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Editor

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LETTER FROM THE EDITOR

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As has been the case with the previous issues of the *AAFSJ*, the articles contained in this volume have been double blind refereed. The acceptance rate for manuscripts in this issue, 25%, conforms to our editorial policies.

The Editor works to foster a supportive, mentoring effort on the part of the referees which will result in encouraging and supporting writers. He will continue to welcome different viewpoints because in differences we find learning; in differences we develop understanding; in differences we gain knowledge and in differences we develop the discipline into a more comprehensive, less esoteric, and dynamic metier.

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A MODEL OF MUNICIPAL DISCLOSURES USING EXPLORATORY FACTOR ANALYSIS

Susan R. Cockrell, Austin Peay State University

ABSTRACT

The Governmental Accounting Standards Board (GASB) issues standards, including numerous disclosure requirements, that apply to all state and local governmental units that prepare their external financial statements in conformity with generally accepted accounting principles (GAAP). It has been argued (Ingram, 1984, Copley, 1991, Giroux & McLelland, 2003, Laswad, et al., 2005, Malone, 2006, and Guo, et al., 2009) that the extent of compliance with these disclosure requirements is influenced by three constructs: the socio/economic environment, political environment, and audit quality.

Prior studies have investigated the disclosure compliance issue in the public sector and one area of concern has been raised—the methodology used has operationalized the constructs by using multiple variables as proxies. Research regarding disclosure compliance has identified, as a limitation, the absence of a methodological framework within which the observed variables and the constructs they represent are developed (Carpenter, 1991 and Cheng, 1992). Consideration of this limitation is important because the weak explanatory power of prior municipal choice models may be linked to the misspecification of the relationship between disclosure compliance and its determinants. The method used in this study, exploratory factor analysis, allows the relationships to be expressed in terms of the constructs and their indicants.

The purpose of this paper is to examine the methodological concern raised in prior research. The issue is addressed by examining municipal disclosure compliance using exploratory factor analysis. This mathematical model consists of a system of equations that directly evaluate the relationships among the constructs of interest, in addition to examining the significance of the observed variables in measuring the constructs.

SUMMARY OF STUDY

The disclosure compliance model, as developed in this study, has four basic constructs that form the underlying theoretical basis of a municipality's degree of financial statement disclosure compliance. The socio/economic environment and the political environment have a direct effect on both audit quality and disclosure compliance. Audit quality, a dependent construct of the socio/economic and the political environment, also has a direct effect on disclosure quality. Figure 1 presents the basic relationships among the constructs. Several

variables, derived from the theoretical literature, are used to measure each construct. The full disclosure compliance model is tested using exploratory factor analysis.

