number of parking spots to be auctioned = 5.
Number of people interested in bidding = 10.

Suppose the bidding for a premium starts at $100. There is 1 bidder at that price. After 30 minutes the premium drops to $98 with just the 1 bidder. After 30 more minutes the premium drops to $96 with still just the 1 bidder. After three subsequent 30 minute intervals, the premium drops to $90 and we have 3 bidders. The bidding has to continue because until now we have 5 parking spots and only 3 bidders. After a few more rounds at $80 we have 4 bidders and at $72 we have 5 bidders. The auction closes with the premium price being $72 and the five bidders being the winners each paying the price of $72.

This is an example of a modified Dutch Auction using a multi unit uniform price auction format. In a traditional Dutch auction, a single unit or a single product cluster is auctioned, and the price decreases until there is one person willing to pay the named price. Thus the bidders are aware that the bids that they make will be the prices that they pay for the product or service, thus creating an incentive for the bidders to strategically lower the bids. Bidders, by bidding lower than their valuation, balance the risk of losing out on a product and the reward of paying a lower price. However, in the modified Dutch Auction, since there are many identical parking spots that are auctioned and an individual has unit-demand for the spots, the final selling price is equal to the last price bid. Thus, for all but one individual, the bid is unrelated to the price paid. For the last individual that submits a bid and hence pays a price equal to the bid, they could behave strategically and bid lower to lower the price that they (and everyone else) pay; however by

lowering their bid they could also lose out on the spot. However this incentive for strategically lowering the bid by the last bidder can be removed by recording each individual's maximum price, and setting the final price to be equal to highest bid lower than the market clearing bid. Thus every bidder has an incentive to bid non-strategically i.e. every bidder would bid their true valuations.

Example 7

Suppose there are 4 parking spots being auctioned and 7 individuals with valuations of (in dollars) 100, 90, 80, 70, 60, 50 and 40. If everyone bids honestly, then under the modified auction stated above, the first 4 bidders are awarded the four parking spots for a price of $60. Individually none of the first four bidders have an incentive to manipulate their bids – the only way any of them could change the outcome would be to bid lower than $60 in which case they would not win the parking spot - a definite loss of surplus compared to (for example) having a valuation of $100 and paying $60 for the parking spot – a surplus of $40.

In the case that we use the original auction mechanism, the first four bidders would win the parking spots and pay $70. Thus the fourth individual would have an incentive of lowering their bid (and thus lowering the payment) and still being the fourth individual. In fact, all of the top four bidders would have that incentive. However this is somewhat unrealistic if the auctioneer (the University) provides little or no information about how close the bids are to clearing the market. It would imply having a lot of knowledge about expected valuations of individuals and some history of the bidding values. But given that the Dutch Auction format was chosen for its simplicity and speed, it is unlikely that individuals especially faculty staff and students at a University would expend that much energy just to save a few dollars – the cost benefit does not add up.

Also, as we can see, the original format is actually better as far as revenue is concerned for the University. Thus even though the revised format has the beauty of eliciting truthful preferences from individuals, it is actually less appealing from a revenue standpoint.

CONCLUSIONS

In this short paper, we have provided an exposition of the various mechanisms used by academic institutions to allocate services like courses, parking spots, and office space and interview slots. We described the workings of each mechanism as well as looked at the positive and negative features of each of them and illustrated them with the use of examples. While other real world application of designed mechanisms like auctions designed to allocate pollution permits or distribute bandwidth to mobile phone providers have as their principle motivation generation of revenue, in these examples from Academia, the principle motivation is to allocate the product or service efficiently. Thus in our analysis we have concentrated on describing the

benefits as well as the inefficiencies that we think occur in these mechanism. This paper concentrates mainly on course allocation mechanisms and we note that academic institutions especially the larger ones have become more and more comfortable implementing some form of course allocation system that is different from the standard registration format used in most academic institutions. We also note that the major cost of these mechanisms is really the process of getting students acquainted with the specific auction or course allocation mechanism and to make sure that the students are properly trained to use these mechanisms efficiently. The academic institution does not collect any revenue in the course allocation mechanisms but does reap the benefits of having the courses allocated more efficiently. Interesting future research would come in the form of analyzing actual data related to some of these auction mechanisms. Fortunately, Columbia University as well as the University of Michigan provides publicly available data on their course allocation auctions. Thus, in a follow up research paper to this one, we will try and use the publicly available data to statistically analyze some of the issue that we have described and illustrated in this paper using examples. This will provide a deeper understanding of the benefits and costs of some of these auction mechanisms that have been described here.

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DO INTERACTIVE ONLINE ROLE-PLAY GAMES TEACH ECONOMICS?

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ABSTRACT

Entrepreneurial experience can bring many concepts in economics courses to life for students. However, few students who enroll in economics courses have had real-world entrepreneurial experience. Increasingly, students enrolled in economics courses have had virtual entrepreneurial experiences. Online role-play games in which players interact are virtual entrepreneurial laboratories. These games involve buying and selling of goods found in the online environment. Players of these games often take part in virtual businesses, involving finding/buying resources to use in production, producing goods, marketing goods, and selling goods. These games provide experience with a variety of economic concepts, including many concepts contained in the national curriculum standards for economics, developed by the National Council on Economic Education (in partnership with the National Association of Economic Educators and the Foundation for Teaching Economics). We explore the ways in which interactive online role-playing games might teach economics, with a concentration on the national standards. We also do a preliminary empirical investigation of whether game playing builds theoretical economic knowledge.

INTRODUCTION

In 1999 a division of Sony launched an online game called Everquest. As referenced by Castronova (2001), Sony revealed that the population of Everquest's world was 400,000. Those who played the game acquired virtual assets that were tradable, and some players auctioned these virtual assets for U. S. dollars (and other currencies) on Internet auction sites. Combining the auction data with data from surveys, Castronova estimated that per-capita GDP of Everquest's world was roughly the equivalent of Russia's per-capita GDP. Game players who sold in-game assets online in 2001 received an implied real wage $3.42/hour.

According to surveys by the PEW Institute, 70% of teens play online games (Lenhart, Madden, and Hitlin, 2005) and 39% of all internet users play online games (Fox, 2004). Also, from 2000 to 2002, the number of people who had played a game on the Internet grew by 45% (Madden and Rainie, 2003). Grobelnik, Holt, and Prasnikar (1999) muse that online games can "increase interest in and decrease skepticism about economic theory" (p. 211). The PEW surveys concerned all online games, including card games and board games. Grobelnik, Holt,

and Prasnikar (1999) refer to basic game-theoretic exercises played over a classroom computer network. We contend that more attractive games in a more natural setting could, in some respects, more effectively accomplish Grobelnik, Holt, and Prasnikar's aims. As Robert Shapiro (2003) asserts, "The similarities to real-world market behavior certainly owe much to the fact that EverQuest players know how real markets work and probably believe in markets."

Literature on interactive online role-play games aptly defines and describes the games and the game experience (especially Castronova 2003a; but also Castronova, 2001; Castronova, 2003b; Lo, Wang, and Fang, 2005; Hines, 2003; and Stephens, 2002). The customer base has been described briefly by Castronova (2001) and more extensively by Griffiths, Davies, and Chappell (2003). These games are called by many names, such as "virtual worlds" (Castronova, 2001), "Massively populated persistent worlds (MPPWs)" (Castronova, 2003b), or "Massively Multiplayed Online Games (MMOGs)" (Sony, 2005a; Sony, 2005b) or, simply, "online games" (Choi and Kim, 2004). Many of these names have subtle differences in meanings. In this paper, we will use the simple term "online games" to refer to the specific class of games which we will now describe.

As we shall use the term, "online game" refers to a game such as Castronova defines (above) in which a player assumes the role of a person and interacts over the internet with other players who have also assumed roles. The role that the player has assumed can be referred to as the player's "avatar" (a standardized term that is used in virtually all the literature on these games). We contrast this concept with more familiar concepts in other types of games. When we refer to a player's "avatar" we do not mean "white" in chess, "Xs" in tic-tac-toe, or "Britain" in a WWII wargame. A player's online persona or avatar is a single individual such as "Zahira, the ruler of the planet Vega 2," in a space-based online game, or "Cambren, the wizard from the burning sands," in a fantasy-based online game. The concept of the avatar is fully developed in Castronova (2003a).

This research focuses on the possible contributions of games similar to Everquest to economic education. We raise two questions. The normative question is, "Should games such as Everquest be used to teach the national standards in economics?" The positive question is, "Do games like Everquest teach the national standards?" With regard to economic education, we focus on a subset of the twenty national curriculum standards for economics, developed by the National Council on Economic Education (in partnership with the National Association of Economic Educators and the Foundation for Teaching Economics) and attempt to show examples of how examples from these games can be used to teach economics. Then we discuss some preliminary research that attempts to illuminate the positive question by showing that such games do teach economics.

In the following sections we discuss how the particular aspects of online games teach the national standards, we review the results of our preliminary study, and finally, we offer conclusions, including directions for future research.

HOW DO ACTIVITIES IN ONLINE GAMES TEACH THE NATIONAL STANDARDS?

We now discuss how the particular activities in which one engages while playing online games might be used to teach some of the national standards. A more detailed explanation of game activities is provided in Appendix IV.

Standard 2: Marginal Cost/Benefit

Effective decision making requires comparing the additional costs of alternatives with the additional benefits. Most choices involve doing a little more or a little less of something: few choices are "all or nothing" decisions.

A player of an online game has many different ways to use time and virtual resources. For example, a player who wishes to purchase a new weapon finds that there are two different weapons on the market, with the better weapon marked at a higher price. The player must decide if the benefits of the better weapon are worth the added costs in terms of the extra sacrifice of gold required to obtain the better weapon. Another example, suitable for class might be the following: A player realizes that gold is valuable, but that increasing status, through gaining experience in quests, is also valuable. Hence, the player must decide if the status gained by spending one more hour in questing is worth the gold that must be sacrificed by taking that hour from his profitable time spent cooking food for other players.

Standard 6: Specialization and Trade

When individuals, regions, and nations specialize in what they can produce at the lowest cost and then trade with others, both production and consumption increase.

Players recognize that the group structure, in which those with differing skills contribute to the success of the group venture, increases the rewards that accrue to the individual. Further, in crafting, players are forced to specialize (avatars must specialize in only one area of crafting, such as woodworking) and frequently trade with other crafting classes. Finally, trade takes place between advanced avatars and beginning avatars, based on their relative abilities. Trade examples from game experiences might include the following: A wizard defeats an enemy, taking from him a sword that is not usable by wizards. Since this sword is useful to a warrior, both the wizard and the warrior can gain if the wizard sells the sword in return for gold. Trade also takes place between those who band together to accomplish objectives. Within a group, a warrior, who specializes in the ability to absorb damage, voluntarily takes damage while a

wizard, who specializes in the ability to do damage, kills the enemy. In this way, players specialize and trade in order to seek rewards that are divided between group members.

Standard 7: Markets – Price and Quantity Determination

Markets exist when buyers and sellers interact. This interaction determines market prices and thereby allocates scarce goods and services.

As discussed previously, players set prices for the goods they wish to sell in markets. For instance, with regard to resource markets, the price of harvested wood is determined by the willingness and ability of players to harvest wood and by the willingness of those who craft bows to purchase the wood. With regard to output markets, the price of the dragonlord's sword is determined by the willingness and ability of players to slay the dragonlord and sell his sword, and by the willingness and ability of potential buyers to buy the sword.

Standard 9: Role of Competition

Competition among sellers lowers costs and prices, and encourages producers to produce more of what consumers are willing and able to buy. Competition among buyers increases prices and allocates goods and services to those people who are willing and able to pay the most for them.

Competition, in the economic sense, occurs throughout online games. Frequently online message boards contain examples of sellers lamenting the competitive pressures of the market while buyers are found who welcome it. Often serious players follow the price of articles in the various auction locations. Certain add-on software products aid such players in tracking the availability of important and often rare resources. A simple example of the concept of competition follows: If the dragonlord's sword is the strongest weapon that a warrior can use, that sword will be highly sought after by warriors, who will compete for it in the market, driving its price up.

Standard 14: Profit and the Entrepreneur

Entrepreneurs are people who take the risks of organizing productive resources to make goods and services. Profit is an important incentive that leads entrepreneurs to accept the risks of business failure.

Players typically use the term "profit" to indicate the residual from production and sales, but view profit as a reward for labor, not as a reward for risk taking. The language of

"entrepreneurs" is not used. However, the games provide many examples of this standard. An armor crafter who finds that lowly warriors are not being served by other armorers has an incentive to invest in materials and devote valuable time to serving these warriors. This crafter will be rewarded with profit if he has correctly assessed the market, but takes the risk that he is wrong and will lose his time and gold. Online entrepreneurs also organize other players in order to enrich themselves. For instance, a player who devises a new strategy to defeat the dragon lord may assemble a team to implement this strategy, devoting time and effort to the campaign. If successful, this player will share in rich rewards, but takes the risk that the effort will fail. The balance between risk and reward is clear.

Standard 19: Unemployment and Inflation

> *Unemployment imposes costs on individuals and nations. Unexpected inflation imposes costs on many people and benefits some others because it arbitrarily redistributes purchasing power. Inflation can reduce the rate of growth of national living standards because individuals and organizations use resources to protect themselves against the uncertainty of future prices.*

It has been noted elsewhere that players are aware of the effects of inflation that result from unscrupulous players who exploit game programming weaknesses and duplicate items (BBC News, 2002). When a group of players finds a way to exploit the game world, duplicating valuable items and flooding the market with gold, this will cause prices to rise and will cause all players to adjust to the new price levels by changing their game activities. Other simple illustrations of this standard exist. For example, if players decide that they no longer wish to richly furnish their homes, furniture crafters will not be able to find work, resulting in losses to the game world until furniture crafters can find profitable alternative pursuits.

Standard 20: Monetary and Fiscal Policy

> *Federal government budgetary policy and the Federal Reserve System's monetary policy influence the overall levels of employment, output, and prices.*

There is no government budgetary policy in online games. However, monetary policy can be illustrated by looking at how non-player merchants affect play. Game designers place automated merchants in the game and set prices that these merchants pay for goods and charge for goods. If non-player merchants were programmed to pay three times their normal prices to players, then the increase in the supply of gold would cause all prices to rise or, if non-player merchants began to charge players three times normal prices to purchase raw materials, then the decrease in the supply of gold would cause all prices to fall. From the authors' observations,

players have an instinctive understanding of this idea. In addition, as noted in Standard 19, players realize that when unscrupulous players exploit game bugs, the money supply can expand and cause inflation. Castronova (2001), however, discusses the inevitability of deflation which derives from the durable nature of many goods in online games. Castronova also measured this deflation at 29% over a one year period during 2000-2001. Some of these problems with deflation have been mitigated in Everquest II because game designers made it impossible for an avatar to resell most of the durable goods which it has previously used. The games offer direct illustrations of this standard in practice.

Thus we find the online game experience provides the student with a context for understanding complex economic theory.

THE POSITIVE QUESTION: DO ONLINE GAMES TEACH ECONOMICS?

We conducted a survey of 51 students at Southern Arkansas University (SAU) who had not taken any courses in economics. The survey instrument was composed of two parts. The first part of the survey contained twenty questions which were meant to test students' knowledge of the twenty voluntary national standards. The second part of the survey contained questions which elicited demographic information, including previous business and work experience. The demographic data is described in Table 1.

Results

Column 3 of Table 2 contains some results of the twenty logit models. Each row of column 3 summarizes the results of one logit. Column 3 lists (1) the number of students who correctly responded to the question (2) the prob value (Significance level) of the logit, based on the chi-squared distribution (3) any variables whose coefficients were significantly different than zero at the .10 level, along with the sign of the coefficient. For instance, with regard to question 7, 88.2% of students answered correctly. Question 7's logit model's prob value was .544, indicating that the independent variables were not significantly related to the likelihood that the student obtained the correct answer to question 7 at any traditionally cited level of significance. The coefficient for the MIS Major variable was negatively related to obtaining a correct answer on question 7 at the .010 level of significance. No other dependent variables were significantly related to the likelihood that the student obtained the correct answer to question 7. We did not attempt to analyze whether variables had a large or small effect on the likelihood of answering questions correctly, through analyzing the partial derivative of the likelihood with respect to each independent variable.

The Online Game variable was significantly related to the likelihood of answering questions related to Standard 6 (trade and specialization), Standard 19 (unemployment and inflation) and Standard 20 (monetary and fiscal policy). In each of these three instances where

Online Games significantly influenced the likelihood that the student would answer the question correctly, the effect was positive. The strong incentives for specialization and cooperation in the structure of groups may cause Online Gamers to gain an understanding of Standard 6. The questions for both Standard 19 and Standard 20 relate to the effect of the money supply on prices. The game-wide effects that are caused by players who exploit game program bugs to duplicate items may be responsible for the both of these results.

CONCLUSIONS

This paper deals with two questions. For the first part we have shown how these types of games can be used to teach economic standards. The authors suggest that economics instructors consider incorporating examples such as we developed here as they attempt to make creative contact with students. We have provided multiple illustrations for eight standards to answer the normative question.

We do not find a definitive answer to the positive question—"Do online games teach the national standards?" We found that online games contributed to understanding of three of the twenty national standards. In particular, playing online games was associated with greater knowledge of the principle of specialization and trade and greater knowledge of the money supply's effect on prices. A larger more complete sample may yield more positive results.

With stronger findings, we might have informed economists that the increase in popularity of online games would be associated with better first-time economics students. But this would stop short of recommending online games as a teaching tool to accompany the course. Besides the expense involved in maintaining subscriptions, there may be harmful side effects to playing online games. It has been well documented (Choi and Kim, 2004; Chou and Ting, 2003; and Lo, Wang, and Fang, 2005) that the "flow" aspects of the games are addictive and may be related to neglecting other activities, such as studying. This is also consistent with Castronova's (2001) survey results on Everquest players. Thus, stronger findings would have pointed to a silver lining to a dark cloud, but not to an unambiguously strong teaching tool.

We have definite ideas for future research. First, our primary interest is in whether online games teach applied economics. The national standards were used to define the important points of the breadth of economics. Future research could make use of a subset of the applied economics questions contained in the Test of Economic Literacy (Walstad and Rebeck, 2001).

Second, a sample including more respondents who have more experience with online games might be obtained using searches of an online game's player database. Such a sample could be compared with a sample obtained from another source which contained fewer online game players, using appropriate statistical techniques.

Third, a future survey could elicit responses which could be used to build variables that control for the intensity of use of online games as well as the breadth of experience with online

games. In addition, the research would be strengthened by controlling for the intensity of computer use in non-gaming activities.

In the end our conclusion is twofold. First, the extensive of use of online games among young people argues strongly for their application in illustrating economic concepts in class. Second, the preliminary findings of our survey lead us to believe that more research will uncover unexpected development in students' understanding of economics based on their online game experience. Ironically the second finding tends to strengthen the first. Specifically, because the online experience appears to teach economics to the users it will be even more effective as an example to further that knowledge base when used in class. Hence the positive informs the normative.