Figure 1
Basic Model of Disclosure Compliance: Relationships Among Constructs

SOCIO/ECONOMIC ENVIONMENT → → ↘

↘

AUDIT QUALITY → *DISCLOSURE COMPLIANCE*

↗

POLITICAL ENVIRONMENT → → ↗
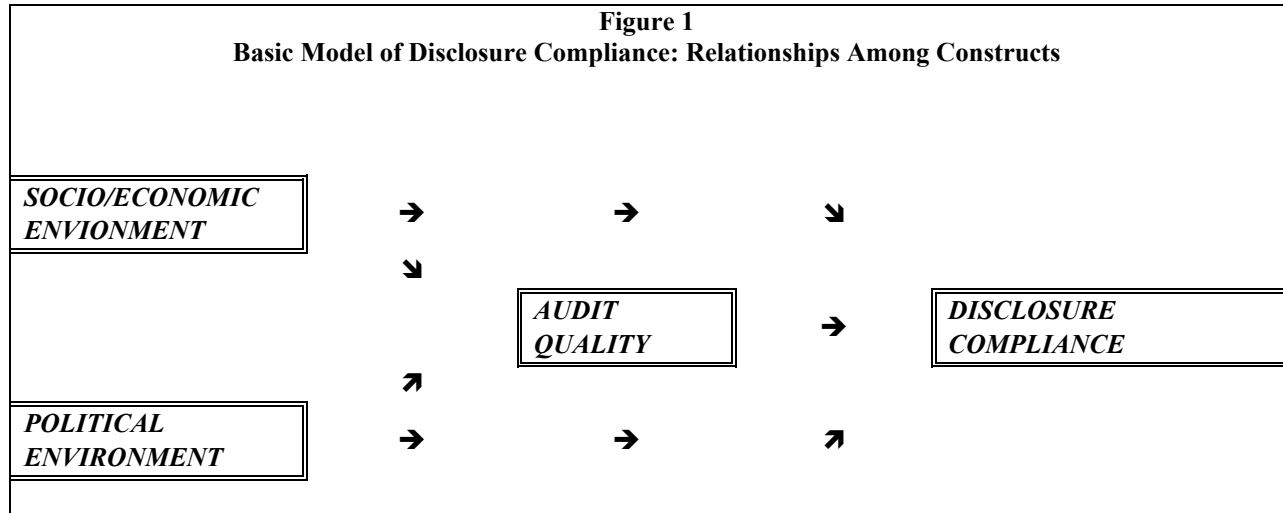
RESEARCH METHODOLOGY

The methodology used in this research is exploratory factor analysis. The disclosure compliance model is composed of the relations among constructs and the measurement of these constructs by observed variables. The mathematical form of the model is a simultaneous system of highly restricted equations. The model, then, consists of certain unknown parameters having a particular structural form. The goal is to estimate, optimally, the parameters and to determine the goodness-of-fit of the model using sample data for the observed variables.

The exploratory factor model (Table 1 and Figure 2) consists of (1) the measurement equations for the dependent and independent observed variables and (2) the structural equation of the latent variables. The structural equation specifies how the independent, ξ, and dependent, η, constructs are related. The coefficient matrix of the η's is represented by β and the coefficient matrix of ξ on η is denoted Γ. The error in the structural equation is the vector of ζ. The measurement equations indicate how the latent constructs are measured in terms of the observed variables. The x's are indicants of independent constructs and the y's are indicants of dependent constructs. The equations also describe the amount of unexplained variance, δ and ε, associated with each indicant.

Table 1
Structural and Measurement Equations for Theoretical Model

$$\eta = \beta\,\eta + \Gamma\,\xi + \zeta$$

$$\begin{bmatrix} \eta_1 \\ \eta_2 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ \beta_{21} & 0 \end{bmatrix} \begin{bmatrix} \eta_1 \\ \eta_2 \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} \xi_1 \\ \xi_2 \end{bmatrix} + \begin{bmatrix} \zeta_1 \\ \zeta_2 \end{bmatrix}$$

$$\eta_1 = \pi\gamma_{11}\,\xi_1 + \gamma_{12}\,\xi_2 + \zeta_1$$
$$\eta_2 = \beta_{21}\,\eta_1 + \gamma_{21}\,\xi_1 + \gamma_{22}\,\xi_2 + \zeta_2$$
$$x = \Lambda_x\,\xi + \delta$$

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \\ x_7 \\ x_8 \\ x_9 \\ x_{10} \end{bmatrix} = \begin{bmatrix} \lambda_{x11} & 0 \\ \lambda_{X21} & 0 \\ \lambda_{x31} & 0 \\ \lambda_{x41} & 0 \\ \lambda_{x51} & 0 \\ 0 & \lambda_{x62} \\ 0 & \lambda_{x72} \\ 0 & \lambda_{x82} \\ 0 & \lambda_{x92} \\ 0 & \lambda_{x102} \end{bmatrix} \begin{bmatrix} \xi_1 \\ \xi_2 \end{bmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \end{bmatrix}$$

$$y = \Lambda_y\,\eta + \varepsilon$$

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \\ y_5 \\ y_6 \end{bmatrix} = \begin{bmatrix} \lambda_{y11} & 0 \\ \lambda_{y21} & 0 \\ \lambda_{y31} & 0 \\ \lambda_{y41} & 0 \\ 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} \eta_1 \\ \eta_2 \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \\ \varepsilon_5 \\ \varepsilon_6 \end{bmatrix}$$

Figure 2
Theoretical Disclosure Compliance Model
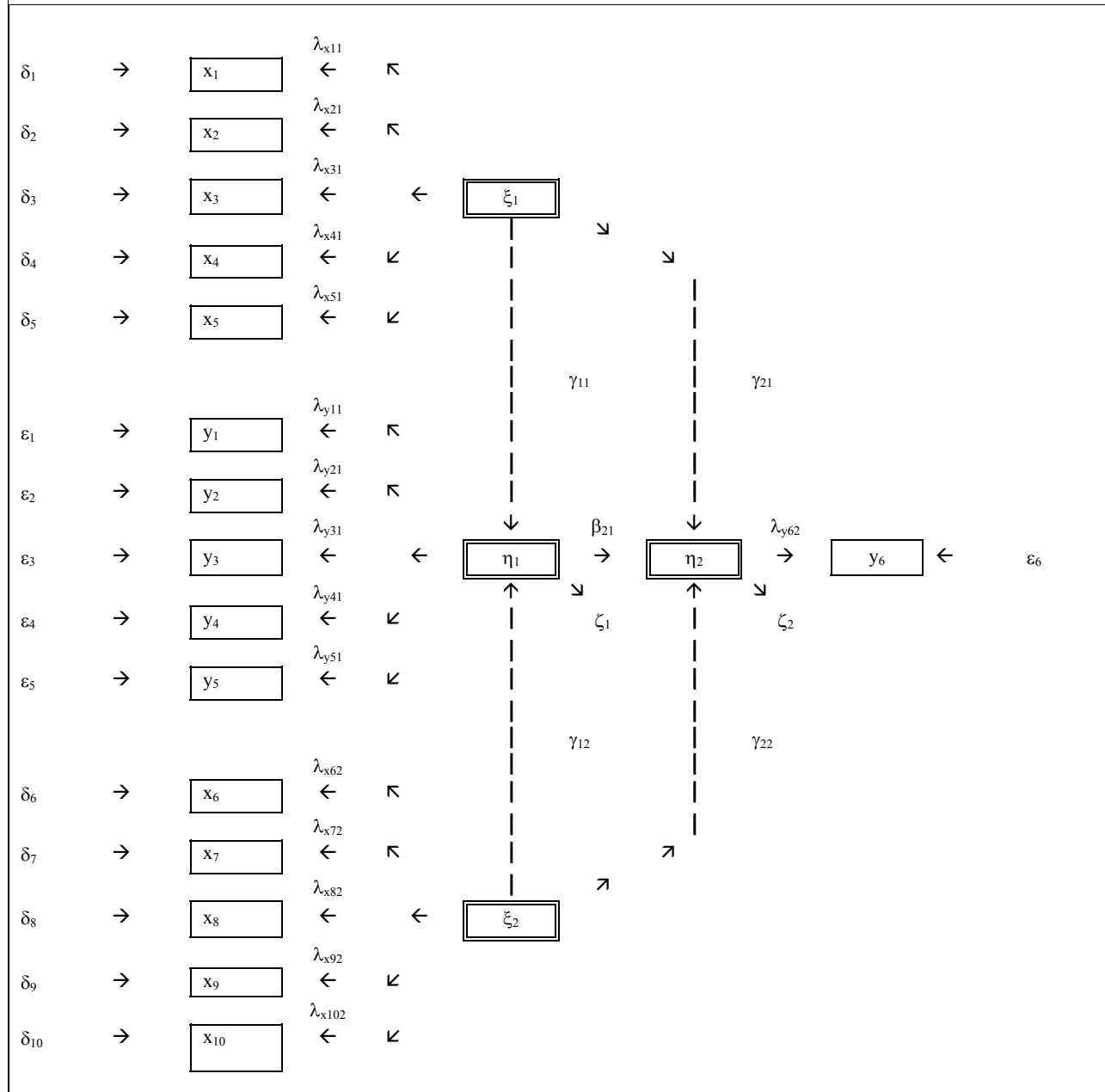
CONSTRUCT MEASURES AND HYPOTHESES DEVELOPMENT

Research is examined to develop the measures of each construct and the relationships among the constructs hypothesized to affect disclosure compliance. The major relationships are the effects of the socio/economic environment and the political environment on audit quality and disclosure compliance.