Table 1: Descriptive Statistics		
Variable	**Mean**	**Std. Dev.**
Male	50.98%	0.504878
Online Game	11.76%	0.325396
Age	22.04	6.154546
Cumulative Credit Hours	47.80	24.37459
Weekly Paid Hours	16.49	17.2932
Family Business Participation	17.65%	0.385013
Work in Business Occupation	33.33%	0.476095
Course Section 1	54.90%	0.502543
Fin/Acct Major	23.53%	0.428403
Mgt/Mkt Major	27.45%	0.450708
Mgt. Info. Systems Major	11.76%	0.325396
Other Major	37.25%	0.488294
Econ Score	56.67%	0.142361

Table 2: Survey Questions, Voluntary Economics Standards, and Results of Logit Estimations		
Question	Standard	Results
1. When resources are scarce, it is always the case that a. Many more resources will soon become available. b. Technological breakthroughs will immediately happen to relieve the scarcity. c. We must choose among alternative resource uses. d. Prices for the products that these resources produce will be low.	Standard 1: Scarcity Productive resources are limited. Therefore, people cannot have all the goods and services they want; as a result, they must choose some things and give up others.	Correct Answer 90.1% Significance level .0005 No coefficient significantly different than zero. Model perfectly predicted the dependent variable.
2. Elron is a tailor. If he wishes to maximize his profits, he should spend another hour making tailored goods if a. He can make at least one more coin from selling the tailored goods. b. He can make at least one more coin than the cost of his materials from selling the tailored goods. c. He can produce at least one unit of tailored goods in the next hour. d. An hour of tailoring pays more than an hour spent in his next best alternative use of his time.	Standard 2: Marginal Cost/Benefit Effective decision making requires comparing the additional costs of alternatives with the additional benefits. Most choices involve doing a little more or a little less of something: few choices are "all or nothing" decisions.	Correct Answer 39.2% Significance level .212 No coefficient significantly different than zero. (+) MIS Significance level is .108
3. In a market system, goods are allocated based on a. Who can acquire the goods first. b. Who is willing to pay the price for the goods. c. Luck. d. The choice of an agreed-upon leader.	Standard 3: Allocation of Goods and Services Different methods can be used to allocate goods and services. People acting individually or collectively through government, must choose which methods to use to allocate different kinds of goods and services.	Correct Answer 84.3% Significance level .107 No coefficient significantly different than zero.
4. If a productive activity suddenly takes longer to do than it did previously, a. Overall, people will put less effort into this activity. b. Overall, people will put more effort into this activity. c. Overall, people will put the same amount of effort this activity. d. People will cease to do the activity at once.	Standard 4: Role of Incentives People respond predictably to positive and negative incentives.	Correct Answer 64.7% Significance level .563 No coefficient significantly different than zero.
5. When Samuel and Jerika, who are both fully informed, agree on a price that Jerika will pay Samuel for a unique item, a. Samuel is made better off and Jerika is made worse off. b. Jerika is made better off and Samuel is made worse off. c. Both are worse off. d. Both are better off.	Standard 5: Gain from Trade Voluntary exchange occurs only when all participating parties expect to gain. This is true for trade among individuals or organizations within a nation, and usually among individuals or organizations in different nations.	Correct Answer 92.2% Significance level .194 No coefficient significantly different than zero.

Table 2: Survey Questions, Voluntary Economics Standards, and Results of Logit Estimations		
Question	Standard	Results
6. Individuals find more success overall if they a. Attempt to be equally good at everything. b. Ignore what they must sacrifice in order to attain their goals. c. Specialize at what they are best at and trade for things they are worse at. d. Do not waste time learning more about their profession.	Standard 6: Specialization and Trade When individuals, regions, and nations specialize in what they can produce at the lowest cost and then trade with others, both production and consumption increase.	Correct Answer 58.8% Significance level .004 (+) Role Playing Game significant at .058 (+) Credit Hours significant at .006 (+) Family Business significant at .085 (+) Business Occupation significant at .097
7. The market price of a good rises when a. Demand for the good rises. b. Supply of the good rises. c. Demand for the good falls. d. The cost of producing the good falls.	Standard 7: Markets – Price and Quantity Determination Markets exist when buyers and sellers interact. This interaction determines market prices and thereby allocates scarce goods and services.	Correct Answer 88.2% Significance level .544 (-) MIS significant at .010
8. If the availability of a resource used in production falls, then a. Prices will fall, since people no longer depend on the resource. b. Price will rise, encouraging potential buyers to find other alternatives. c. Price will fall, encouraging sellers to develop alternative supplies. d. Price will rise, encouraging potential buyers to buy more.	Standard 8: Role of Price in Market System Prices send signals and provide incentives to buyers and sellers. When supply or demand changes, market prices adjust, affecting incentives.	Correct Answer 52.9% Significance level .076 (-) Business Occupation significant at .010 (+) Management and Marketing significant at .068
9. Competition among buyers ensures that a. Goods go to those who are most willing to pay. b. Goods are produced in an efficient way. c. Prices will be low. d. They will have all of the good that they wish to consume.	Standard 9: Role of Competition Competition among sellers lowers costs and prices, and encourages producers to produce more of what consumers are willing and able to buy. Competition among buyers increases prices and allocates goods and services to those people who are willing and able to pay the most for them.	Correct Answer 56.8% Significance level .478 (-) MIS significant at .071

Table 2: Survey Questions, Voluntary Economics Standards, and Results of Logit Estimations		
Question	Standard	Results
10. For cooperative ventures to be successful, it is essential that a. The division of the potential rewards is well defined. b. All the participants are alike. c. Some of the participants are highly capable, while other participants are weaker. d. The goal of the venture should not be too well defined.	Standard 10: Role of Economic Institutions Institutions evolve in market economies to help individuals and groups accomplish their goals. Banks, labor unions, corporations, legal systems, and not-for-profit organizations are examples of important institutions. A different kind of institution, clearly defined and enforced property rights, is essential to a market economy.	Correct Answer 74.5% Significance level .932 No coefficient significantly different than zero.
11. Money is most likely not a. Something that is readily acceptable in transactions. b. Something that helps one compare the value of various goods and services. c. Something that holds its value well over time. d. A resource used to produce goods and services.	Standard 11: Role of Money Money makes it easier to trade, borrow, save, invest, and compare the value of goods and services.	Correct Answer 37.3% Significance level .531 (+) Management and Marketing significant at .034
12. The cost of spending money today, rather than in the future is a. The exchange rate. b. The interest rate. c. The price of the good. d. The unemployment rate.	Standard 12: Role of Interest Rates Interest rates, adjusted for inflation, rise and fall to balance the amount saved with the amount borrowed, which affects the allocation of scarce resources between present and future uses.	Correct Answer 21.6% Significance level .030 (+) Paid Hours significant at .043 (-) Management and Marketing significant at .074
13. Income depends on a. How much an individual produces per time period. b. The value of a unit of the goods or services that an individual produces. c. Neither a. nor b. d. a. and b.	Standard 13: Role of Resources in Determining Income Income for most people is determined by the market value of the productive resources they sell. What workers earn depends, primarily, on the market value of what they produce and how productive they are.	Correct Answer 64.7% Significance level .039 (+) Male significant at .008 (+) Age significant at .076 (-) Paid Hours significant at .044
14. Profit is the reward for a. Waiting to consume income at a later date. b. Expending labor in producing goods and/or services. c. Taking the risk of organizing productive ventures. d. Owning productive resources.	Standard 14: Profit and the Entrepreneur Entrepreneurs are people who take the risks of organizing productive resources to make goods and services. Profit is an important incentive that leads entrepreneurs to accept the risks of business failure.	Correct Answer 31.3% Significance level .095 (-) Credit Hours significant at .025 (-) Course Section 1 significant at .044

Table 2: Survey Questions, Voluntary Economics Standards, and Results of Logit Estimations		
Question	Standard	Results
15. To raise one's future standard of living, one might a. Increase the amount of goods consumed today. b. Increase the amount of services consumed today. c. Attempt to supply goods that are already abundantly being supplied. d. Acquire education or training.	Standard 15: Growth Investment in factories, machinery, new technology, and in the health, education, and training of people can raise future standards of living.	Correct Answer 70.6% Significance level .481 (-) Course Section 1 significant at .094 (-) MIS significant at .097
16. A policy that continually redistributes money from those who have more to those who have less will a. Eventually lead to increases in total wealth. b. Eventually lead to decreases in total wealth. c. Cause no eventual changes in wealth. d. Always be fair.	Standard 16: Role of Government There is an economic role for government in a market economy whenever the benefits of a government policy outweigh its costs. Governments often provide for national defense, address environmental concerns, define and protect property rights, and attempt to make markets more competitive. Most government policies also redistribute income.	Correct Answer 47.1% Significance level .324 No coefficient significantly different than zero.
17. The costs of a particular new policy exceed its benefits. This policy was most likely enacted because a. Of the actions of special interest groups. b. The policy's costs are large, but spread thinly over a large population, while its benefits are small, but spread thinly over the same population. c. The costs are small, relative to the benefits. d. The benefits are large, relative to the costs.	Standard 17: Using Cost/Benefit Analysis to Evaluate Government Programs Costs of government policies sometimes exceed benefits. This may occur because of incentives facing voters, government officials, and government employees, because of actions by special interest groups that can impose costs on the general public, or because social goals other than economic efficiency are being pursued.	Correct Answer 17.6% Significance level .487 (+) Course Section 1 significant at .069
18. Prices at which goods are eventually sold are determined by a. Sellers. b. Buyers. c. Sellers, together with buyers. d. Government.	Standard 18: Macroeconomy – Income/Employment and Prices A nation's overall levels of income, employment, and prices are determined by the interaction of spending and production decisions made by all households, firms, government agencies, and others in the economy.	Correct Answer 43.1% Significance level .790 No coefficient significantly different than zero.

Table 2: Survey Questions, Voluntary Economics Standards, and Results of Logit Estimations		
Question	Standard	Results
19. If the amount of money circulating in the economy rises, then in the long run a. Employment rises. b. The standard of living rises. c. Output of goods and services rises. d. Prices rise.	Standard 19: Unemployment and Inflation Unemployment imposes costs on individuals and nations. Unexpected inflation imposes costs on many people and benefits some others because it arbitrarily redistributes purchasing power. Inflation can reduce the rate of growth of national living standards because individuals and organizations use resources to protect themselves against the uncertainty of future prices.	Correct Answer 45.1% Significance level .702 (+) Online Games significant at .058
20. If the government reduces the quantity of money in circulation, then a. Prices fall. b. Prices rise. c. Interest rates rise. d. Inflation rates rise.	Standard 20: Monetary and Fiscal Policy Federal government budgetary policy and the Federal Reserve System's monetary policy influence the overall levels of employment, output, and prices.	Correct Answer 56.7% Significance level .009 (+) Online Games significant at .036 (-) Business Occupation significant at .006

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STUDENT CHOICE OF EFFORT IN PRINCIPLES OF MACROECONOMICS

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ABSTRACT

The model of student effort choice implicit in the literature is a tradeoff between the utility of scoring well on examinations and the disutility of the effort expended studying. The existing literature contains only minimally specified model structures. This paper develops the implicit model in the literature with an explicit utility maximization problem. The solution to the student's choice of effort is then empirically estimated with a unique and much broader data set. The results provide a more complete perspective on the factors determining student choice of effort. The model is then extended with estimation of a production function allowing for a calculation of the marginal effects that each of the variables ultimately has on score through its impact on effort.

INTRODUCTION AND LITERATURE REVIEW

Student effort is recognized as an important input in education production function. Although effort is essential in the theoretical modeling of education production, the direct treatment of effort has been limited both theoretically and empirically. Student effort has been modeled in the literature by McKenzie and Staaf [1974], Wetzel [1977], Becker [1982], Becker and Rosen [1992] and Krohn and O'Connor [2005] . A limitation found in these previous studies are they are focused principally on modeling educational production and give effort limited attention and tend not to empirically estimate effort at all.

Empirical estimations are limited to studies by Wetzel [1977] and Krohn and O'Connor [2005]. These empirical studies offer limited explanations of the connection of the regressors to the utility function of the student or to the educational production function. Wetzel [1977] estimates regressions where the dependent variables are indirect measures of effort. Wetzel constructs three McKenzie and Staaf [1974] styled effort variables by dividing gain in TUCE scores by three different aptitude scores based on the SAT as a proxy for effort. Wetzel uses end of semester TUCE score and never directly observes student effort. In the Wetzel study,

explanatory variables are limited to student grade expectation and hours worked as predictors of student effort. Wetzel finds student work hours has a negative impact on effort and grade expectation has a positive impact on effort. More recently, Krohn and O'Connor [2005] estimate student effort with an actual observation of effort rather than a McKenzie-Staaf proxy. However, the independent variables used to estimate effort are limited to a small vector of human capital measures, GPA, SAT and previous classes in economics. Other regressors include the pretest score and a dummy variable for gender. Krohn and O'Connor find students with higher ability study more. They also find evidence that females may in fact put forth more effort and that higher exam scores earlier in the semester lead to less effort exerted later in the semester. Overall, the collective right hand specification in this literature is thin and the development of this topic has been limited.

The purpose of this paper is to add to the existing literature by developing a more thorough specification of the model structure and provide an explicit connection of the empirical estimation of effort to the underlying student utility function. The resulting model provides a more complete perspective on the vectors determining student choice of effort. The empirical model will then be estimated using a richer list of explanatory variables than has previously appeared in the literature. The results will be used to calculate both marginal effects on post test scoring and the actual learning differentials implicitly observed in our data. This approach provides a fuller presentation of the determinants of effort in both theoretical utility maximization and the observed impact of effort determinants on learning.

MODEL

The model of student choice implicit in the literature is a tradeoff between the utility of the student's post test score ($S1$) and the disutility of the student's effort (E), the student's utility/disutility tradeoff. While this literature poses the problem as a utility/disutility tradeoff, the disutility of effort is a surrogate for the opportunity cost of effort in addition to any unpleasant aspect of the work itself. The disutility of effort is net of any pleasant aspect to the work itself. A student's post test score depends on the student's pretest score ($S0$), the rate of depreciation (d) of pretest understanding and the student's gain (G) from effort. Equation 1 shows this relationship.

$$1.\ S1 = G + (1\text{-}d)S0$$

While we note the rate d above, we have no reliable measure of how knowledge prior to day one of the class depreciates across students. This rate is either implicitly or explicitly assumed constant in all studies in this literature. We will follow this practice here. Therefore, we are treating this rate as an unobserved parameter of the student's maximization problem.

Variables influencing a student's marginal values (preferences) in the tradeoff are represented with the vector of variables *P*. Equation 2 summarizes the utility function *U*.

$$2.\ U(\ G + (1\text{-}d)S0, E, P)$$

A student's expected production depends upon teacher inputs, *T*, human capital, *K*, student effort, *E*, and the student's perception of the relative difficulty of the material, *PRD*. The student's expected gain function (*G*) is shown in equation 3 below. A student maximizes welfare under the condition shown in equation 4 involving the marginal utility of gain, U_G, the marginal gain from effort, G_E, and the marginal disutility of effort, U_E. The solution to the student's choice is given by the effort function shown in equation 5.

$$3.\ G(T, K, E, PRD)$$
$$4.\ U_G(S0, P)\ G_E(T, K, E, PRD) - U_E(E, P) = 0$$
$$5.\ E = f(S0, PRD, T, K, P)$$

The expected signs of the variables in the effort function, equation 5, can be determined by inspection of equation 4^1. A high value of *S0* means that the student is further into the region of diminishing marginal utility of posttest score and would imply a negative coefficient for *S0*. Teaching inputs may be complimentary to student effort (Increasing *T* increases G_E.) implying a positive coefficient on the *T* regressor. Alternatively, teaching inputs may be substitutes for student effort (Decreasing *T* decreases G_E.) implying a negative coefficient on the *T* regressor. Human capital *K* always increases G_E and so implies a positive coefficient on *K* regressors. Higher values for *PRD* mean a reduced reward to student effort and imply a negative coefficient on that regressor. In theory PRD is an ex-ante concept, however, our survey measures it ex-post. This may blur the lines of cause and effect. None the less, we feel that it is an important influence on the student's choice. Therefore we will assume an ex-ante character in student responses. Sign expectations for the coefficients of P regressors depend on whether the regressor would be expected to shift the utility/disutility tradeoff toward or away from effort. This formulation of the model allows us to use the vector list inside the function *f* as an expositional scheme in specifying regressor variables. Each vector, *T*, *K* and *P*, will be discussed in turn. We shall also specify an additional vector (*N*) of three regressors that indicate both productivity and preferences.

The vector T consists of variables representing teaching influences. Two teaching variables were based on student perceived clarity in the reading of the textbook, *CREAD*, and clarity in the lecture, *CLEC*. Our third teaching variable was the student's assessment of the rapport between the teacher and the students, *RAP*. These variables are measured with Lichert scale survey questions. Lastly, a dummy variable for the instructor (TEACHER) was included.

As noted earlier, the signs of these regressors depend on the input being a compliment or a substitute for student effort.

The vector K consists of measures of human capital. Human capital accumulated prior to entering university study is measured by the student's *ACT* composite score. ACT enters our regressions in log form. Accumulated hours of course work, *AHRS*, is used to represent experience with college courses. *AGE* is used to represent maturity. Another way of employing age is to distinguish between traditional students (age < 25) and nontraditional students with the binary variable *NONTRAD*.

The vector P (preference for achievement over leisure) involves family influences and income (included as a separate regressor). Family influences (father/mother etc.) occur in complex ways. When these influences enter the classroom it is only in student preferences for achievement over leisure. In absence of family measures, we can do well in representing such preferences with the ratio GPA/ACT. While our model is about the student's choice of effort for an individual class, we can apply the same reasoning to a model of a student's overall GPA. Suppose a simple linear utility function, a Cobb-Douglass style production function and the solution equation for GPA/ACT in equations 6 through 8 below.

6. $U = a_1 GPA + a_2 E$
7. $GPA = BE^b ACT^{1-b}$
8. $GPA/ACT = B(Bb)^{b/(1-b)}[a_1/a_2]^{b/(1-b)}$

In the utility function, a_1/a_2 is the student's preference for achievement over leisure. Within the limitations of this simple construction, GPA/ACT is a monotonic transformation of the student's preference for achievement over leisure. When family measures are not available we will use GPA/ACT and where they are available we will use these measures along with GPA/ACT.

Peer influences are represented by the percent of the class with the same major, *SMAJ*. A Lichert scale measure of student preference for working in short periods of intense effort, work style preference (*WP*) is also included in measuring a student's preferences in the utility/disutility tradeoff.