The goal of good government is the efficient response to its citizen's demands for goods and services. Municipalities of greater wealth have more professional administrations and the citizens demand a higher level of financial information (Swanson, et al., 1979). Financially sound municipalities, with higher citizen incomes, would present a lower level of audit risk (DeAngelo, 1981). This lower risk increases the audit quality for the municipality. The measure of income, or wealth, that prior research consistently found significant to policy decisions was per capita income (Ingram, 1984, Baber, et al., 1987, Cheng, 1992, Giroux & McLelland, 2003, Laswad, et al., 2005, Malone, 2006, and Guo, et al., 2009). *Per capita income is expected to be a statistically positive indicant of the socio/economic environment in the disclosure compliance model.*

The density of a municipality is directly related to the amount, and cost, of police, fire, and other public safety services. *Density, measured as the population per square kilometer, is a positive and statistically significant indicant of the socio/economic environment.*

The level of education of the citizens of a municipality can be expected to affect disclosure compliance in two ways. One, the greater the education level of the population, the more demands they make in the form of monitoring (Evans and Patton, 1987). Secondly, the educated citizen forms or becomes a member of a coalition, or interest group, that demands an even higher level of monitoring (Stigler, 1971, Becker, 1983, Malone, 2006, and Guo et al.,2009). *It is expected that education, measured as the percentage of the population with four years of college, is a positive and statistically significant indicant of the socio/economic environment.*

Debt has been included in prior research, and found significant, as an indicator of disclosure quality (Evans and Patton, 1983, Copley, 1991, Carpenter, 1991, Cheng, 1992, Giroux & McLelland, 2003, Laswad et al.,2005, Malone, 2006, and Guo et al.,2009). The amount of debt increases the external constraints on the entity. Also, greater disclosures may signal a better managed municipality, resulting in lower interest costs. Debt is measured as the amount of general obligation long-term debt per capita. *Debt is expected to be a positive and statistically significant indicant of the socio/economic environment.*

The size of an entity has been a major factor in the disclosure compliance research and has proven to be an appropriate and consistently significant variable (Baber, 1983, Evans and Patton, 1983, Baber et al.,1987, Copley, 1991, Carpenter, 1991, Giroux & McLelland, 2003, and Guo et al.,2009). Rubin (1988) found size to be significant in the examination of audit fees for a

group of large municipalities but was not significant for the group of small municipalities. S*ize, as measured by population, is expected to be significant for the group of municipalities*.

Research has determined that several factors, including the form of government, regulation, and competition, are positive indicants of the political environment. The extent of disclosure has been shown to be positively associated with a manager form of government (Evans and Patton, 1983, Copley, 1991, Giroux & McLelland, 2003, Laswad et al.,2005, Malone, 2006, and Guo, et al., 2009). Municipalities with managers are expected to present a greater degree of professionalism and be better managed than those municipalities with elected mayors. Greater and better disclosures are a signaling device to the bureaucracy and city councils of efficient management (Zimmerman (1977) and Evans and Patton (1983)). The form of government is measured dichotomously as either an appointed manager or an elected mayoral form of government. *It is expected that form of government is a positive and statistically significant indicant of the political environment.*

Municipal financial reporting regulation by the state has been found significant as a factor in the degree of disclosure compliance (Evans and Patton, 1983, Baber and Sen, 1984, and Giroux, 1989). State regulation can take one of three forms: (1) state regulations required GAAP, (2) state regulations require financial reporting to be some method other than GAAP, or (3) the municipality is unregulated by the state. Significant differences have been found between municipalities in which the state regulations require GAAP and those where the state regulations require a non-GAAP method (Ingram and DeJong, 1987). No significant differences were found between municipalities in states where GAAP is required and the unregulated states. Regulation is measured dichotomously as (1) GAAP regulated and unregulated or (2) non-GAAP regulated. *It is expected that a state requirement of GAAP or an unregulated state are positive, statistically significant indicants of the political environment.*