The vector N includes regressors that are nonspecific indicators of both productivity and preferences in the tradeoff. Male gender, *MALE*, is one such binary variable. Having a high percentage of accumulated hours transferred from other universities, *TRAN*, is another. Course specific motivation and ability is measured by a binary for being a non-business major, *NONBUS*.

DATA

The model presented in the previous section was empirically tested using student examination and survey data collected in macroeconomic principles classes at a public university in Kentucky. Students were given a pre-test covering the basics of aggregate demand, aggregate supply, short-run equilibrium and long-run self-adjustment[2]. The test was given on the first day of class and not returned to students. The test consisted of thirty-five multiple-choice questions selected by topic from the textbook test bank. Reading was assigned and then material was presented in traditional lecture format. Students were surveyed each class period on the time they spent studying the material since the previous class meeting (i.e. reading, going over notes working problems, etc.). After the material was covered, the test was re-administered to students about six weeks into the semester, students were not aware that the same test was to be given. The two instructors spent the same amount of class time covering material and utilized the same textbook.

A distinction between this study and other studies in the literature is in the measurement of effort. Studies prior to ours are often end-to-end in nature and measure learning by the overall gain in understanding at the end of the course and thus ask students' questions like, "How much did you study on average per week for this class?" This study directly surveys student study minutes through self-reporting. This shorter periodicity of data collection (i.e. at the start of each class period) offers potential gains in measurement accuracy because the reported events are more proximate. The experimental design prevented incentive for over or under reporting of study minutes. Both of our data collection included this effort measurement.

Clearly the measure of student study minutes does not reflect the quality dimension of effort. On the other hand, one cannot imagine a rational motivation for students to spent time pointlessly. If students fail to make their efforts effective, i.e as a pure cost with no benefit, it would indicate an irrational choice. Empirically this type of variance will be assigned to the error term of our regressions.

In addition to the student survey, information on *GPA, ACT* scores, and *AHRS* were collected from the university. Some data points were lost due to the failure of the student to take one of the exams, failure to submit effort data or unavailable transcript information for the student. The data described above are the consequence of our previous inquiries into education production in the principles class. At the midpoint of collecting production data, we decided to expand our inquiry to include student effort functions. In particular, family data and student perceptions of teaching were added to the variables being collected. Therefore, our data set includes a group of observations in which we do not have the additional survey information and another group of observations where the additional survey information was collected. We refer to the former as the long data set and the latter as the wide data set. Variable definitions, data availability and summary statistics are reported in Table 1.

Table 1: Variable, Notation And Summary Statistics		
Vectors/ Variables	Description	Mean (Std. Dev.)
EFFORT	Total Minutes Study Time[a]	298.77(182.19)
S0	Pretest Score[a]	.43 (.12)
PRD	Perceived Relative Difficulty[a]	278.88 (74.81)
T	Measures of Teaching Influences	
RAP	Teacher Rapport with the Class[b]	3.65 (.76)
CLEC	Clarity of the Lectures[b]	3.91 (.91)
CREAD	Clarity of the Reading in the Textbook[b]	3.69 (.86)
TEACHER	Teacher Binary[a]	.52 (.50)
K	Measures of Human Capital	
ACT	The Student's Composite Act Score[a]	21.3 (3.55)
GPA/ACT	GPA to Act Ratio[a]	.14 (.03)
AHRS	Accumulated College Coursework[a]	65.58(32.80)
AGE	Age[a]	21.90 (2.74)
NONTRAD	A Nontraditional Student[a]	.09 (.29)
P	Variables Affecting the Student's Preferences for Utility of Scoring and Disutility of Effort	
FED	Father's Education[b]	14.03 (2.98)
MED	Mother's Education[b]	13.78 (2.91)
SIB	Number of Siblings[b]	2.26 (1.73)
SED	Number of Siblings with College Hours[b]	.77 (1.02)
INC	Family Income[b]	1.34 (1.81)
SMAJ	% Of The Class with the Same Major[a]	.10 (.07)
WP	Preference for Short Intense Periods of Effort[a]	2.19 (1.21)
N	Nonspecific Indicators of Preference and/or Productivity	
MALE	Male[a]	.61 (.48)
TRAN	% of Transfer Hours in Accumulated Hours[a]	.39 (.49)
NONBUS	A Non-Business Major Binary[a]	.37 (.48)
[A]available In Both Datasets [B]available In The Wide Dataset		

EMPIRICAL ESTIMATION

The estimation of the student effort equation using the long data set is reported in columns one and two of Table 2. The estimation of the student effort equation using the wide data set is reported in columns one and two of Table 3. In both tables, moving from column 2 to 3 we remove insignificant variables to gage the impact on remaining coefficients. In order to interpret the model further, we report the marginal effects of each variable and the corresponding maximum learning differential in our data set for each variable. This information appears in the last two columns of both Table 2 and Table 3. The marginal effect of each regressor is its

coefficient in the estimation of the effort equation multiplied by the marginal product of effort derived from the production function shown below. Each regressor's range of variation multiplied by its marginal effect tells us the largest learning differential that the regressor implicitly created in our data set.

Table 2: Student Effort Equation Estimates and Impact – Long Dataset				
VARIABLE/(VECTOR)	Coefficient (t-Stat)	Coefficient (t-Stat)	Marginal Effect	Learning Differential
S0	-1.77 (-4.22)	-1.67 (-4.08)	-.064	-.038
PRD	-.000 (-.10)	-.000 (-.45)	-.00001	-.006
TEACHER(T)	-.222 (-2.30)	-.241 (-2.55)	-.009	-.009
ACT(K)	.750 (2.25)	.668 (2.05)	.025	.026
AHRS(K)	.001 (.79)			
AGE(K)	.027 (.75)			
GPA/ACT(P)	4.23 (2.10)	3.71 (1.90)	.141	.026
NONTRAD(P)	.298 (.91)	.537 (3.05)	.02	.02
SMAJ(P)	-4.66 (-5.19)	-4.68 (-5.25)	-.178	-.061
WP(P)	-.040 (-1.07)	-.033 (-.92)	-.001	-.005
MALE(N)	-.170 (-1.93)	-.145 (-1.71)	-.006	-.006
TRAN(N)	.022 (.23)			
NONBUS(N)	-.294 (-2.57)	-.275 (-2.46)	-.011	-.011
R^2/n	.43/113	.41/113		

Table 3: Student Effort Equation Estimates and Impact – Wide Dataset				
VARIABLE (VECTOR)	Coefficient (t-Stat)	Coefficient (t-Stat)	Marginal Effect	Learning Differential
S0	-2.28 (-4.07)	-2.43 (-4.46)	-.092	-.055
PRD	-.002 (-2.40)	-.002 (-2.12)	-.00008	-.039
RAP(T)	.006 (.06)			
CLEC(T)	-.091 (-.95)			
CREAD(T)	.229 (2.61)	.159 (2.37)	.006	.018
TEACHER(T)	-.475 (-2.59)	-.541 (-4.20)	-.021	-.021
ACT(K)	1.17 (2.25)	1.49 (3.36)	.057	.057
AHRS(K)	.002 (.48)			
AGE(K)	-.017 (-.26)			
GPA/ACT(P)	2.47 (.88)	3.06 (1.21)	.116	.021
NONTRAD(P)	.902 (1.58)	.654 (2.85)	.025	.025
FED(P)	-.033 (-1.26)			
MED(P)	.001 (.04)			
SIB(P)	-.051 (-.93)			
SED(P)	.151 (2.43)	.115 (2.35)	.004	.026
INC(P)	.068 (.99)			

Table 3: Student Effort Equation Estimates and Impact – Wide Dataset				
VARIABLE (VECTOR)	Coefficient (t-Stat)	Coefficient (t-Stat)	Marginal Effect	Learning Differential
SMAJ(P)	-4.40 (-3.56)	-5.02 (-3.75)	-.191	-.066
WP(P)	-.161 (-2.78)	-.166 (-3.14)	-.006	-.025
MALE(N)	-.275 (-1.18)	-.023 (-.19)	-.0009	-.0009
TRAN(N)	.090 (.67)			-.014
NONBUS(N)	-.177 (-.92)	-.357 (-2.17)	-.014	-.014
R^2/n	.74/58	.69/59		

Let the production function used in these calculations is given in equation 9.

$$9. \quad S1 = a0 + a1 S0 + a2 Effort + a3 ACT + a4 Teacher$$

The estimated coefficients using the relevant data obtained from the long data set (with t-ratios in parenthesis) are shown as equation 10.

$$10. \quad S1 = -.368 + .491 S0 + .038 Effort + .210 ACT + .019 Teacher$$
$$(-1.54) \quad (5.07) \quad (2.05) \quad (2.98) \quad (.84)$$
$$R2 = .317 \qquad n = 131$$

Based on these estimates, the marginal product of effort is positive and significant as we would expect.

A statistical issue arises from the endogeneity of effort in equation 10. Ordinarily this results in stochastic regressor bias because effort is correlated with the disturbance of the regression. In this literature, the operating assumption is that students maximize their expected utility. This literally strips the stochastic term from equation 10 in the students' choice making that choice independent of the error term. Further discussion of this point is provided in Appendix B.

The model performed well, explaining around about forty percent of the variation in the dependent variable using in the long data set and seventy percent in the wide data set. The results were stable across the two sets of estimation and were tested for heteroscedasticity using the Ramsey test and found homoscedastistic. The independent variables also performed well individually and as predicted by theory.

The coefficient on the pre-test variable, *S0*, is negative and significant at the one percent level in all of the estimates. As predicted by the comparative statics, a student achieving a high pre-test score will exert less effort in preparing for the post-test. This variable also has the second largest learning differential in both data sets. The variable measuring student perceived difficulty, *PRD*, also performed as predicted by the model. *PRD* is negative in every equation estimated. However, *PRD* is only significant in those equations utilizing the wide data set.

Two of the classroom inputs were found to significantly affect effort. The variable measuring the student perceived clarity of the reading assignments, *CREAD*, was positive and significant at the one percent level. From a student perspective a high CREAD value enhances student effort and is not seen as a substitute for it. The dummy variable capturing differences between the two instructors was significant in all the estimated equations. One of the instructors had students that exerted significantly less effort (avg. 256 minutes) compared to the other instructor (avg. 356 minutes). This instructor's presentation of the material was seen by students as a substitute for student effort.

In the vector of human capital measures, *ACT*, GPA/ACT and *NONTRAD* all had positive coefficients as predicted by the model. ACT was significant in all of the equations estimated including both the wide and long data set. GPA/ACT was only found to be significant in the long data set. GPA/ACT had the largest positive impact on learning differential in both data sets. NONTRAD was significant in the refined estimates of both the wide and long data sets. *AGE* and *AHRS* performed poorly in all of the models in which they were included. *NONTRAD*, *AGE*, and *AHRS* are likely redundant measures of experience and maturity; as a result, the two later measures were eventually dropped in favor of *NONTRAD*.

The vector of variables measuring student utility of test score on the post-test and the disutility of effort achieved mixed results. The variables *INC*, *FED*, *MED* and SIB were insignificant in all of the models estimated and eventually led to their omission in the final estimations of the model. The variables *SED*, *SMAJ* and *WP* were the significant variables from the preference vector. SED was positive and significant at the one percent level, suggesting that if students have had siblings with some college experience the more effort they will exert in preparing for the post-test. SMAJ was positive and significant at the one percent level. This suggests that the more students having the same major as a given student in the classroom will negatively influence the amount of effort exerted by the student. It is interesting that the quasi-peer influences, *SED* and *SMAJ*, are more impactful on student effort than the parental influences as measured by *INC*, *MED* and *FED*. Student work style preference, *WP*, was negative and significant at the one percent level in the wide data set only. Students, who indicate that they prefer to study intensely for short periods, actually exert less effort in total.

MALE was negative and significant in the long data set only. The impact of MALE on learning differentials, however, is small relative to other significant variables. Differences in gender achievement in economics may be an area for future research. *NONBUS* was negative and significant in the final equations estimated for both the wide and long data sets suggesting non business students exert less effort all else equal which might be expected. However, this variable has a relatively small impact on learning differentials.

CONCLUSION

This paper has added to the existing literature on student effort by expanding the specification of the effort function to include all of its principle vectors of influence. These vectors included teaching inputs (*T)*, human capital (*K),* and student preferences in the tradeoff between marginal gain from effort and the marginal disutility of effort (*P).* These vectors of influence are added to the additional factors of pretest score (S0) and perceived relative difficulty (PRD). The theoretical model was improved by explicitly connecting regressors to the utility function or the production function. It was estimated using a richer list of explanatory variables than had been used in previous studies in the literature. The results are reported and used to calculate both marginal effects on post test scoring and implicit learning differentials observed in our data. This approach provided a fuller perspective on the effort function in theoretical utility maximization and in the observed impact of effort determinants on learning in our sample.

Two data structures were employed for estimation purposes. Although the wide data set is limited in observations, the overall results are strong and generally consistent with the results found in long data set. The wide data set also provides a relatively strong indication that the added variables substantially improve the model's empirical performance. The most significant negative influences on effort included: Pre-test score, student perceived difficulty, proportion of peers with the same major, preference for short intense study, and a non-business major. The most significant positive influences on effort included: clarity of the reading assignments, ACT score, number of siblings with college experience and non-traditional student status. A possible application of this model for further research could be as a vehicle for testing differences in teaching regimes or course designs in order to determine which elicits greater student effort and ultimately improved educational outcomes.

ENDNOTES

[1]   Comparative statistics are provided in the appendix.
[2]   This material is covered in Chapter 7 and Chapter 8 of Roger Arnold's *Macroeconomics*, 5th edition.

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APPENDIX A

This appendix contains the comparative static analysis referred to in the paper. Our purpose is to derive the expected signs of regression coefficients of the effort function derived from utility maximization by the student. Utility depends on S1, the post test score, and the time spent in effort, E. Maximization is constrained by the relationship between production and effort in the production function. Production also depends on the student's pretest score, S0, their human capital, K, and the student's perception of the difficulty, PRD. The problem is stated:

1.   Maximize $U(S1, E)$ subject to $S1 = f(PRD, K, E) + rS0$

The assumption that the student's rate of retention of achievement on the pretest (1-d) is uniform across the data set reflects the lack of data on this rate. We substitute the constrained value for S1 (which is $f(PRD, K, E) + (1-d)S0$ for S1 in the utility function and differentiate with respect to E. In our notation, the derivative of a function k with respect to x is denoted k_x and the derivative of k_x with respect to z is denoted $k_{x,z}$. The first order condition for maximization is:

2. $dU/dE = U_{S1}*f_E + U_E = 0$

This condition is further differentiated by E and one of the variables to be analyzed (X is PRD, K or S0.) and then solved for the dE/dX. The implicit effort function underlying our regressions is $E = g(PRD, K, S0)$. For each variable in g, the analyses derive its expected regression sign.

For PRD, we differentiate equation 2 by PRD and E producing equations 3 and 3'.

3. $U_{S1}*f_{E,E}*d_E + U_{S1}*f_{E,PRD}*d_{PRD} + U_{E,E}*d_E = 0$

3'. $d_E/d_{PRD} = [-U_{S1}*f_{E,PRD}]/[U_{S1}*f_{E,E} + U_{E,E}] < 0$
        (-)   (-)   (-)   (+) (-)   (≤0)

The outcome of a negative expected sign corresponds to the assumptions that the marginal utility of achievement, U_{S1}, is positive, the effect of higher PRD on the marginal product of effort, $f_{E,PRD}$, is negative, the effect of more effort on the marginal product of effort, $f_{E,E}$, is negative and that the effect of more effort on the disutility of effort is no effect or a negative change.

For K, we differentiate equation 2 by K and E producing equations 4 and 4'.

4. $U_{S1}*f_{E,E}*d_E + U_{S1}*f_{E,K}*d_K + U_{E,E}*d_E = 0$

4'. $d_E/d_K = [-U_{S1}*f_{E,K}]/[U_{S1}*f_{E,E} + U_{E,E}] > 0$
        (+)   (-)   (+)   (+) (-)   (≤0)

The outcome of a positive expected sign corresponds to the assumptions that the marginal utility of achievement, U_{S1}, is positive, the effect of higher K on the marginal product of effort, $f_{E,K}$, is positive, the effect of more effort on the marginal product of effort, $f_{E,E}$, is negative and that the effect of more effort on the disutility of effort is no effect or a negative change.

For S0, we differentiate equation 2 by S0 and E producing equations 5 and 5'.

5. $U_{S1}*f_{E,E}*d_E + U_{S1,S1}*r*d_{S0} + U_{E,E}*d_E = 0$

5'. $d_E/d_{S0} = [-U_{S1,S1}*r]/[U_{S1}*f_{E,E} + U_{E,E}] < 0$
                -(-)   (+)   (+)   (-)   (≤0)

The outcome of a negative expected sign corresponds to the assumptions that the effect of greater achievement on the marginal utility of achievement, $U_{S1,S1}$, is negative, the marginal utility of achievement, U_{S1}, is positive, the effect of more effort on the marginal product of effort, $f_{E,E}$, is negative and that the effect of more effort on the disutility of effort is no effect or a negative change.

APPENDIX B

Our model can be expressed:
Maximize E[U(S1, Effort)] subject to :
S1= (1-d)S0 + f(Effort, ACT, Z) + v,

where v is the stochastic element of the production function. In a production function regression, v would be the error term of the regression. The E operator and brackets symbolize the student maximizing the expected value of their utility. Substituting the S1 equation into the problem and setting v to zero in order to be maximizing expected utility the student maximizes:

U((1-d)S0 + f(Effort, ACT, Z) + 0, Effort)

The resulting effort level depends on S0, ACT, and Z, but is independent of v; the covariance of Effort and v is zero. In the two regression model shown below, Effort in equation one is independent of the disturbance of that regression, v.

S1 = (1-d)S0 + f(Effort, ACT, Z) + v
Effort = f(S0, ACT, Z)

The only reason for two stage least squares is that one cov(Effort, v) is nonzero causing stochastic regressor bias under OLS. Here, it is not that way and OLS estimation does not produce biased estimates.

THE TEST ASSESSMENT QUESTIONNAIRE: A TOOL FOR STUDENT SELF-ASSESSMENT AFTER THE MIDTERM EXAM

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ABSTRACT

This paper introduces instructors to a practical tool, the Test Assessment Questionnaire, which helps students critically evaluate their course progress after the midterm exam. This tool has two benefits: it guides students toward more self-awareness in their studies and it can be used as a part of assessment and assurance of learning efforts. Additionally, it requires minimal class time to implement and virtually no work burden on the part of the instructor. This tool has been piloted and refined in the principles of economics courses. It is recommended for exams with multiple choice questions, true/false questions, and mathematical problems.

INTRODUCTION

When exams are used to assess student learning, the implicit assumption is that the students have submitted work that reflects their understanding of the material after their genuine attempt to learn it. Some students do diligently prepare for exams; some do not. Additionally, some students *believe* that they have earnestly prepared for an exam, when in reality their efforts are not adequate for the grade they are targeting (e.g. students who might say "I thought I got an A" because "I studied really hard" and yet earn a lower grade).

Several studies have investigated student overconfidence. Walstad (2001) calls for further investigation of the psychology of students, suggesting concepts from behavioral economics (e.g. overconfidence) could be used to explain student behavior. Falchikov and Boud (1989) find that students have grade expectations that are higher than the typical distribution for the course. Additionally, students in the principles courses are found to be overconfident in their understanding of material, as measured by their predictions of exam scores (Grimes 2002). Nowell and Alston (2007) find that instructor grading practices can influence the degree of overconfidence.

When faced with a student who is upset at receiving a lower than expected exam grade, instructors may respond by telling students to study more. For the students who only study for two hours the night before the exam and earn a D grade, this strategy surely has merit. However, for other students, simply studying more may or may not result in a higher grade. The lack of

effect of study time on achievement is documented by Becker (1982). This can be frustrating to the students who feel they already are "studying hard".

Such students may start to blame the instructor for the disconnect between effort and desired grade. Students may label the instructor as "unfair" or the course simply "too hard". Grimes, Millea, and Woodruff (2004) find that the degree to which students accept personal responsibility for performance affects their evaluation of teaching effectiveness and course satisfaction. In course evaluations, students reward professors who increase achievement in the contemporaneous course, not those who facilitated deep learning for subsequent courses (Carrell and West 2010). Millea and Grimes (2002) conclude that instructors need not "water-down" courses in order to receive favorable course evaluations. Instead, they can positively influence evaluations by addressing negative student attitudes about forthcoming coursework.

Informed by these studies, we introduce a practical tool, the Test Assessment Questionnaire (TAQ), which helps students critically evaluate their course progress after the midterm exam. This tool has two main benefits: 1) it guides students toward more self-awareness in their studies 2) it can be used as a part of assessment and assurance of learning efforts. Additionally, it requires minimal class time to implement and virtually no work burden on the part of the instructor. This tool has been piloted and refined in the principles of economics courses. It is recommended for exams with multiple choice questions, true/false questions, and mathematical problems. We have not experimented with using it for essay exams. It may be possible for an instructor to develop their own version compatible with essay questions.

TAQ DESCRIPTION AND RATIONALE

The Test Assessment Questionnaire guides students through an analysis of their midterm exam mistakes (see Appendix A for a copy). Students are asked about their exam preparation activities as well as studying activities for the course in general. Additionally, students are guided to formulate a study strategy for the remainder of the course.

Logistics

In the class period when the midterm exam is returned, students are also given the correct answers and a copy of the TAQ. The instructor does not devote time to going over the exam. Instead, students are tasked with completing the TAQ as homework; it should take about 5 minutes to explain the assignment and answer student questions regarding the questionnaire. The TAQ is due either in the next class period or one week later (Note: It is important to incentivize the completion of this assignment. For example, it could be worth a bonus point applied to the exam grade or points toward a homework grade). In that class period, the instructor devotes 10 to 15 minutes to debrief the class on the exercise, to answer any remaining questions on the content, and to discuss study strategies (see Appendix B for a study strategies handout). The instructor

collects the TAQs for review outside of class. Depending on the size of the class, it takes about 10 to 15 minutes to briefly skim through the students' answers and record that the student completed the assignment. TAQs are returned to students in a later class period. Some students will subsequently decide to attend office hours to discuss their course progress and get some additional feedback on their study strategies.

TAQ Content and Rationale

The TAQ starts with a series of multiple choice questions regarding course preparation activities. For example, *"How often did you miss our class? a. never   b. 1 - 2 times   c. more than 2 times"* and *"For how many chapters did you complete the Reading Outline? a. all   b. most of them   c. a few of them   d. none"*. Such questions guide the student toward a comprehensive look at whether or not their personal study habits during the course are facilitating their learning. These questions can be tailored to suit the individual instructor's course activities.

The TAQ progresses to ask open-ended questions about exam preparation activities and a comparison of homework scores to the exam score. The answers provide insight into whether or not students are adequately preparing for the exam. In our experience, students do not seem shy in reporting the reasons for their lack of performance on exams; it is not uncommon for several of the students with failing midterm grades to candidly explain the various reasons they did not study much (e.g. studying for a different exam or had to work). Other students will report that they "studied really hard the night before the exam". More successful students will report ramping up their study time for the 2 weeks before the exam. The purpose of the homework-score-versus-exam-score query is to lead students to find a link (or lack thereof) between the two types of assessment. For example, some students see that their scores are clearly linked. If they want to improve their exam scores then it is a wise first step to try to improve on their homework scores. Where there is a wide difference between homework and exam scores (often homework being the higher score), students routinely offer that they rely heavily on their notes when doing homework or work with a study group.

The next portion of the TAQ charges students with reviewing each missed exam question and determining why they think they answered it incorrectly. Whether their perceptions of why they missed a particular question are accurate is a question left for future research. To facilitate this analysis, eight categories of common types of mistakes are listed, along with an "other" option. Students can choose from the following reasons: 1) didn't know a definition 2) couldn't apply a definition I knew 3) didn't read the question/answers carefully 4) knew the answer but couldn't come up with it during the exam 5) didn't know how to set the problem up 6) used the wrong formula 7) debated between two answers and choose the wrong one 8) just didn't know the material 9) other. Once mistakes have been categorized, students are asked to comment on any trend they observe. In our experience, a clear pattern often emerges.

The purpose of analyzing midterm exam mistakes is to lead the student to look at their performance in a critical way. Routinely students approach instructors after a poorer-than-expected performance on an exam, expressing that they do not know what they did wrong. In our personal experience, such students had rarely (if ever) critically reviewed their mistakes. Instead of being fixated on the *number* of mistakes, the TAQ directs students to focus on the *type* of mistake they are making.

This change in focus can be a powerful tool for motivating students to improve their learning. It charts a much clearer path for the student's future study activities. Some students observe that they mostly miss the graphing problems; they immediately see that they need to spend more time with that part of the material. Other students realize they miss questions from lectures on the days when they did not attend class (and while this may seem straightforward to instructors, it is often a profound realization for students).

In addition to student self-awareness, when an instructor knows what type of questions a particular student is missing, advice can be tailored to the student's needs. For students who consistently miss definitional questions, making flash cards may be a suggestion. Students who find that they are debating between two answers and choose the incorrect one understand most of the material but there is a nuance or detail they have not picked up on. When this is explained, they seem to feel much better about the situation, knowing that they "almost have it" now and with a little more attention to detail they will be able to choose the correct answer.

There are at least two types of students for which the economic content may not be the culprit behind their lack of performance: students with inadequate math skills and students with test anxiety. Some students report that they always do poorly when math is involved. No doubt many readers have encountered similar students. This problem often persists despite a math prerequisite for the course. In addition, several students self-identify on the test assessment that they have test anxiety in general. The TAQ does not ask specifically if the students suffer from text anxiety, to do so would be a violation of institutional policy regarding students with disabilities. However, many students volunteer in the "other" category that the reason they did poorly was because of test anxiety or that they are "bad test takers". Both issues warrant further investigation but are larger and deeper than the scope of this paper.

The final question asks students what grade they hope to earn in the course and to identify a new study strategy for reaching that goal. Many students report that they will no longer wait until the last minute to do their homework so that they can attend office hours and ask questions. Other common strategies include doing the reading in advance, reviewing class notes more often for short periods of time, and studying more than solely right before an exam.

DISCUSSION AND CONCLUSION

Our goal is to provide a tool that instructors can immediately use in their classrooms. The only preparation needed is to edit the TAQ to suit the instructor's course activities and to make

photocopies. About 5 minutes of class time are needed to explain the TAQ assignment and 10 to 15 minutes of class time are needed for debriefing. Another 10 to 15 minutes outside of class are needed to review the completed TAQs. This brings the total time cost to less than an hour of the instructor's time.

In its current form, the TAQ is best suited for use by instructors who have taught the same course a few times and who solicit formative feedback from students a few times before the midterm. If an instructor is new to a course or has not asked students for informal course feedback prior to the midterm, then it is recommended that some questions be added to the TAQ to address instructor *mea culpa*.

Additionally, the TAQ can be used in departmental assessment activities. Many instructors are finding that because of the current emphasis on assessment and assurance of learning in higher education, new demands are being placed on their time. Data on why students are missing particular questions can inform curriculum and teaching discussions. Having study habit and exam preparation information on students who score Ds or Fs can shed light on whether students are "not meeting expectations" because they aren't studying or for other reasons.

Perhaps most importantly, students are given a tool that concretely guides them into self-awareness with respect to their studies and students seem to feel positively about the experience. In anonymous end-of-course evaluations, students are asked to respond to the following open-ended statement: *"Please comment on the experience of completing the Test Assessment and/or meeting with me to discuss it."* While some students leave the statement blank, all students who chose to respond indicated that it was a beneficial or positive experience. Several indicated that the technique was helpful for their study habits in general, not solely the economics course.

The Test Assessment Questionnaire has the potential to be a powerful student aid which requires minimal additional instructor time expenditure and at the same time provides a complement to departmental assessment activities. It is also possible that it can help students improve their final exam scores over their midterm scores. The TAQ's impact on course learning outcomes warrants future inquiry.

ACKNOWLEDGEMENT

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APPENDIX A

You may download an electronic copy of the TAQ at *http://www.scribd.com/doc/34225467/.* Instructors may freely customize the TAQ for use in their classrooms.

Test Assessment Questionnaire

Name: _____ Exam Score Percentage: _____

1.   How often did you miss our class?
        a. never b. 1 – 2 times   c. more than 2 times

2.   For how many chapters did you complete the Reading Outline?
        a. all   b. most of them   c. a few of them   d. none

3.   When did you complete the Reading Outlines?
        a. before we covered the topic in class   b. after we covered the topic in class

4.   For how many chapters did you complete the online Homework?
        a. all   b. I missed 1 or 2   c. I missed 3 or more

5.   How often did you come to office hours or email the professor for clarification on the material?
        a. never b. 1 or 2 times   c. 3 or more times

6.   When did you start working through the exam information / review sheet?
        a. as soon as it was available   b. 2 weeks before the exam   c. 1 week before the exam
        d. the night before the exam   e. I didn't work through it.

7.   For how many chapters did you work some of the Optional Problem Set questions?
        a. all chapters and all problems   b. most chapters and problems
        c. a few chapters and problems   d. none

8.   How did you prepare for this exam?   How many hours did you spend preparing for the exam?

9.   How does your exam score compare with your homework average? Why do you think that is the case?

10.   Go through the questions you answered incorrectly on your exam. For each question, choose the reason
        you feel you got the answer wrong. Write the number of each question in the table next to the reason.

Reason	Question Numbers
Didn't know a definition	
Couldn't apply a definition I knew	**e.g. #3, #6**
Didn't read the question/answers carefully	
Knew the answer but couldn't come up with it during the exam	
Didn't know how to set the problem up	
Used the wrong formula	
Just didn't know the material	
Debated between two answers and chose the wrong one	
Other (please specify)	

11.   Do you notice any patterns with the type of question you missed? Explain.

12.   What letter grade do you hope to earn in this course?   To achieve your goal, what is your strategy
        for studying between now and the next exam?

APPENDIX B

Study Strategies for Common Exam Mistakes

*Didn't know a definition***:**

Try making flash cards after each class or after you finish reading the chapter. Keep your flash cards with you and review them whenever you have a couple of minutes to spare.

Couldn't Apply a Definition I knew:

 After you have the definitions memorized, check to see that you actually *understand* what it means. Try to think of examples that illustrate each definition and add them to your flash cards. If you can't come up with an example, then ask me.

Didn't read the question/answers carefully:
This is a common issue. With the pressure of an exam, nerves kick in and many students rush too quickly. One way to make sure you are not missing details in the question is to "mark up" the question as you read. Underline or circle key words, cross out words in answers that make them incorrect, etc..   Another way to stop yourself from rushing is to physically put down your pencil and take a breath. Try doing this every 3 or every 5 questions. Don't worry – no one will even notice that you are doing it. *Even a very brief pause can be beneficial*.

Knew the answer but couldn't come up with it during the exam:

Does this happen to you often? Test anxiety might be the culprit. You might want to check out some of the workshops on test taking strategies offered for free on campus.

Didn't know how to set the problem up:

Going forward, whenever we do a problem, try writing out the steps in words alongside the calculations. For example, on an algebra problem, you might write   1) set the two equations equal   2) solve for Q*   3) plug that value back into either equation to find P*.   If you are having trouble figuring out the general steps, ask me for help.

Used the wrong formula:

As you learn new formulas, copy them all into one sheet of paper. Next to each one, describe when you would use it and perhaps copy an example problem there for reference. Frequently review this formula notes sheet and have it handy when studying and working homework problems.

Debated between two answers and choose the wrong one:

This one is so frustrating! Many times, you are able to eliminate 2 answers and then are left deciding between the remaining 2. When you find yourself unable to choose, chances are that you know the material fairly well, perhaps at 80-85%, but there is some detail in that last 15-20% of knowledge that would tell you *definitively* what the correct answer is. If this is the case for you, then your current study strategies are serving you well, but you need to spend a little more time and effort on studying the details. Small, frequent study sessions will often help.

Just didn't know the material:

Maybe you missed class that day or maybe you didn't study. You usually know why you didn't know the material.

Other:

If you feel you are consistently missing questions for other reasons, you should stop by office hours so we can come up with a study strategy specifically for you. (Note: If you selected "other" because you feel the questions are "too wordy" or "tricky" then you are not alone. Across the nation, students tend to feel this way about economics multiple choice questions. Taking your time to read each question/answer carefully can often help.)

UNDERWATER MORTGAGES: WHY HOMEOWNERS MAY CONTINUE TO PAY THE DEBT

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ABSTRACT

The ongoing decline in housing values has left a segment of homeowners with mortgage balances that are larger than the property's market value and many of these underwater owners continue to make mortgage payments on-time and in-full. This situation is not compatible with theories or teachings in finance and makes it no economic sense for the homeowner to continue making payments on the debt.

This paper introduces some realistic interpretations that may help to explain why timely payments continue to be made by a subset of the estimated 12-14 million people with underwater mortgages. Initial secondary data and evidence is provided by the National Housing Survey conducted monthly and compiled quarterly by Fannie Mae. The focus is on the attitudes and beliefs of underwater mortgage holders and how they may value the real property rights that are a central part of homeownership. It is suggested that this subset of homeowners value these intangible rights to such an extent that they are willing to continue making payments. Further, these rights are valued because many basic conscious and subconscious needs are met through having access to, and ownership of, consistent reliable shelter. The paper lays the groundwork for primary data collection that may further address both the value of real property rights and motivation theory to obtain those rights.

INTRODUCTION

When a homeowner purchases their primary residence using debt, the result is typically two documents. The first is a loan or promissory note and the second is the mortgage or deed of trust (Galaty, Allaway, & Kyle, 2003). The promissory note is the borrower's personal promise to repay and contains the terms of repayment. The mortgage is a security instrument that gives the lender the right to sue for foreclosure if the terms of the note are violated. The mortgage creates a lien on the property. Most lending institutions prefer to loan 80 percent or less of the value of the real property when issuing a primary, or first-in-line, note. Lenders assume that a homeowner with 20 percent equity in the property is highly motivated to adhere to the terms of the note so that the security document never has to be executed. In attempting to increase homeownership in the U.S., government agencies and government-sponsored enterprises have created many programs designed to protect lenders if they underwrite a loan for more than 80

percent of the value of the property. At least one program allows loans of up to 96.5 percent of the property's value if the borrower qualifies (FHA, n.d.).

Large loan-to-value ratios to purchase real property allows very little cushion if the value of the collateral declines; a situation that has become all too familiar in the U.S. since 2007. When the value of the home used as collateral falls below the amount of the secured debt, the loan is said to be "underwater," and recently there were approximately 12 million such loans in the U.S. (Bernanke, 2012). In the absence of other considerations, it makes no economic or financial sense for the borrower to continue to make payments on the debt, however, it is estimated that fully 90 percent of underwater homeowners are current on their mortgage and continue to make payments (Zillow, 2012).

This paper argues that, when other considerations are taken into account, underwater homeowners have other-than-financial reasons to continue making payments. It begins with a discussion of the current state of underwater mortgages in the U.S. followed by a summary of the National Housing Survey for the first quarter 2012 with specific attention to attitudes of underwater homeowners. Then the theoretical underpinnings for motivation and need satisfaction first described by A.H. Maslow (1943) are outlined. It is suggested that need satisfaction consciously or subconsciously motivates underwater homeowners to continue making payments on the mortgage debt. Finally, it is argued that the owner of real property rights may place such a premium on the value of the rights that they are justified in making on-time and in-full payments on an underwater mortgage.

UNDERWATER MORTGAGES IN THE U.S.

According to Bernanke (2012), "It is estimated that indeed, about 12 million homeowners – more than 1 out of 5 with a mortgage – are underwater, meaning they owe more on their mortgages than their homes are worth." Approximately 31.4 percent of homeowners in the U.S. are currently underwater in their mortgage and the typical amount that the debt exceeds the property value is $75,644 (Zillow, 2012). It is estimated that the cumulative value of underwater debt is $1.2 trillion (Humphries, 2012). The cause of this nationwide negative equity phenomenon is well documented to be (1) underestimation of borrower credit risk when underwriting questionable exotic loans, (2) lending standards that allowed individuals to borrow excessively against the equity in their homes, and (3) a collapse in real estate prices during the recent financial crisis.

A myriad of assistance programs have been implemented by both the public and private sector to assist homeowners cope with the loss in property value. These programs have primarily focused on homeowners whose mortgage payments are delinquent and those who may be facing foreclosure (e.g. Johnson, 2011). Fewer methods of assistance are available to underwater homeowners whose mortgage is current. One solution for these homeowners is to purposefully stop making further payments, so that they would eventually qualify for assistance. Known as a

"strategic default," it is performed by persons who have the financial resources to continue making payments, but choose to stop (Strategic default, n.d.). However, 59 percent of all homeowners surveyed would not choose this option if they were underwater on their mortgage by 40 percent (Riefflin, 2012). Indeed, a housing research company survey recently found that 90 percent of underwater homeowners continue to make payments on their mortgage debt (Zillow, 2012).

RECENT SURVEY EVIDENCE FROM U.S. HOMEOWNERS

FannieMae conducts a telephone survey of the general population each month that compiles an array of attitudes and behaviors of both those that rent and those that own their residence. The data from three monthly reports is combined to provide a quarterly report. The most recent Quarterly National Housing Survey is the first quarter 2012, which indicated that 30 percent of respondents rent, 5 percent are boarders, and 65 percent own their primary residence. Of those that own, 41 percent own outright and 59 percent have a mortgage on the property. Twenty five percent of mortgaged property was reported to be underwater, while 59 percent are above water. The remaining 16 percent believe that the debt and the properties' value are even.