Elected officials supply monitoring in the form of auditing and financial disclosures to demonstrate their execution of pre-election promises and their incentives to do so increase as competition increases. Political competition, in general, can take three forms—interparty, intraparty, and intergovernmental. Interparty political competition has been measured, and found significant in prior research, as the percent of legislative seats held by a minority party (Baber, 1983, Baber and Sen, 1984, Marks and Raman, 1987, and Cheng, 1992). The level of voter turnout has been found significant in prior research to measure intraparty competition (Baber and Sen, 1984, Carpenter, 1991, Cheng, 1992, Laswad et al.,2005, Malone, 2006, and Guo et al.,2009). Intergovernmental competition is affected by the level of services that are provided by the municipality and its reliance on resources from outside the municipality. The external reliance can be measured by the amount of intergovernmental funding a municipality receives, both from the federal government and the state. An increased reliance on external funding also imposes on the municipality additional monitoring requirements, which would result in increased level of disclosures. The effect of intergovernmental competition has, in prior research, been measured, and found significant as the percentage of intergovernmental revenues to total

revenues (Ingram, 1984 and Copley, 1991). *Both the percent of council seats held by the minority party and the voter turnout are expected to be positive, statistically significant indicants of the political environment in the disclosure compliance model. Also, it is expected that the reliance on external funding is a positive and statistically significant indicant of the political environment in the disclosure compliance model.*

Audit complexity and auditor firm size have been determined to be significant indicators of the quality of audits. The size of the audit firm has been found to be of importance in prior research as an indicator of the quality of the audit in the public sector (Baber et al.,1987, Marks and Raman, 1987, Rubin, 1988, and Copley, 1991). As DeAngelo (1981) points out, audit firms providing higher quality services have relatively greater investment in their reputation capital and, therefore, have greater incentives to assure that client financial statements do not contain errors or inadequate disclosure. The larger the auditing firm, the more the firm has to lose which increases the audit quality by larger firms. Auditor size is measured dichotomously as (1) Big 6 and national or (2) local and state. *It is expected that the engagement of a Big 6 or national auditor is a positive and statistically significant indicant of audit quality in the disclosure compliance model*.

Audit quality is determined by numerous factors affecting the auditor's exposure to legal liability and this exposure increases with the complexity of the client's operations (Simunic, 1980). Audit complexity can be measured in various ways; the measure employed in this research is the total number of funds of the municipality. *It is expected that the number of funds is a positive and statistically significant indicant of audit quality in the disclosure compliance model for the municipalities*.

Additional factors that are included to indicate the complexity of the audit are (1) "busy season" audits (Rubin, 1988), (2) single audit report required (Baber et al.,1987), and (3) whether the opinion was other than unqualified (Rubin, 1988 and Giroux, 1989). *It is expected that (1) the timing of the municipal audit, (2) the existence of a single audit report, and (3) the opinion issued by the auditor are positive and statistically significant indicants of audit quality*.

GASB Statements and Interpretations, which constitute GAAP for state and local governments, indicate the disclosures required when financial statements are issued and adherence to these requirements measure the quality of disclosure. The index used here consists of 90 disclosure items based on the AICPA <u>Local Government Audit and Accounting Manual</u>. Disclosure compliance is the number of disclosure practices present in the annual reports of the sample of municipalities, as a percentage of the total applicable disclosures for that entity. *The disclosure index is a positive and statistically significant indicant of disclosure compliance*.

> H_1: *The municipality's socio/economic environment is positively and significantly associated with disclosure compliance. [γ_{21} is positive and significant.]*

> H_2: *The municipality's political environment is positively and significantly associated with disclosure compliance. [γ_{22} is positive and significant.]*

H_3:   The municipality's socio/economic environment is positively and significantly associated with audit quality. [γ_{11} is positive and significant.]

H_4:   The municipality's political environment is positively and significantly associated with audit quality. [γ_{12} is positive and significant.]

H_5:   The municipality's audit quality is positively and significantly associated with disclosure compliance. [β_{21} is positive and significant.]

Table 2 **Measures of Model Constructs**		
SOCIO/ECONOMIC ENVIRONMENT ξ_1	Income Density Education Debt Size	x_1 = Per capita income x_2 = Population per square kilometer x_3 = % population w/4 years college x_4 = Long term debt per capita x_5 = Population

POLITICAL ENVIRONMENT ξ_2	Form Of Government
	Regulation
	Intraparty Competition
	Interparty Competition
	Intergovernmental Competition
		x_6 = Mayor vs manager
		x_7 = GAAP regulated & unregulated
		        vs non GAAP regulated
		x_8 = Voter turnout local election
		x_9 = Percent of council seats held by
		        minority party
		x_{10} = Intergovernmental revenues/
		        Total revenues