When asked how far they are underwater, 63 percent indicated that the home is worth at least 20 percent less than all debt secured by the property, with the other 37 percent estimating that the debt exceeds the property's value between 5-20 percent. It is interesting that 47 percent of underwater homeowners believe that the current value of the home is *greater* than the purchase price, and yet they find themselves underwater. This would indicate that the property was subsequently used to secure debt beyond the initial mortgage and, in aggregate, the total debt now outweighs current value of the home. If a home becomes worth less than what is owed, it is not acceptable to discontinue making payments according to 88 percent of both underwater and above water homeowners. The strategic default option is viewed negatively by both groups. An economist quoted in Riefflin (2012) states, "Of course, strategic default is not just a mathematical decision. The most common reason for avoiding strategic default cited by homeowners was that it is a moral issue."

Exhibit 1 contains the attitudinal questions of the National Housing Survey from the first quarter of 2012, along with the percentages of respondents that believe owning rather than renting their primary residence is the way to achieve the stated goal or objective. Of note is that these objectives are not outwardly financial or economic in nature.

Exhibit 1: Achieving Goals by Owning versus Renting: National Housing Survey results				
Percentage that selected owning as opposed to renting as the way to achieve stated objective				
	General Population N=3,048	Those with mortgages N=1,166	Above water N=654	Under Water N=280
Have control over what you do with your living space	93	98	98	97
Have a sense of privacy and security	90	96	96	94
Have a good place for your family or to raise children	88	90	90	91
Live in a place where you and your family feel safe	83	89	90	90
Feel engaged in your community	80	88	88	89
Live in a nicer home	82	86	88	82
Live in your preferred school district	69	77	78	75
Live in a convenient location	62	66	66	67
Have flexibility in future decisions	61	60	59	60
Have less stress	50	48	48	48
More likely to buy rather than rent at some point in the future	58	59	50	79

Regardless of mortgage status, control of the property, happiness and safety of the family, school district and location, and having flexibility in the future are all perceived to be better obtained by owning a primary residence rather than renting, but at a cost of perhaps increased stress.

Interestingly, homeowners with underwater mortgages are substantially more likely to purchase another home sometime in the future versus those with above water mortgages (79 percent versus 50 percent, respectively). The anomaly does not appear to be a result of the age of the mortgage or phase in life of the homeowner. As the data in Exhibit 2 indicates, 81 percent of the underwater homeowners purchased their home in 2001 or after, and nearly half (49 percent) received the original mortgage since 2007. Over 90 percent of mortgaged properties have had their last refinance in the years since 2002 and two-thirds (66 percent) have refinanced since 2007. There is no substantive difference between underwater and above water mortgage holders in the timing of refinancing.

Exhibit 2: Cumulative Percentages						
Year of initial mortgage and Year of last refinance						
	Year of original mortgage				Year of last refinance		
	Those with Mortgages	Above water	Under water		Those with Mortgages	Above water	Under water
2012	0	0	0		6	7	7
2011	11	10	9		24	25	19
2010	21	21	14		39	39	36
2009	33	34	25		52	53	49
2008	41	41	36		59	61	57

	Year of original mortgage				Year of last refinance		
	Those with Mortgages	Above water	Under water		Those with Mortgages	Above water	Under water
2007	47	45	48		66	67	66
2006	56	52	59		71	72	71
2005	62	59	66		78	78	82
2004	70	67	73		82	82	87
2003	74	71	77		86	87	89
2002	78	76	78		88	89	91
2001	81	80	81		89	90	91
2000	85	86	84		91	92	93

Exhibit 2: Cumulative Percentages
Year of initial mortgage and Year of last refinance

Many entities echo the attitudinal findings in the National Housing Survey when comparing homeownership with renting. Carr (2011) notes four important reasons to buy a home:

1) It means having a good place to raise children and provide them with a good education.
2) You have a physical structure where you and your family feel safe.
3) It allows you to have more space for your family.
4) It gives you control of what you do with your living space (renovations and updates).

Creating stability, fostering community, being proud to own property, and having the ability to change the property to suit the homeowner's needs are four reasons to purchase rather than rent a primary residence according to Pinnacle Capital Mortgage Corp. (2012). It is also implied that buying real estate for other than investment purposes is often more of an emotional commitment than a financial decision.

Homeownership continues to be marketed as a positive experience by both public and private entities to such an extent that it is "bound up with our personal psychologies," and over 90 percent of people in the U.S. hope to own a home sometime during their lives (Pinnacle Capital Mortgage Corp., 2012). Further, most Americans were born and raised in a homeownership environment and have experienced the positive benefits long before understanding any of the financial implications. Given this experience and promotion, once a home is purchased there may be conscious or subconscious reasons why a property owner is highly motivated to keep and protect their home even at a substantial personal cost.

MOTIVATION TO OBTAIN OWNERSHIP OF A SECURE SHELTER

A well-known theory of human motivation was proposed A.H. Maslow in 1943. The theory assumes that human needs lead to motivation which may result in behavior to satisfy the unfulfilled needs. He proposes that human needs are arranged in a purposeful order ranging from basic physiological needs up to self-actualization needs or "being everything that one is capable of becoming." Once a need arises, it may eventually become so intense that it demands satisfaction (motivated behavior) in order to lessen the intensity or to eliminate it completely. Once a need is satisfied, the person is free to address additional higher-level needs as they arise. Exhibit 3 outlines Maslow's need hierarchy.

Exhibit 3: A. H. Maslow's Need Hierarchy	
NEED LEVEL	**EXAMPLE / MOTIVATOR**
Physiological	Breathing (Air), Food, Water, Sex, Sleep, Homeostasis (Warmth), Shelter, Excretion
Safety and Security	OF: Resources, Property, Employment, Family, Health, Physical well-being
Social / Belonging	Friendship, Group involvement, Family, Intimacy
Esteem	Self-esteem, Recognition, Attention, Status, Confidence, Achievement, Self-respect, Respect by others
Self-actualization	Morality, Justice, Creativity, Spontaneity, Problem solving, Lack of Prejudice, Wisdom, Acceptance of Facts

The fundamental primitive level of humans' physiological needs are essentially those that maintain life. For the purposes of this paper, the focus is the need for shelter and how satisfaction of this need leads one to higher level needs tied to that shelter once it is obtained. Virtually all humans need protection from the elements that shelter provides. Renting or owning that shelter satisfies this need and the safety and security needs can then be pursued.

Shelter can serve to protect our physical well-being, health, family, and other property, satisfying to various degrees, safety and security needs. Both renters and owners can keep themselves safe, warm, and healthy and the National Housing Survey indicates that "having a sense of privacy and security" is the second most important goal or objective. However, a person that rents shelter only has the ability to store or house other property, their family, and perhaps some resources. An owner of shelter accomplishes these needs and more. They provide future shelter and security for their family, and a home may be viewed as a financial resource providing some financial security. Owners control the shelter and have ability to alter and affix other property. If the family becomes larger (or smaller) owners can continue to add value and usefulness through expansions, renovations, or demolitions. In sum and in comparison to transient renters, ownership can meet not only basic safety and security needs, but the stability and confidence to suspect these needs will be satisfied in the future.

> "As a tenant on someone else's property, you cannot control the timing or frequency of major disruptions, such as landlord changes, rent increases, and

property renovations. You could even pay your monthly rent diligently, only to find out that your rental property is facing foreclosure. The possibility of being forced to move may always linger in the back of your mind, and renters do move more often than owners – five times as often, according to one study by the National Association of Realtors." Pinnacle Capital Mortgage Corp. (2012)

The third level of needs is social in nature as humans are social animals and have a need to feel part of a group and have friends and family. At a basic level, both owners and renters may feel a part of a neighborhood even if there is little interaction between neighbors. One becomes accustomed to and familiar with local surroundings and nearby conveniences. In addition, people may meet these needs through their place of work, place of worship, or by volunteering. An attachment develops between the individual and the local community because of where they locate and live. Indeed, "feeling engaged in the community" and "have a good place for your family" both rank highly in the National Housing Survey.

A difference in the satisfaction of social needs between owners and renters may exist because ownership means permanence. An owner can be confident that these needs will continue to be satisfied for as long as they desire to maintain contact or participation in a particular social group. In short, it is an owner that can decide to dispose of the property and move, who is to be excluded from the property and how to change the property to satisfy social needs.

While renters share many of the same legal rights to a shelter and may intend to remain indefinitely, ultimately it is the owner of the rental property that decides how long they may stay. Further, they may not have the right to alter or change the property to enhance need satisfaction. If a renter moves (for whatever reason), the lower level needs are likely to arise and take precedence once again and these social needs will be suppressed or ignored for a time. So renters' ability to maintain future social need satisfaction is uncertain.

As lower-level needs are satisfied or become less intense, esteem needs will emerge and take precedence. These include self-esteem and self-respect, garnering attention, confidence, achievement and accomplishment, and gaining social status. Purchasing one's primary residence and qualifying for a mortgage can lead to a certain sense of achievement and accomplishment as well as self-respect and confidence. Where one chooses to live may indicate the need for social status and attention which can be achieved either by owning or renting.

The highest level of Maslow's need hierarchy are self-actualization needs which includes morality, problem solving, justice, acceptance of facts, and wisdom. With regard to underwater homeowners, continuing to make mortgage payments satisfies a moral need while abiding to a contract (the mortgage note) may be interpreted as keeping with justice. Non-delinquent underwater homeowners that resign themselves to continued payments is consistent with acceptance of facts and should they search for solutions to their dilemma it would involve problem solving.

Given that the need for shelter and all it can provide related to motivation theory, ownership preferable to renting. In the Unites States, ownership of real property has its base in English common law, which dictates the legal implications of ownership. Renting a shelter does not provide the same legal rights as ownership and may differ from state to state based on landlord-tenant laws. Ownership of real property is more universal in regard to legal rights and also implies a more complete set of these rights.

REAL PROPERTY RIGHTS ROLE IN THE PROBLEM

In the U.S., ownership of real property includes both ownership of the land and physical structures on the land and certain intangible rights afforded by law. Most would agree that land and naturally occurring attachments as well as any man made improvements to or on the land have some value and would be included in the purchase price of real property. The intangible assets are less apparent and value may depend on the purchaser's circumstances and motivations. For the purpose of this paper, the circumstances and motivations of a potential owner is to satisfy some needs that may be conscious or subconscious. Ownership of these rights is an attempt to secure permanence of need satisfaction so that higher-level needs may be pursued.

The intangible rights most often associated with real property according to Galaty, Allaway, & Kyle, 2003 are the right to:

Possession: the property is owned by whomever holds title.
Control: within the laws, the owner controls the use of the property.
Enjoyment: the owner can enjoy the use of the property in any legal manner.
Exclusion: others can be excluded from using or entering the property,
Disposition: the title holder can sell, rent or transfer ownership or use of the property at will.

It is beyond the scope of this paper to address various forms of possessory interests or estates in which these rights may be held. It is assumed that the rights are held as a fee simple absolute estate meaning that the owner possesses all of the rights: the most complete form of ownership. Exhibit 4 provides some examples of the differences between owners and renters as holders of intangible legal rights.

The Constitution of the United States allows people to own, outright, both personal and real property. Ownership of real property is accomplished by obtaining title to the land and all improvements on the land. Further, the tangible assets of the subsurface and, theoretically, the airspace above the land are included in ownership. The title contains is a very detailed description of the location of the owned parcel and is recorded in local government records. The recording of real property transfers dates to 1677 when the English Parliament passed the Statute for the Prevention of Frauds and Perjuries (Ling & Archer, 2008).

Ownership of real property and particularly shelter cannot be accomplished by renting, as a renter does not obtain a title to the residence that they occupy. Ownership is held by another person or entity which entitles that person or entity to the other intangible legal rights.

Control of the real property describes the ability to change the property to suit the owner. One may add to or remove from the property without prior approval of another person or entity. A renter's ability to change the real property that they occupy is highly likely to be restricted by the owner. For example, a renter may not have the ability to remove trees or landscaping or install new lighting, while an owner would have total control over those activities. Further, the right of control allows the owner to encumber (borrow against) the property. Obviously, a renter would not be allowed to borrow against their place or space of residence. The National Housing Survey confirms that this right to control the property is of primary importance to homeowners.

The right of enjoyment allows one to profit from the use of the property and to use the property in any legal manner so long as the use does not unduly interfere with the rights of others. This right is most likely to be very similar for both owners and renters. It is essentially this right that renters are providing compensation (rental payments) to the owners to obtain.

The right of excluding others from entering and using the property will also be similar for owners and renters. However, it is likely that an owner of rental property will desire to protect the property and retain the ability to enter in order to perform inspections, maintenance, and repair. So a renter may be unable to exclude the owner or an agent of the owner.

The right of disposal is the ability to transfer title to some or all of the property. This can be accomplished by selling, donating (give away), or passing the property to an heir or heirs upon death of the owner. Since a renter cannot possess title to the real property, they also cannot dispose of the property.

Exhibit 4: Examples of Intangible Rights; Owner versus Renter		
Right	**Owner**	**Renter**
Possession	Holds title to the property.	Cannot hold title.
Control	Remove trees. Install ceiling fans. Change lock on the door.	Limited, if any, control over changes to the property.
Enjoyment	Essentially same as Renter. Have pets. Unlimited persons per room. Celebrate anytime.	Essentially same as owner, likely many lease provisions. Pets possible, likely extra cost. Possible limits on persons per apartment. Celebration times may be limited.
Exclusion	Can exclude anyone from the property.	Likely owner and/or owner's agent cannot be excluded.
Disposal	Sell, Donate, Will or give away	No right of disposal

When a renter occupies a property, the compensation paid to the owner is to secure some of the property rights from the owner. Typically, this includes the right to occupy, to enjoy, and

at least some level of control and exclusion. To a certain extent, the rental payments represent the value to the individual of securing limited legal rights to shelter.

Rental payments received by an owner may be viewed as a measure of the value of temporarily providing a subset of legal rights to a renter. This implies that the owner can place a value on the legal rights that are not transferred. Ergo, a value can be attached to the complete set of legal rights separate from the value of the tangible assets of the land, subsurface, air and any improvements. It is the possession of the complete set of legal rights and tangible assets that makes ownership of a shelter preferable to renting.

Arguably, it is not just shelter that is sought, but permanent shelter and the method used to obtain permanent shelter in our system is to own the complete set of real property rights to that shelter. By doing so, a person obtains much more than just land and a home. The home provides safety and security and aids in the satisfaction of social and higher level needs as described by Maslow (1943).

Once a person becomes a homeowner, there may be strong non-financial motivations to keep the home and all the property rights, even at significant cost and when there is no economic reason to do so. Such is the case with underwater homeowners. Although the land and structure of real property may have declined in value, there exists no evidence that the value of legal property rights has similarly declined. The debt that is secured by the tangible assets of the property is also a means to secure the legal rights to the property. With no knowledge of the value a homeowner places on the set of legal rights and solely focusing on the value of the tangible structure, one is left with an incomplete assessment of the total value of ownership relative to the level of debt used to obtain ownership.

VALUE OF PROPERTY RIGHTS USING AVERAGE UNDERWATER MORTGAGE

Thus far, it has been argued that there exist non-financial reasons that justify why nearly 90 percent of underwater homeowners continue to make payments on their mortgage. They do so to maintain the legal rights that are an integral part of real estate ownership. They were motivated to obtain those rights by physiological and psychological needs which shelter can provide, and ownership provides a sense of permanence of satisfying these needs. The following is perhaps one method to estimate the value that underwater homeowners place on the legal rights of ownership.

In the U.S. the average amount that the mortgage debt exceeds the value of the property is $75,644 (Zillow, 2012). It can be shown that the average current market value of an underwater home in the U.S. is $169,986 and the average debt secured by these properties is $245,630. Assuming the value of the property does not change from current levels over the remaining life of the mortgages, the difference of $75,644 represents the value of the intangible real property rights to the average underwater homeowner. It is the amount of "goodwill" that the homeowner will pay over and above the value of the tangible asset.

Eighty-seven percent of underwater mortgages were refinanced during or after 2004 and have an age of 8 years or less (FannieMae, 2012b). It is assumed that the refinanced mortgages are fully amortizing, fixed interest rate, 30-year loans with monthly payments, and that the average loan has been outstanding four years. With these assumptions, the monthly dollar cost of financing the $75,644 value placed on real property rights over the remaining life of the debt can be computed. Exhibit 5 contains the monthly payment required at varying interest rates of the refinanced mortgage.

Exhibit 5 Underwater Mortgage Payment Schedule				
Assumptions	Amount underwater: $75,644 Remaining term = 26 years or 312 months Original loan = fully amortizing 30-year fixed rate Marginal income tax rate = 25 percent			
Current Interest Rate	**Monthly Payment**	**Approximate After-tax Payment first 5 years**	**Total amount of Amortization over 5 years**	**Remaining Underwater Balance**
4.0 %	$ 390.36	$ 330.95	$ 7,182	$ 68,462
4.5 %	$ 411.73	$ 344.63	$ 6,722	$ 68,922
5.0 %	$ 433.70	$ 358.86	$ 6,283	$ 69,361
5.5 %	$ 456.24	$ 373.62	$ 5,866	$ 69,778
6.0 %	$ 479.34	$ 388.90	$ 5,470	$ 70,174
6.5 %	$ 502.97	$ 404.68	$ 5,095	$ 70,549
7.0 %	$ 527.12	$ 420.95	$ 4,740	$ 70,904

If it is assumed that the average underwater homeowner itemizes expenses for federal income tax purposes, a tax deduction for annual mortgage interest paid on their primary residence is appropriate. Exhibit 5 contains an approximation of an after-tax monthly mortgage payment during the next five years assuming a marginal tax rate of 25 percent. If the underwater amount of $75,644 is amortized over the next 26 years at an interest rate of 5 percent, it will cost the homeowner approximately $358.86 per month or approximately $4,300 per year. This amount is an estimate of the value to the average underwater homeowner of maintaining the real property rights to their home.

SUMMARY

The recent financial crisis and downturn in the housing market has left many homeowners with debt secured by the home larger than the current value of the property. Some face financial hardships and default on the debt because they are unable to maintain the payments. Others with the financial wherewithal continue to make debt payments and keep the mortgage current, even though if they were forced to sell, they would face an average loss of over $75,000.

It is argued in this paper that underwater homeowners are motivated to continue to service their debts in order to keep and maintain the shelter that satisfies a variety of basic human needs and desires. Some of these needs and desires can be accomplished by renting shelter but ownership provides a wider range of need satisfaction and also allows for future stability in this regard. So it is permanent shelter that is preferable which implies the legal right to that shelter.

Ownership of real property encompasses the purchase of both tangible and intangible assets. The tangible assets such as a home and land are relatively easily valued because markets exist where ownership is exchanged. It is the tangible assets that are basis for secured debts that allow individuals to purchase the property. The intangible assets encompass the set of legal rights that transfer with ownership. There is no separate market for these rights and the value attached to them will vary by individual. It has been argued that underwater homeowners value these legal rights of ownership to such a degree that, in combination with the tangible land and improvements, they are justified in continuing to make payments on the mortgage debt.