AUDIT QUALITY η_1	Audit Firm Size Complexity Of Audit	y_1 = Big 6 and national vs local y_2 = Number of funds y_3 = "Busy season" audit y_4 = Single audit required y_5 = Opinion other than unqualified
DISCLOSURE COMPLIANCE η_2		y_6 = Disclosure Index

DATA COLLECTION

A random sample of 400 municipalities was chosen and letters were mailed to the Chief Financial Officers of each municipality requesting a copy of their latest Comprehensive Annual Financial Report (CAFR). Usable responses were received from 220 municipalities, with the distribution among the states for the sample being fairly even. The data was accumulated from

the CAFRs whenever possible. If the information was not in the CAFR, it was obtained from the 2000 Bureau of the Census data.

STATISTICAL RESULTS

Univariate analysis of the sample data was performed to test for normality of the variables. After appropriate transformations, the model of municipalities was tested. The model was transformed to achieve the best fit to the data.

The model is first tested as predicted. Then, through a series of iterations the model is adjusted to achieve the best fit with the data. The admissible revisions to the model are guided by the underlying theory and an examination of the goodness-of-fit measures. If the parameter estimates are small in relation to their standard errors, these relationships are eliminated. Other relationships can be added to the model as a result of the examination of the residuals, correlations between the errors, and the modification indices (Bentler, 1980).

With respect to the socio/economic environment, the variables per capita income and education are not significant and are dropped from the model. The variable, own revenue per capita, is a measure of the socio/economic environment construct instead of the political environment. An examination of the political environment construct indicates that the variables voter turnout and minority party are not significant measures so these two variables are dropped. The audit quality variable "busy season" audit is not a significant measure and is deleted from the model. Audit complexity is accurately measured using the remaining variables. The variables, number of funds and opinion other than unqualified, are measures of the audit quality construct and, in addition, are significant measures of disclosure compliance. The variable, single audit, is not a significant measure of the audit quality construct, but is a significant measure of disclosure compliance.

Several error terms of the independent construct measures are correlated: (1) density and population, (2) long-term debt and own revenue per capita, (3) population and form of government, (4) population and regulation, (5) own revenue per capita and form of government, and (6) form of government and regulation. The error terms are residuals and correspond to the portion of each variable that is not explained by the construct. Correlation between two error terms indicates measurement error in the variables or some relationship between the variables that is not captured in the construct.

With respect to the relationships among the constructs, the socio/economic environment construct is significantly correlated to the construct political environment and the construct audit quality is closely related to the construct disclosure compliance. However, the direct relationships from the socio/economic environment to disclosure compliance and from the political environment to audit quality are not significant and are deleted from the model.

The goodness-of-fit of the model is determined by an examination of the measures of overall fit and also indicators of component measures. The model has a Chi-square, with 32 degrees of freedom, of 43.01 (probability level = 0.093). The Chi-square is not a formal test of

the hypothesis that the model is a good fit. It is a general indicator of the model's goodness-of-fit. It should be noted that the Chi-square value desired is the opposite of the typical use; small Chi-square values indicate a close correspondence between the model and the sample data. A Chi-square with a p-value greater than or equal to 0.05 is considered, by convention, to indicate a satisfactory fit of the model to the data (Bagozzi, 1991).

Other statistics regarding the goodness-of-fit of the model include a goodness-of-fit index (GFI = 0.967) and an adjusted (for degrees of freedom) goodness-of fit index (AGFI = 0.932). These indices indicate the amount of variance that is explained by the model. The squared multiple correlations (SMCs) are estimated to determine if the model is a good representation of the data. The SMCs measure the strength of the linear relationships in the model. In the disclosure compliance model, the SMCs for the structural equations are 0.900 for the audit quality construct and 0.947 for the disclosure compliance construct. The SMC's are also provided for each construct measure to indicate the reliability of the variable as an indicant of the construct. (See Table 2) If the SMC's are large, i.e. greater than .6, this indicates high convergent validity of the model. Of the socio/economic and political environment variables, population is, by far, the most reliable indicant. The coefficient of determination provides an indication of how well the observed variables serve as measurement instruments of the model constructs. This statistic is provided for the independent and dependent observed variables and for the structural equations. The coefficient of determination for the dependent variables is 0.988 and for the independent variables is 0.852. The coefficient of determination for the disclosure compliance model, i.e. the structural equations, is 0.991. The modification indices are examined to ascertain if any of the constrained parameters in the model should be freed. Specifically, they measure the amount the Chi-square would decrease by freeing the constraint. The model, as adjusted, indicates no modification index greater than 4. To further assess the fit of the model, the normalized residuals are examined. If the value is greater than 2.58, a standard normal deviate, the model is unable to explain the relationship between the indicants. The model, as adjusted, indicates no normalized residual greater than 2.58.