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THE EFFECT ON STUDENT PERFORMANCE OF WEB-BASED LEARNING AND HOMEWORK IN MICROECONOMICS

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ABSTRACT

For most students, economic logic is a new and challenging way of looking at social and commercial activity which is difficult for many to grasp. University principles texts today typically rely on simplified abstract models and problems to develop skills in concepts and principles. They then make use of numerous examples of these principles in action in the form of journalistic reports, historical examples, or simple case studies to improve students' critical thinking skills in applying these new concepts and ways of thinking in a more realistic setting of actual events. The opportunity to provide many more learning options, mandatory homework, instant feedback, easier assessment and incentives for completion using a technology with which many more students are familiar and comfortable seemed very appropriate to enhance the teaching of economics.

A survey of literature on the use of mandatory homework and web-based (online) learning systems has shown a mix of outcomes in a variety of subjects. Most of these studies have set up control groups and tested homework assignments that were mandatory or optional, traditional paper or online, etc. We recognized the potential value of web-based learning systems and adopted one for our microeconomics courses. Our analysis is designed to test the effect of the mandatory use of a web-based learning system on quiz and exam scores in microeconomic principles courses. This analysis is not against a control group but an endogenous test of the effect on exam and quiz scores of using the various tools available within the system on an individual student basis.

INTRODUCTION

For many students, economics is a rather unique and unusual way of looking at the world and human behavior. Economic logic is a type of critical thinking itself about social activities and commercial issues. Grasping the key principles and effectively applying them to understanding individual and firm behavior is very challenging and considered difficult. Although economics is a social science, it is more often compared with mathematics and physics with regard to degree of difficulty. Many students therefore enter an economics course with a predisposition about its difficulty which must be overcome as well.

University principles texts today typically rely on simplified abstract models and problems to develop skills in concepts and principles. They then make use of numerous examples of these principles in action in the form of journalistic reports, historical examples, or simple case studies to improve students' critical thinking skills in applying these new concepts and ways of thinking in a more realistic setting of actual events. The opportunity to provide many more learning options, mandatory homework, instant feedback, easier assessment and incentives for completion using a technology with which many more students are familiar and comfortable seemed very appropriate to enhance the teaching of economics.

For many years, the authors had been teaching economics using the traditional "chalk-and-talk" lecture format and showing sample problems in class to improve students' understanding of concepts and ability to solve homework and test problems. We used varying degrees of homework assignments, in-class quizzes, and exams to measure student performance, provide feedback, and encourage staying current with the material we were covering. Exams were often adjusted for degree of difficulty from previous experience to get average scores that students were comfortable with in order to minimize the risk of adverse effects on student evaluations of teaching performance.

These circumstances lead us to recognize the potential value of web-based assignments to expand learning opportunities and provide more consistent and immediate feedback. Previously we were only able to post solutions to homework problems, without sufficient classroom time to review the details. It was very time-consuming to grade homework with sufficient individual feedback to help students improve their weaknesses. Web-based homework programs allowed for potential solutions to both these teaching problems. These online programs also offered additional resources such as study guides and practice tests.

OVERVIEW OF RELATED RESEARCH

A review of research on the performance of students using varying forms of homework and assignments suggested a very mixed bag of results. Many of the studies on web-based homework have been in math and science courses, but a few have analyzed economics courses. One study conducted in a calculus class on the use of mandatory homework showed no significant improvement from a class in which problems were assigned but were not collected and graded. Yet most studies suggest or assume that homework that provides feedback and creates motivation for students should be effective. Gutarts and Bains (2010) point out that a drawback of mandatory homework is that it becomes the only effort used to study. If so, then students are giving up on other means of improving their understanding just to meet the homework requirement. Our attempt to investigate the effects of an online homework system takes advantage of immediate feedback and the motivation of knowing the homework counts significantly toward their course grade.

Another study reports that homework incentives do improve performance. This study was conducted in a required major course in organizational psychology in which instructors graded oral presentations without knowledge of whether homework was required or not. The results suggested that there was a significant difference in performance in the group that had specific incentives to complete the assignments. (Radhakrishnan, 2009) The authors attributed the improvement to students being more attentive to homework because of the incentives. They also reported that the loss of marks on assignments was more of a motivator than gains from bonus. Incidentally, we have not seen this type of response with our students but we have not attempted to measure it explicitly.

There have been many recent studies on web-based homework again with mixed conclusions. For example, a study of first year math students controlled between a web-based homework and traditional paper homework. They measured no significant difference on exam scores although the students using web-based homework were somewhat more likely to attempt the assignments which improved their course score. (Lenz, 2010)

Exam scores in a college algebra course were reportedly improved for students using online homework compared to traditional paper homework. The authors used a Pearson/Addison-Wesley product called *CourseCompass,* which employed extensive hints, allowed multiple attempts, and provide instant feedback much like the homework system used in this study. (Burch, 2010) However, the students' scores on the paper homework assignments were actually a better predictor of exam performance. Burch and Kou also noted better student retention rates for online assignments as compared to paper.

Another interesting study examined the use of web-based homework compared to an ungraded paper homework control group. Their results indicated that the students using web-based homework did at least as well as the control group and better on the "less-complex, skill-based calculations". (LaRose, 2010) These results are unclear though because the skills test was administered online so the control group may have been at a disadvantage with regard to using the system. Nevertheless, students were more aware of the amount of homework they were attempting when it was graded and counted as opposed to ungraded. Interestingly the amount of homework completed in this study correlated with overall GPA which complicates the real effect of the online system on course performance.

One key element we wish to exploit is "more time" as a measure of level of effort on the homework assignments. Finally, online homework has the benefit of allowing more class time allocated to new material rather than just reviewing old homework. Given the amount of material that is traditionally expected to be covered in a university economic principles course, the class time issue has always been a limiting factor.

Students now are generally more comfortable with using new technologies, so implementing them for class assignments and performance evaluation is a logical progression. Student satisfaction with these new web-enhanced technologies is another element researchers are interested in evaluating because of its expected impact on success. Hermans, Haytko, and

Mott-Stenerson examined three particular issues with regard to this issue. They looked at the effect of student satisfaction with their instructor, the ease of system use, and satisfaction with the course itself. All three of the variables correlated significantly but they noted that ease of use does not necessarily mean that students fully accept the technology. (Hermans, 2009)

One critical issue from this study with regard to our system is that no social interaction is allowed. Students highly value interaction, so just access to doing homework online may not help them accept the technology. Discussion boards, real-time interaction, and other forms of student connections may be more appealing to students. The Hermans, et al study was focused on developing distance learning courses; however the traditional university classroom setting using online supplements must still maintain close interaction with students to enhance satisfaction.

Another study by Demirci is of importance with regard to evaluating online homework performance. Demirci investigated student performance and perceptions using a control group for a web-based physics course. His results indicate that there is no significant difference in performance on concept tests. The first semester students actually showed a significant improvement for the control group using tradition paper homework. However, students' perceptions of the online homework were favorable. (Demirci, 2010)

A few other variables or issues are reported in some other studies. Mandatory attendance reduced absenteeism and improved exam scores in economics courses. (Marburger, 2006) The magnitude of this improvement was only about two percent compared to a no attendance policy control group. Student behavior was examined in economics courses and found to be significant. (McClure, 2003) Indicators of student disinterest during an instructor's lecture were correlated with poorer performance. However, the author noted that measures of boorish or rude behavior were not correlated with performance.

Finally, a variety of characteristics of web-based learning systems for accounting courses were evaluated by Pergola and Walters, 2011. They did not attempt to describe the significance of each feature of the system but they are pointing the relative desirability to aid the instructor in choosing a system for their course. This study leads to the conclusion that many other characteristics of online courses, web-based systems, and homework programs can impact student success and satisfaction and have not yet been carefully examined. Our effort is to contribute something to this diverse and difficult topic regarding teaching and helping our students.

METHOD AND DATA

Most of the studies referenced in this paper have used traditional control groups as a means of testing the significance of various factors as explained earlier. Since there were mixed results from the literature on whether mandatory or online homework contributed to conceptual learning and we had already decided to add an online homework system to our principles

courses, we wanted to address another question. If we use an endogenous control for other factors related to student performance within the courses we had established, could we detect an improvement in exam scores based on the use of the online homework? Our exams are currently the standardized measure of conceptual knowledge for our courses. If we could detect an improvement, then a future study using a traditional control group may further confirm our results.

Our data was collected over a five semester period from students enrolled in 20 sections of Principles of Microeconomics and includes 924 observations. The population of these principles sections is approximately 90% business students. They are generally traditional students classified as sophomores, although a few juniors and freshmen are not unusual. The variables collected for each student in our data set include exam scores, online quiz scores, online homework scores as well as time spent online with the publisher's software. All of these quizzes and homework assignments are mandatory in that they are included in overall course grade. We also have data on time spent on the individualized study plans and practice tests which are optional assignments. Time spent on assignments is interpreted as a proxy variable for student effort or engagement on the assignments both individually and cumulatively. For each student enrolled in these sections we have also collected their overall GPA for all college work and ACT score which is used to control for academic abilities. We also compiled their grade in their college algebra course which is used specifically to control for mathematical aptitudes. A table of summary statistics is included in the appendix.

For each chapter that is covered, students are expected to complete one homework set defining new terms and general concepts and another homework set that focuses more on problem solving, graphing, and calculations. After completing these two assignments they can then open and work the chapter quiz. Each of these assignments is a 10-point assignment included in the final course grade. The homework assignments can be worked as many times as the student wishes with hints and links to the text for help. Only their best attempt is counted. This policy is designed to provide a compelling incentive for completing the homework assignments for the points even if they are still having trouble with the material and subsequent exams. This incentive is consistent with that documented in Radhakrishnan, et.al. (2009). Students must receive a score of at least 70% on the homework assignment before they are allowed to open the quiz assignment for that chapter. The quiz assignment has a limited time period within which to complete and may only be attempted once.

Our initial instinct is that the use or appropriate use of online assignments and supplements will result in improved exams scores and course performance. We have formed several basic hypotheses from working with this system of assignments. First, with regard to homework assignments, since each can be attempted multiple times, the final scores would not likely reflect the student's true comprehension of the material. However, time spent on these assignments would likely represent a level of effort or commitment in order to comprehend the material before moving on to the quizzes. Level of effort was considered a significant factor in

the reviewed literature. (Gutarts and Bain, 2010; Burch, 2010) Second, because quizzes could only be attempted once, we expected that the quiz scores should correspond closely with overall comprehension of the material and therefore with exam scores. Finally, we presumed that student performance based on exam scores would be linked to their overall intellectual ability. We wanted to be able to control for this ability in order to test for improvements in performance linked to doing assignments beyond their general intellectual ability.

The two measures that were available as indicators of intellectual or scholastic ability were ACT scores and cumulative GPA. These variables are correlated. However they do measure somewhat different types of ability. Overall ACT scores are generally the result of accumulated ability to work standardized problems quickly and accurately whereas cumulative GPA measures success in individual courses which is more likely a combination of ability and effort. Many less intellectually gifted students overcome their impediments by hard work and extra effort which could also be captured in the GPA. We had no reason to presume that one variable was theoretically better for this application than the other and allowed our data to indicate which had more statistical power.

RESULTS

A full description of the variables which are referred to in this section is provided in the appendix as an Index of Variable Names. The variable names referred to specifically in the tables of the regressions of this section are added in brackets to aid the reader.

Our first model confirms the hypothesis that cumulative GPA [gpa] and quiz scores [qavg] are significantly correlated with exam scores [exam] as shown in Table 1. As a matter fact, both the average score on quizzes as well as the amount of time spent completing quizzes were both statistically significant in predicting exam scores (results not shown), again indicating that students' ability and effort are contributing to more success on the quizzes and then on exams. This result is not surprising as we described above.

However, our interest lies more in how the homework assignments and other tools available were promoting student performance. To address this issue we ran two additional models which are shown in Table 2 and Table 3 below. These models include the amount of time spent in the program on homework assignments [hwtime], using the study plan [sptime] for follow up on questions students answered incorrectly, and extra time spent [xtime] on practice tests, eBook, video segments, and other tools available. We included student's GPA as our ability control variable in one model and student's ACT score [act] as the control in the other. For reasons described earlier, GPA was preferred over ACT. The coefficient on GPA was about seven times higher than for ACT. Also, student scores in their college algebra course was a statistically better control than ACT for these economics courses (results not shown).

Table 1: First Regression Model
regress exam gpa qavg

Source	ss	df	MS			
				Number of obs =		842
				F(2, 834) =		244.14
Model	73695.8702	2	36847.9351	Prob > F =		0
Residual	125875.829	834	150.93025	R-squared =		0.3693
				Adj R-squared =		0.3678
Total	199571.699	836	238.722128	Root MSE =		12.285

exam	Coef.	Std. Error	t	P>t	[95% Conf.	Interval]
gpa	6.885	0.7331	9.39	0.000	5.4456	8.3234
qavg	0.352	0.0266	13.24	0.000	0.2995	0.4038
_cons	26.510	1.8280	14.5	0.000	22.9219	30.0980

The model using GPA as a control was a more statistically powerful model as indicated by the F-statistic. From the results of these two models, we made two important observations from our data. First, that time spent on homework was not significant in predicting better exams scores. Second, that study plan time spent and extra time spent were both statistically significant although their coefficients were not very high. In the model in Table 2, one extra hour spent on the study plan, practice tests, etc. would result in just less than one extra point earned on the exam.

Table 2: Second Regression Model
regress exam gpa hwtime sptime xtime

Source	S.S.	df	MS			
				Number of obs =		870
Model	54323.84	4	13580.9607	F(4, 865) =		75.99
Residual	154597.38	865	178.725295	Prob > F =		0
				R-squared =		0.26
Total	208921.223	869	240.415677	Adj R-squared =		0.2566
				Root MSE =		13.369

exam	Coef.	Std. Error	t	P>t	[95% Conf.	Interval]
gpa	11.016	0.7030	15.67	0.000	9.6357	12.3955
hwtime	-0.103	0.1088	-0.95	0.342	-0.3169	0.1102
sptime	0.949	0.3092	3.07	0.002	0.3421	1.5558
xtime	0.871	0.3593	2.43	0.016	0.1661	1.5767
_cons	35.780	1.8111	19.76	0.000	32.2251	39.3343

Table 3: Third Regression Model regress exam act hwtime sptime xtime						
					Number of obs =	745
Source	**S.S.**	**df**	**MS**		F(4, 740) =	47.93
Model	34782.7159	4	8695.67897		Prob > F =	0
Residual	134240.889	740	181.406607		R-squared =	0.2058
					Adj R-squared =	0.2015
Total	169023.605	744	227.182265		Root MSE =	13.469
exam	**Coef.**	**Std. Error**	**t**	**P>t**	**[95% Conf.**	**Interval]**
act	1.651	0.1342	12.3	0.000	1.3872	1.9143
hwtime	0.134	0.1160	1.15	0.249	-0.0940	0.3615
sptime	1.530	0.3613	4.23	0.000	0.8207	2.2394
xtime	1.383	0.3802	3.64	0.000	0.6369	2.1296
_cons	28.041	2.8218	9.94	0.000	22.5018	33.5811

The model using GPA as a control was a more statistically powerful model as indicated by the F-statistic. From the results of these two models, we made two important observations from our data. First, that time spent on homework was not significant in predicting better exams scores. Second, that study plan time spent and extra time spent were both statistically significant although their coefficients were not very high. In the model in Table 2, one extra hour spent on the study plan, practice tests, etc. would result in just less than one extra point earned on the exam.

DISCUSSION

The results from our data on homework time were not surprising. Although we would like to show that more time spent on homework improved exam scores, a few factors make that difficult to observe. In our courses, the homework assignments were mandatory and they could be worked multiple times. If the homework exercises were not completed then it would not be possible to earn enough points to pass the course. Since homework can be attempted multiple times, a perverse incentive is created for some students to simply click through the questions as quickly as possible. They could then use the feedback from the program to repeat the questions again until they achieved an acceptable score. While the points earned for the homework increased the motivation to complete, it did not necessarily create the motivation to comprehend the material. So one drawback of this system is that the homework might become the only source of study for many students, assuming that would sufficiently prepare them for exams. (Gutarts and Bains, 2010) This possibility would certainly diminish the effects of predicting exam scores based on homework performance.

The study plan and other practice tools available for preparation in the program were not mandatory. Students that are ambitious enough to use these tools were gaining a small but statistically significant improvement in exam scores and presumably quiz scores as well. Using these tools in the program is the real level of effort that can impact learning that is referred to in the literature. (Lenz, 2010; Burch and Kuo, 2010)

In order to better understand our results we have also encouraged students to provide feedback through student evaluations of teaching or by other means. As one might expect, comments vary from "online homework is very helpful" and "love MyEconLab" to "online quizzes are nothing like the homework; much harder". Generally, comments run favorable for the homework system by about four or five to one.

Because of some comments that the quizzes were harder, we did a simple check. For some chapters we switched the homework assignment that contained mostly problems with calculations or graphs with the quiz assignment for that same chapter. The results of this switch had no apparent effect on the average score for that quiz. We concluded that the time constraint on the quiz, as well as some students' lack of real effort to prepare, was affecting their perception of the difficulty.

The publisher, Pearson, provided us with some information form a marketing report on MyEconLab. Their results on over 275,000 student surveys in 2010 indicated that 90% of students felt that the system's assignments, study plan, and practice questions with feedback had helped them to better prepare for tests. Also, 84% reported that they would recommend MyEconLab to their friends.

CONCLUSION

Although much of the literature has indicated mixed results on the use of mandatory homework, we have concluded that an online system of exercises has been beneficial to our students. The results of our analysis suggest that an increased level of effort using the tools provided in the online program can statistically significantly improve exam scores. The magnitude of these improvements is small but additional studies may allow for an investigation of different types of assignments that may be more effective. A follow up investigation using a traditional control group may make it possible to measure the effects compared to other homework methods.

Our sample population is not random. These students have self-selected into our sections for a variety of unknown reasons. This selection process certainly limits the interpretation, so our results may not apply equally to all other student populations (i.e. other types of schools, regions, disciplines, etc.). Our study only investigates the use of the software program in microeconomics courses. Application to other disciplines and sub-disciplines may not be appropriate but is consistent with other studies in mathematics, science, and other quantitative classes. The lack of other measures of mastering skills certainly limits the interpretation of these

results. The use of exams scores as the measure the conceptual knowledge gained in the course could be improved upon. Despite the limitations these results do provide some guidance for understanding how online homework programs may improve student performance.

We intend to explore whether we can better design our courses and also collect and organize our data to examine its effects further. Designing assignments that promote good performance on the exams is a challenge of its own, but this system has still allowed us to provide students with useful exercises and more immediate and effective feedback than would otherwise have been possible using traditional written homework or in-class quizzes. Our observation is consistent with David Colander's statement in the preface to his economic principles textbook. "I strongly believe that most students have the ability to understand economic concepts even though on exams it often appears as if they have serious problems. In my opinion, many of those problems are not conceptual; rather, they are problems in motivation, reading, and math." (Colander, 2008, v) Difficulty on economics exams seems to be a consistent reality for many students. Today's students use computer technology as an everyday part of their lives. We will continue to use these online tools to better challenge and motivate our students to improve and to promote more effective ways of teaching the economic way of thinking.

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APPENDIX

Table 4: Summary Statistics					
Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
gpa	920	2.5058	0.6801	0.49	4.00
act	787	20.3266	3.6736	11	35.00
ca	666	2.1396	1.1064	0	4.00
hwtime	924	3.7515	4.1617	0	61.29
hwavg	879	92.8764	14.6928	0	120.00
qtime	924	1.3849	0.9617	0	5.44
qavg	861	57.4058	18.1984	0	97.57
sp	924	9.5563	29.8061	0	215.00
sptime	924	0.4179	1.4600	0	17.97
xtime	924	0.2960	1.2540	0	27.26
ttime	924	5.8504	5.3171	0	62.89
exam	874	63.9325	15.5235	18	103.00

Table 5: Index of Variable Names	
Variable	Description of Variables
gpa	Cumulative University GPA (4 point scale)
act	Highest Recorded ACT Score
ca	Score in College Algebra
hwtime	Cumulative time spent on Homework Assignments
hwavg	Average Score on Homework Assignments
qtime	Cumulative time spent on Quiz Assignments
qavg	Average Score on Quiz Assignments
sp	Dummy variable indicating use of Study Plan
sptime	Cumulative time spent on Study Plan
xtime	Cumulative time spent on Extra Practice Tests
ttime	Total time spent using Publisher's Software
exam	Average Score on Course Exams in class

A COMPARISON OF THE GREEK AND AMERICAN FINANCIAL CRISES: ANOTHER PERSPECTIVE

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ABSTRACT

The recent economic strife in Greece has been well-publicized. After years of unsustainable spending, the government is faced with frightening realities, and austerity measures have only magnified the tensions. The cumulative debt of the country is close to $1.9 trillion which is about 6.33 times its GDP. This leaves a per-capita burden on its citizens of about $176,416. In contrast, the total debt of the United States (in all categories and levels) is about $57 trillion which is about 3.72 times the GDP and a burden of about $181,355 per citizen.

In both countries significant amounts need to be added for unfunded liabilities from entitlement programs. In Greece these obligations increase the totals to $5.32 trillion which is 17.73 times its GDP and a per-capita burden of $494,002. In the United States the unfunded liabilities increase the totals to $183.44 trillion which is 11.97 times GDP and a per-capita amount of $583,640.

With a debt to GDP ratio that is less than 68% of the Greek ratio and per-capita earnings that are more than 75% greater than that of the Greeks, Americans could possibly feel some comfort that the country is not as far down the path of bankruptcy. However, the additional uncertainty of the "derivative markets" dwarf all the rest. Through these "insurance policies" on financial instruments, America has become the insurer of the world's economies, and the staggering amount of $740 trillion has increased by about 35% since the same phenomenon took the world's economies to the brink of collapse in 2008. With these derivative instruments, it might be argued that America is in a more precarious situation than Greece.

INTRODUCTION

In the simplest of terms, the countries of the world have essentially operated under two basic financial/economic philosophies: The first is based on free market economies with localized decision-making and private ownership of property (sometimes called capitalism). The second is based on a socialistic/collective approach with more centralized decision-making and the "spreading" of that which is produced.

Those who advocate the latter approach (socialism/collectivism) argue that it is more fair because everyone can share more equally in the outputs. However, those who advocate the former method (a free market approach) argue that the socialistic approach is less fair because

the economic fruits of time, effort, money, and risk-taking are largely "stolen away" by those not participating. Although the purpose of this paper is not to explore the details of the two approaches, it is necessary as a lead-in to the topic to summarize the (1) productivity, (2) economic well-being, and (3) sustainability of the two philosophies.

As to productivity, there are good comparisons from history to show the effectiveness of the two approaches. For example, in the 45 years that Germany was divided between the west under capitalism and the east under communism, West Germany had a per-capita production that was 2½ times that of East Germany. Taiwan (an island nation) under capitalism had per-capita production that was three times greater than the island of Cuba under communism. Likewise, communistic Russia was out-performed 4½ times by the United States. And currently the capitalistic South Korea is outperforming the communistic North Korea by more than 20 to 1 on a per capita basis.

As to the economic well-being of the individual, while there are some who acknowledge capitalism's ability to produce more, they assert that poor people are worse off because the wealthy people take most of what is produced. Of course it is part of capitalism that those who "hustle" will generally have more to enjoy, but the evidence is that poor people are also better off. In the USA, for example, we define the poor as those earning less than $10,890 per year, and that amount is greater than the average earnings of people in 65 other countries, and almost 100% of the bottom one fifth of Americans have more spending power than the bottom one fifth of countries like India. Let's also remember that of those under the poverty level in the United States, 43% own a home, 73% own a car, 97% own a color television, 78% have a VCR or DVD player, 89% own a microwave, and 80% have air conditioning (Williams, 2010). Yes, capitalism consistently outperforms other forms of government, even for the poor people.

As to sustainability, the answer is also largely provided by history. As one example, in the 1920s following World War I, the economies of the world were in a weakened condition. While communistic Russia had to temporarily abandon full communism even to survive, the 150-year-old United States relied once again on capitalism. The highest tax rate was lowered from 77% to 25% and the result was an increase in tax revenues from $77 million to $230 million, the national debt was reduced from $23 billion to $17 billion, unemployment dropped from 20% to 3.3%, the GDP of the country increased annually by 7%, and per-capita income grew by over 30%. In contrast, Russia continued to weaken under its 74 years of communism until it finally went bankrupt in about 1991. In East Germany it lasted about 45 years before bankruptcy. But "mostly" under capitalism the United States continues to endure with strength after 236 years—especially in those industries where free markets have been allowed to flourish.

There are always those who try to distinguish between communism and socialism, but the same problems occur under either approach—increased bureaucracy, red tape, and inefficiency at the central levels and declining incentives and motivation at the local levels. In Europe, for example, where the economic systems have been very socialistic, these countries are almost universally headed towards bankruptcy because of their collectivist and redistributive

approaches. While the United States has a Debt to GDP Ratio of 1.04, the countries in Europe generally have a Debt to GDP ratio that is more than twice that amount including a ratio of 12.51 in Ireland, 4.9 in the United Kingdom, 2.59 in Portugal, 2.33 in Spain, 1.64 in Italy, 2.07 in Germany, 2.76 in France, and 2.24 in Greece. In other words, these countries generally have debt to GDP ratios that are more than double the ratio for the United States.

There is also much evidence of it within the United States such as highly socialistic California where four million more people have left the state in the last two decades than have come from other states (Kotkin, 2012). In contrast, highly capitalistic Texas has had the greatest influx of people and has created more jobs than any other state in the nation. On average, free market economies will always have more sustainability than economies of redistribution. As Adrian Rogers said back in 1931: "You cannot legislate the poor into prosperity by legislating the wealthy out of prosperity. What one person receives without working for, another person must work for without receiving. The government cannot give to anybody anything that the government does not first take from somebody else. When half of the people get the idea that they do not have to work because the other half is going to take care of them, and when the other half gets the idea that it does no good to work because somebody else is going to get what they work for, that my dear friend, is the beginning of the end of any nation. You cannot multiply wealth by dividing it."

It should be noted that programs of redistribution are usually difficult to stop or reverse because it is always easier for public officials to give or to increase than to take away. In fact, it is characteristic that initial stages of socialism lead to socialistic "creep." In the United States, for example, when Social Security was introduced to the country in the 1930s, the American people were told that participation would be voluntary and would require a yearly maximum of one percent of a person's wages up to $1,400 or $14 per year.

Now, 75 years later, it is mandatory and requires the participants (with their employers) to pay 15.3 percent of the first $106,800 or $16,340. In other words, the maximum dollar amount paid each year is about 1,362 times greater than what was first presented. Even adjusted for inflation the burden is now more than 30 times greater than when first proposed, and the additional infusions of capital are still far from being able to cover the outlays. In summary, programs of redistribution usually grow until they "choke out" the productive elements of society, and that is what is happening in both the United States and Greece. Greece has found it to be true as their austerity programs have led to civil disobedience, riots, and the burning of buildings throughout the country.

Many citizens will say that it is only fair that we receive Social Security because we pay into it and some of that is true, but the sad reality is that the government plan is not and never has been actuarially sound. When people are involved in a "risk pool" with a private insurance company, the sum total of the money paid by those people must be sufficient to cover the expected pattern of payouts associated with the risk. In fact, if an insurance plan is not fully and actuarially funded by the insurance company, the company will be closed down by the insurance

commissioners representing the very governments that operate without sufficient funds. The United States government never intended for the Social Security program to be actuarially sound. It was known from the outset that the contributions of the participants would not be sufficient to cover the demands of the plan but that forced taxation would be needed to provide the necessary funds.

From a moral standpoint, it is all right for a citizen of society who wants to retire at a given age to put away money to cover that retirement (actuarially), but there are moral problems associated with someone wanting to retire expecting someone else to pay for it. What has happened to the concept of self-reliance? In Social Security, for example, we are moving closer to the point where it will require two people to take care of another person in society, and what a burden that will be for the caretakers and for the whole national system.

Another moral problem is that governments frequently need to borrow money to cover these situations which, in itself, is a problem. Even worse is the fact that our children and grandchildren will be paying for these excesses for many decades to come. Still another moral problem is the fact that the money intended for the beneficiaries is frequently spent by the governments for other needs. In the Social Security Trust Fund of the United States, for example, we are told that there is about $2.5 trillion in the fund, but the truth is that there isn't any money in the fund because the government has spent it and replaced the money with IOUs called government bonds. So when the obligations come due, either the taxpayers need to come up with replacement money or it needs to be borrowed. It is the epitome of the illegal practice of fund co-mingling for which governments put private citizens in jail.

Regardless of where they have been applied, the more "collectivist" methods have taken countries toward the brink of collapse at reckless speeds (including Greece and the United States) and if these processes are not reversed (or at least contained), it is 100 percent certain that these countries will go bankrupt. So let's take a look at the drift towards insolvency in Greece and see how it compares with the United States and its movement in the same direction.

THE GREEK AND AMERICAN FINANCIAL CRISES

The recent strife and turmoil in Greece has been well-publicized. After years of establishing burdensome commitments and spending beyond sustainable levels, the Greek government is now faced with the frightening possibilities of collapse. Other European countries are demanding more fiscal responsibility by Greece and that has led to attempts by the Greek government to establish austerity measures that are beyond what many Greek citizens are willing to accept. Consequently, there has been widespread rioting, destruction, and some loss of life. With that in mind, let's review the Greek situation and how it compares with the United States.

The Gross Domestic Product is, of course, a measure of the total amount produced by a country in goods and services, and as shown in Table 1, Greece produced a total of $300 billion in goods and services in the most recent year of 2011 (in American dollars). With a population

of 10.77 million people, the GDP per capita was at $27,855. In contrast, the 314.3 million people in the United States had a GDP of about $15.33 trillion in the same year which was a per capita GDP of $48,775 or about 1.75 times the value produced by each Greek citizen.

Table 1: Ratio of Total Debt to Gross Domestic Product		
	America	Greece
Population	314,300,000	10,770,000
Per Capita Gross Domestic Product	$48,775	$27,855
Gross Domestic Product	$15,330,000,000,000	$300,000,000,000
Ratio of National Debt to GDP	1.04	1.40
National Debt (as shown by Federal budgets)	$16,000,000,000,000	$420,000,000,000
State and Local Government Debts	$2,825,000,000,000	$90,000,000,000
Business Debt	22,405,000,000,000	865,000,000,000
Personal Debt	15,770,000,000,000	525,000,000,000
Total State, Local, Business, and Personal Debt	$41,000,000,000,000	$1,480,000,000,000
Total Debt (all "explicit" debts)	$57,000,000,000,000	$1,900,000,000,000
Total Debt per Capita	$181,355	$176,416
Ratio of Total Debt to Gross Domestic Product	3.72	6.33

As to debt, the crisis in both countries, simply stated, is that they are spending beyond their means and paying for it by excessive borrowing. The increased debt levels are already a financial burden, and the possibility of either country significantly reducing the debt levels in the foreseeable future seems remote. In fact, the main emphasis of both countries doesn't seem to be paying down the debt but slowing (or stopping) the increases before there is complete insolvency. As a first measure of this concern we turn to the concept of "National Debt" (Table 1) which is usually defined as a country's "official debt" in the Federal government's annual budgetary process. In the United States this debt figure is about $16 trillion as of about September 4, 2012 (and growing rapidly); in Greece it is about $420 billion (and also growing rapidly). As shown, the National Debt to GDP Ratio in the USA is 1.04 but much more in Greece with a ratio of 1.40.

A major concern with the debt issue seems to relate as much to the pattern or direction of it as much as the amount of it. In Greece the debt increases have been excessive for 16 consecutive years, and in the United States the National Debt has increased by a shocking 60 percent in the last four years from less than $10 trillion to the amount that has now reached $16 trillion. As burdensome as these figures are, it gets worse when one considers the additional debts relating to state and local governments, businesses, and households. When these amounts are added to the "National Debt," we usually refer to the sum as "Total Debt." As shown in Table 1, the "Total Debt" for the United States is at $57 trillion which is 3.72 times the GDP. For Greece, the "Total Debt" is about $1.9 trillion or 6.33 times the GDP.

Also, notice in both countries the amount by which Total Debt exceeds National Debt. For the United States, adding the debts of state and local governments, businesses, and

households increases the total by 3.56 times, but for Greece the additions increase the debt by 4.52 times. With the additional debts, the burden on the citizens becomes substantial. As shown in Table 1, For Greece, the Total Debt per Capita is a large $176,416. For Americans the "Total Debt per Capita" is $181,355 which means that families of four have an initial debt responsibility of $725,420 before even considering debts for their own families like buying a home.

But there are other facts that need to be considered before concluding whether it is Greece or America that has more economic challenges. The first of these relates to unfunded liabilities which are largely created by entitlement programs. In the United States the main categories of unfunded liabilities are Social Security, Prescription Drugs, Medicare, and smaller amounts including currency obligations. As shown in Table 2, the total for these four was a whopping $126.438 trillion as of about September 1, 2012. Greece also has many unfunded liabilities, but they don't match up exactly with the American categories, so as shown, there is some combining of numbers to come up with the total of $3.4204 trillion.

Table 2: Debt Relationships with Unfunded Liabilities		
	America	Greece
Population	314,300,000	10,770,000
Gross Domestic Product	$15,330,000,000,000	$300,000,000,000
Total "Explicit" Debts (from Table 1)	$57,000,000,000,000	$1,900,000,000,000
Social Security Liability	15,880,000,000,000	}
Prescription Drug Liability	21,008,000,000,000	} $3,420,000,000,000
Medicare Liability	83,550,000,000,000	}
Currency Obligations and Other Debt	6,000,000,000,000	$400,000,000
Total of Unfunded Debts	$126,438,000,000,000	$3,420,400,000,000
Total of Expanded National Debts	$183,438,000,000,000	$5,320,400,000,000
Total Expanded National Debts per Capita	$583,640	$494,002
Ratio of "Expanded" Debts to GDP	11.97	17.73

Table 2 also shows that with Total Unfunded Debts added to the Total "Explicit" Debts from Table 1, the amount is $183.438 trillion for the Americans and $5.3204 trillion for the Greeks. On a per-capita basis the Total Expanded National Debt is $583,640 for the Americans and $494,002 for the Greeks. When Total Expanded National Debts are compared to GDP, the ratio is about 48 percent more for the Greeks at 17.73 than for the Americans at 11.97.

But there is another "jump" needed before any conclusions can be reached about the financial conditions of the two countries, and this category seems more significant. The amounts relate to the fact that America has become the primary insurer (or underwriter) of the world's financial systems by issuing what are known as credit default swaps (also known as derivatives). These are essentially insurance policies that guarantee other financial instruments, and the total was about $550 trillion when the mortgage meltdown occurred in 2008. The entire world's economy was threatened at that time by a systemic "credit freeze" and the world's credit markets

were likely within days of a complete worldwide meltdown. It was probably because of America's so-called bailout legislation that a total collapse of the financial markets was averted.

Table 3: Expanded Debt Relationships with Derivative Obligations and Local Debts		
	America	Greece
Population	314,300,000	10,770,000
Gross Domestic Product	$15,330,000,000,000	$300,000,000,000
Total of Expanded National Debts (Table 2)	$183,438,000,000,000	$5,320,400,000,000
Potential Derivative Obligations	740,000,000,000,000	50,000,000,000
Total Debt and Derivative Exposure	$923,438,000,000,000	$5,370,400,000,000
Per-capita Debt and Derivative Exposure	$2,938,078	$498,644
Ratio of Debt and Derivative Exposure to GDP	60.24	17.90

Actually, the fact that the United States Government stepped in to solve the problem in 2008 has led to a greater "moral hazard." Rather than making derivative traders more cautious, many of them have become more bold with the belief that the government will bail them out again. Now nearly four years later, the "fragile" derivatives market has increased from about $550 trillion to $740 trillion as shown in Table 3. Of course, nobody can possibly know how many claims might eventually be made with these derivatives (insurance policies), but the mortgage meltdown and bailout of 2008 shows that it can happen.

With the addition of these derivatives, the Americans have a staggering Total Debt and Derivative Exposure of $923.44 trillion and the Greek total is $5.37 trillion. On a per capita basis, the Debt and Derivative Exposure is $2,930,078 for the Americans and $498,644 for the Greeks. With these totals it can be seen that the Americans actually have a more tenuous financial situation with total potential claims being 60.24 times its ability to produce (GDP) compared to 17.90 for the Greeks. Reflecting on these per capita dollar amounts, it doesn't seem realistic or likely that each family of four in the United States can be responsible for potential claims of nearly $12 million. It is a sobering situation to contemplate.

SUMMARY

With worldwide attention having been focused on the Greek financial crisis, the basic focus of this analysis has been to determine how the American economy compares with the Greek economy in the severity of its financial situation and its ability to cope with these financial pressures. The basic finding is that the Greek crisis is currently more serious when considering all forms of "explicit" debts, both public and private, at the national, state, and local levels; For Americans, these debts are 3.72 times the country's gross domestic product, but for the Greeks, they are 6.33 times the country's gross domestic product.

When adding "unfunded liabilities" to these "explicit" debts (like Social Security and Medicare), the Greek situation is still more serious with the obligations at 17.73 times the gross

domestic product compared to 11.97 times for the Americans. But when derivatives (financial insurance "policies") are added to the equation, the American situation is far more serious with all obligations at 60.24 times the gross domestic product compared to 17.90 for the Greeks. While some may argue that these derivatives (credit default swaps) are not really the same as traditional debts, nevertheless, it was the American derivatives markets that brought the world's economies to the brink of collapse in the Fall of 2008, and such derivatives have increased by approximately 35 percent since that crisis was mitigated by the "bailout legislation" of 2008. It could very well happen again.

CONCLUDING COMMENTS

With the information above, some logical questions might include "Is it too late?" and "How much time do we have?" Of course the answer to both questions is impossible to determine for a variety of reasons including the question of what kind of leadership the two countries will have in the future. Both countries are involved in an election year with candidates and political parties with significantly different perceptions about the problems and potential solutions.

In Greece, for example, new elections in June left the course of government in limbo. The New Democracy Party (ND) (with US-educated Antonis Samaras as its leader) is the center-right party. The Greek Socialist Party (PASOK) is the party of the "old left," and the Democratic Left Party (DL) is the "moderate left" party. Through two election cycles no party has been able to get a majority vote, so these three parties are trying to form a coalition with all three parties being "pro-Europe" meaning that they want to remain with the euro. There is also a potential threat by the radical left SYRIZA party that wants to turn the country into a communist state, but it appears unlikely that it will make significant inroads in this election cycle.

The future of Greece will largely be determined by the coalition government that emerges and the political/economic philosophies that will guide the country. In the United States, the presidential election is also significant with the two parties (and candidates) having dramatically different political and economic views and perceptions. It will be interesting to watch both elections "play out."

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A STUDY OF DIFFERENCES IN STUDENTS' PERCEPTIONS OF THE MARKET SYSTEM AND THE ROLE OF THE FEDERAL GOVERNMENT

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ABSTRACT

This study examines data gathered in an anonymous in-class survey of first-year university students regarding their perception of markets in the United States economy. The study employs a survey instrument developed by Lephardt and Breeden (2005). The purpose of the study is two-fold. First, the study investigated the existence of differences in the perception of the role of markets along gender lines. Although this study found male students generally had a more favorable impression of markets, only token statistical evidence was found for the existence of these differences. Second, the study investigated the existence of differences in the perception of the role of markets by major field of study. This study found the existence of statistically significant mean differences in the responses of Business and Non-Business majors in the perception of markets to be noteworthy.

THE SURVEY INSTRUMENT AND ASSOCIATED MATERIAL

This study uses the Market Attitude Inventory (MAI) survey instrument developed by Breeden and Lephardt (2002) and Lephardt and Breeden (2005). The 2002 paper was an empirical study that used a survey instrument first developed by the authors in 1992 and refined over the next decade. The 2002 study involved 406 student responses in three different economics courses during two time periods (1992 and 1999). The authors found "significant differences in attitudes between demographic subcategories and between classes of students, as well as changes in attitudes over the time elapsed" (Breeden and Lephardt 2002, 154). The 2005 study relates the development and underpinnings of the survey instrument used in the 2002 paper. In many ways, the methodology set forth in the Lephardt and Breeden study of 2005 preceded the 2002 study. The authors noted two factors that motivated them to develop the MAI. One factor was a long-term research agenda involving "the evaluation of the relationship between an individual's attitudes toward the market system and achievement of economic success within that system" (Lephardt and Breeden 2005, 63). The second factor was the absence

of any valid survey instrument "that measured the values and attitudes people hold toward the market system" (Lephardt and Breeden 2005, 63).

The survey instrument has two sections. The first section of the survey requested demographic data from the individual respondent. Specific questions pertained to the respondent's gender, age, ethnicity, and major field of study.

The second section of the survey instrument was a slightly modified version of the MAI developed by Lephardt and Breeden (2005). The original MAI had 22 statements that measured attitudes towards the market system. For each of the 22 statements, students were asked on the survey instrument to "indicate your level of agreement to each statement by writing a number between '0%' and '100%' for the statement, with '0' indicating "strong disagreement" with the statement and '100%' indicating "strong agreement" with the statement. Some of the MAI statements portray a positive perspective towards a market economy while others portray a negative slant towards a market economy (Thomas and Campbell 2006, 33-34). The 22 statements in the MAI are prefaced with the clause "In my opinion, the market system in the U.S." (Lephardt and Breeden 2005, 68). Breeden and Lephardt found "students in more advanced business classes having the most pro-market attitudes" (Breeden and Lephardt 2002, 169). However, since this study focused on first-year students, and first-year students, with minimal exposure to either business or economics in the high school curriculum, might focus on the word "market" in the introductory clause and lose sight of the study's emphasis. Consequently, it was decided that the introductory clause be massaged to read "In my opinion, the *economic system* in the United States:" (emphasis added). The wording of the 22 statements, however, did not change from the original MAI. Five additional statements that relate to the role of the federal government in a market-based economy were introduced. Hence, the wording of the introductory clause to these five statements (Statements 23-27, inclusive) was revised to read "In my opinion, the federal government of the United States should: _____ ".

SURVEY RESULTS

The expanded version of the MAI was administered anonymously during the second week of the semester to students in eight sections of a freshman-level "Introduction to Business" course. This course is required of all Business majors and is a prerequisite to all other College of Business courses. The course also serves as a popular elective for Non-Business majors so a wide range of majors are represented in the survey. The sections ranged in size from 18 to 25 students.

A total of 186 survey instruments were returned but one survey was discarded for incomplete responses. Of the 185 viable surveys, 84 were from young women and 101 returned from young men. Approximately 90 percent (164) of the respondents self-identified themselves as Caucasian while seven respondents self-identified themselves as African-American and seven

more self-reported themselves as Hispanic (or Latino/Latina). Over 55 percent of the students (102) indicated they were planning to major in an area within the College of Business.

Table 1 provides the 27 survey statements. The table is arranged in such a manner as to provide sample characteristics (mean and standard deviation) for each statement for five different cohorts (specifically, Overall, Females, Males, Business, and Non-Business). The cohorts are arranged in such a manner that it allows a test of the differences in the mean responses for both gender and major field of study (specifically, Business and Non-Business).

EXAMINING DIFFERENCES IN MEAN RESPONSES BY GENDER

Breeden and Lephardt (2002) examined a number of sub-categories among the respondents. One of their findings is that male students tended to be more pro-market than females. King and King (2007) also used the MAI and found "females had less favorable views of free markets than males, although neither group reported particularly strong beliefs" (King and King 2007, 168).

Table 1 allows for the examination of the mean responses along gender lines. In general, for the original 22 MAI statements, the mean responses by males were generally more favorable to the role of markets than were the mean female responses. This was true for statements that held either a positive perspective or a negative perspective towards the role of markets. For 16 of the 22 statements, males viewed the role of markets more favorably than females. However, in only two of the original 22 MAI statements (Statements 19 and 21) is the difference in the mean responses statistically significant at the ten percent (10%) level. For all five statements regarding the role of the federal government, females felt that the government should be more active in social and business issues, although none of the comparisons were statistically significant.

This study added five statements (Statements 23-27, inclusive) that pertained to the role of the federal government in the United States economy. For all five statements, the mean responses by males were more pro-market than were the mean responses for females. However, for only one of the five statements was the difference between the means found to be statistically significant at the ten percent level.

EXAMINING DIFFERENCES IN MEAN RESPONSES BY MAJOR

Breeden and Lephardt found one of "the most notable subgroup categories was the Business Major comparison between the 1992 and 1999 sample" (Breeden and Lephardt 2002, 160). Breeden and Lephardt found nine of the differences in means to be statistically significant at the one percent level. Moreover, the authors found that in eight of those instances "the means indicate there is a pervasive decline in positive attitudes towards the market" (Breeden and Lephardt 2002, 160) among Business majors.

Table 1 allows for the examination of the mean responses by major college of study (that is, Business and Non-Business). In general, for the original 22 MAI statements, the mean responses by Business majors were generally more favorable to the market than were the mean responses by Non-Business majors. For 17 of the statements, Business majors expressed a more positive view of the role of the market than Non-Business majors. For five of the statements (Statements 5, 6, 9, 15, and 18), the responses of the Non-Business majors were more favorable in their perception of the role of the market, although none of the five differences were found to be statistically significant. For four of the five statements regarding the role of the federal government in a market economy, Non-Business majors felt that the government should play a more active role in addressing social and business issues. This was true for statements that held either a positive perspective or a negative perspective towards the role of markets.

For six of the original 22 MAI statements, the differences in the mean responses were statistically significant at the ten percent (10%) level. One interesting finding is that among the statements with statistically significant outcomes, four had a negative slant towards markets while two had a positive slant towards markets. Statements 1, 3, 7 and 11 have a negative slant towards the role of markets in the functioning of the economy. Specifically, Statement 1 pertained to markets promoting an unfair distribution of income, Statement 3 commented upon markets encouraging unethical business behavior, Statement 7 addressed markets promoting greed and excessive materialism, and Statement 11 referenced the attempts by business to use markets in the pursuit of monopoly power. The two positive statements with a positive perspective of markets pertained to markets providing employment opportunities for all who desire to work (Statement 19) and the role markets play in encouraging innovation and developing new businesses (Statement 20). None of the five statements that addressed the role of the federal government in the United States economy were found to be statistically significant at even the 20 percent (20%) level.

The differences in mean responses, including a more favorable view of the role and efficiency of markets by Business majors, may be explained by the background and interests of new Business majors, as well as, learning experiences in typical programs. When deciding on a major, students understand they will be gaining knowledge and skills transferable to both for-profit and not-for-profit organizations. Students obtain these critical tools through learning experiences found in general management degree programs. AACSB International specifies undergraduate degree programs include experiences in management-specific knowledge and skill areas, including domestic and global economic environments of organizations, as well as ethical and legal responsibilities in organizations and society. To address these requirements, Business schools typically provide direct, applied knowledge and learning experiences in macroeconomics. In a typical macroeconomics course, students analyze the public sector of the economy, while focusing on the decision-making process of government. Included in this experience are analysis and discussions of areas such as the role of government in solving problems – such as market failure, poor information, lack of competition in markets, and

economic instability. As a result, Business majors (including first-year students) may be expected to have a more thorough, balanced, and in-depth understanding of the role and limits of the economic system and the role of government in the United States.

CONCLUSIONS

The objective of this study was to investigate the existence of differences in the perception of markets along both gender lines and major field of study. This study found male students generally had a more favorable view of markets than female students but that this difference was not particular strong in a statistical framework. This study also found a pronounced difference in the perception of markets along major fields of study.

The differences in the views of the role of markets and the federal government may bear some relationship to the manner in how a major was selected by a student. Students who selected a business discipline as their major may inherently believe that markets work well and choose their major as one that offers higher economic benefits for their future. Alternatively, students who major in areas in which they have a passion for study, but are less likely to lead to higher salaries and security, may feel that markets are unfair as to salaries, benefits, and the distribution of income and feel that the role of the federal government should make up for this deficit by providing a sense of equality to all individuals.

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	TABLE 1 RESPONSE SUMMARIES AND TESTS OF HYPOTHESES				
	Situation/Scenario	**Cohort**	**Characteristic:** **Mean**	**St. dev.**	$H_1:\mu_x-\mu_y \neq 0$ **Pr > | t |**
In my opinion, the economic system in the United States:					
1.	… leads to an unfair distribution of income.	**Overall**	**53.45**	**24.26**	
		Females	56.31	22.05	
		Males	51.17	26.34	0.149
		Business	48.75	23.70	
		Non-Bus	59.22	24.51	*0.004*
2.	… rewards people fairly for their productivity and hard work.	**Overall**	**54.95**	**23.94**	
		Females	52.12	22.46	
		Males	57.30	24.97	0.143
		Business	56.18	24.10	
		Non-Bus	53.43	23.80	0.440
3.	… encourages unethical business behavior.	**Overall**	**44.76**	**22.56**	
		Females	46.25	21.23	
		Males	43.51	23.65	0.413
		Business	41.27	23.26	
		Non-Bus	49.04	21.03	*0.020*
4.	… leads to quality and technological advancement in products and services.	**Overall**	**74.34**	**18.14**	
		Females	73.21	19.32	
		Males	75.27	17.31	0.445
		Business	74.36	17.32	
		Non-Bus	74.30	19.20	0.982
5.	… leads to inadequate amounts of important public services (like police, roads, and fire protection).	**Overall**	**44.46**	**21.70**	
		Females	44.43	21.82	
		Males	44.49	21.70	0.987
		Business	44.48	21.76	
		Non-Bus	44.43	21.76	*0.988*
6.	… provides opportunities and incentives for success.	**Overall**	**71.25**	**21.58**	
		Females	70.17	20.09	
		Males	72.16	22.81	0.534
		Business	71.21	22.18	
		Non-Bus	71.31	20.96	*0.973*
7.	… encourages greed and excessive materialism.	**Overall**	**67.11**	**24.15**	
		Females	65.50	25.63	
		Males	68.38	22.90	*0.437*
		Business	64.46	24.46	
		Non-Bus	70.57	23.50	*0.098*
8.	… allows equal access to work opportunities.	**Overall**	**46.48**	**22.11**	
		Females	43.81	22.27	
		Males	48.70	21.83	0.134
		Business	47.37	21.85	
		Non-Bus	45.39	22.51	0.545

TABLE 1 (Continued) RESPONSE SUMMARIES AND TESTS OF HYPOTHESES				
Situation/Scenario	**Cohort**	**Characteristic:** **Mean**	**St. dev.**	**$H_1: \mu_x - \mu_y \neq 0$** **Pr > | t |**
In my opinion, the economic system in the United States:				
9. … leads to erratic cycles of growth and then decline in economic activity.	**Overall**	**59.77**	**20.92**	
	Females	60.12	22.05	
	Males	59.49	20.04	0.838
	Business	59.98	20.61	
	Non-Bus	59.52	21.42	0.882
10. … raises the living standards for most people.	**Overall**	**58.56**	**19.78**	
	Females	58.07	19.32	
	Males	58.96	20.24	0.665
	Business	58.87	18.53	
	Non-Bus	58.17	21.32	0.811
11. … leads to monopoly power among businesses.	**Overall**	**53.91**	**22.92**	
	Females	56.00	23.00	
	Males	52.18	22.83	0.260
	Business	50.25	22.49	
	Non-Bus	58.42	22.78	*0.015*
12. … leads to an efficient use of resources.	**Overall**	**44.64**	**22.79**	
	Females	45.33	22.71	
	Males	44.06	23.36	0.706
	Business	49.76	22.71	
	Non-Bus	42.01	22.76	0.160
13. … encourages the abuse of the environment.	**Overall**	**53.63**	**24.88**	
	Females	51.13	26.86	
	Males	55.70	23.03	0.214
	Business	51.75	23.68	
	Non-Bus	55.93	26.23	0.258
14. … leads to unemployment and worker insecurity.	**Overall**	**50.03**	**22.27**	
	Females	52.07	23.15	
	Males	48.34	21.49	0.257
	Business	48.21	21.66	
	Non-Bus	52.28	22.93	0.583
15. … leads to excessive risk of business failure.	**Overall**	**50.76**	**22.13**	
	Females	49.35	23.02	
	Males	51.93	21.41	0.434
	Business	50.15	23.36	
	Non-Bus	51.51	20.86	0.679
16. … requires a lot of government control to work well.	**Overall**	**46.04**	**25.41**	
	Females	45.44	23.91	
	Males	46.53	26.71	0.772
	Business	44.26	25.11	
	Non-Bus	48.22	25.77	0.294

TABLE 1 RESPONSE SUMMARIES AND TESTS OF HYPOTHESES				
Situation/Scenario	**Cohort**	**Characteristic:** **Mean**	**St. dev.**	$H_1:\mu_x-\mu_y \neq 0$ **Pr > | t |**
In my opinion, the economic system in the United States:				
17. … allows too much foreign competition.	**Overall**	**48.60**	**24.14**	
	Females	51.23	24.31	
	Males	46.42	23.74	0.178
	Business	48.26	24.90	
	Non-Bus	49.01	23.33	0.835
18 … provides consumers the goods and services they want.	**Overall**	**71.68**	**22.65**	
	Females	68.93	25.19	
	Males	73.96	20.15	0.133
	Business	71.18	23.91	
	Non-Bus	72.29	21.19	0.741
19. … provides employment opportunities for all who desire to work.	**Overall**	**50.76**	**27.21**	
	Females	46.26	27.03	
	Males	54.51	26.92	*0.040*
	Business	54.79	25.88	
	Non-Bus	45.81	28.11	*0.025*
20. … encourages innovation and the development of new businesses.	**Overall**	**65.24**	**22.08**	
	Females	63.20	22.07	
	Males	54.51	22.07	0.254
	Business	54.79	22.29	
	Non-Bus	45.81	21.53	*0.074*
21. … provide goods and services at an affordable price.	**Overall**	**44.64**	**21.03**	
	Females	51.19	22.81	
	Males	57.51	19.08	*0.041*
	Business	56.67	21.68	
	Non-Bus	52.16	20.05	0.147
22. *"Overall, I believe that the economic system in the United States is a fair and ethical system."*	**Overall**	**57.44**	**23.29**	
	Females	56.37	22.12	
	Males	58.33	24.30	0.107
	Business	59.31	22.11	
	Non-Bus	55.13	24.62	0.226

			Characteristic:		$H_1:\mu_x-\mu_y \neq 0$
TABLE 1 **RESPONSE SUMMARIES AND TESTS OF HYPOTHESES**					
Situation/Scenario		**Cohort**	**Mean**	**St. dev.**	**Pr > | t |**
In my opinion, the federal government of the United States should:					
23.	… take a greater responsibility for solving the problems in society.	**Overall**	**59.43**	**27.21**	
		Females	61.21	25.34	
		Males	57.94	28.71	0.409
		Business	58.19	26.33	
		Non-Bus	60.95	28.33	0.493
24.	… balance the budget every year.	**Overall**	**72.22**	**23.18**	
		Females	75.36	22.29	
		Males	69.60	23.68	0.093
		Business	72.06	23.20	
		Non-Bus	72.41	23.29	0.919
25.	… limit the importation of foreign products to protect the American economy.	**Overall**	**53.92**	**24.43**	
		Females	55.06	23.56	
		Males	52.97	25.20	0.564
		Business	54.51	23.54	
		Non-Bus	53.19	25.60	0.716
26.	… use tax policies to promote a more equal distribution of income.	**Overall**	**50.24**	**28.37**	
		Females	50.89	28.71	
		Males	49.69	28.21	0.863
		Business	48.45	25.84	
		Non-Bus	52.43	31.22	0.344
27.	… provide a job to anyone who wants one.	**Overall**	**60.49**	**30.00**	
		Females	63.21	30.79	
		Males	58.23	29.29	0.261
		Business	58.58	31.14	
		Non-Bus	62.84	28.55	0.338