ANALYSIS AND SUMMARY OF RESULTS

Several interesting results were obtained from this research. First, per capita income and education were predicted to be significant measures of the socio/economic environment construct. However, both were found to be insignificant and were deleted from the model. The variables were expected to reflect lower audit risk and the citizens' demand for a higher level of financial information. Several factors may explain this. First, the population variable is highly influential in the model. This influence may dwarf the relative significance of per capita income and education. Second, per capita income and education both signal greater demands by the citizens for financial information. The significance of the variables density and debt and the

inclusion of own revenue per capita as a socio/economic variable may capture this citizen demand, making per capita income and education insignificant.

Second, the variable own revenue per capita is a measure of the socio/economic environment construct instead of the political environment. The variable was predicted to be a measure of intergovernmental competition, specifically, the municipality's reliance on external funding, in the political environment. An increase in external funding also imposes on the municipality additional monitoring requirements. This indicator of the demand for monitoring, along with long-term debt per capita, which is also such an indicator, are significant measures of the socio/economic environment construct.

Third, the political environment construct measures of voter turnout and minority party are not significant measures and were deleted from the model. These measures are indicators of intraparty and interparty political competition, respectively, and were predicted to be significant. Voters often obtain information regarding political candidates from interest groups who can affect the election outcomes by disseminating information that favors or disfavors a candidate (Stigler, 1971). If candidates wish to be elected, they cannot ignore the interest groups and, therefore, they advocate policies that appeal to these groups. Increased competition can be viewed as increased effort on the part of group leaders to influence elected officials through actions designed to increase voter turnout. (Becker, 1983). Although the theory would imply that competition would be significant, it may be that voter turnout and minority party percentage in the city council are inadequate as measures of this competition in the political environment.

Fourth, the auditor size variable is a significant construct measure of audit quality, possibly as a result of the audit firm's incentives to uphold their reputation. Also, the demand by municipalities for an independent audit has seen significant growth in the past decade. The larger firms, i.e. Big 6 and national firms, have the resources and expertise available to perform a quality audit. Municipalities, which have fewer resources to hire the auditors, hire smaller firms. In sum, municipalities who can hire Big 6 or national firms have better quality audits and, as a consequence, higher levels of disclosure.

Fifth, an examination of the audit quality measures indicates an inverse relationship between the opinion and the audit quality. A positive association was expected because of the decrease in the auditor's risk as a result of the warning implied by a modified opinion. However, a negative association is not counter-intuitive. The modification of opinion may increase the auditor's risk, and decrease audit quality, because of the increase in necessary audit procedures. The modification may also reflect the municipality's lack of an effective internal control structure, which also increases the audit risk.

The error terms of some of the measures for the socio/economic and political environment constructs are significantly associated. These error terms are assumed a priori to be only random measurement error. The significance of these associations may be the result of two factors. First, these errors may contain some true variance that is associated with a construct or constructs that are not included in the model. Second, the number of associated error terms offer evidence of weakness in the measurement model. This weakness is best described as a lack of

discriminant validity combined with problems in underlying conceptualization of the measures themselves.

The relationships between the constructs (1) socio/economic environment and audit quality, (2) political environment and disclosure compliance, and (3) audit quality and disclosure compliance are all positive and significant, as hypothesized. However, two of the relationships hypothesized to be significant were not: (1) the socio/economic environment and disclosure compliance and (2) the political environment and audit quality. Several factors may have caused these relationships to be insignificant. First, there is a positive significant correlation between the socio/economic and the political environment constructs, which was not hypothesized to exist. Second, the associations between the error terms of the socio/economic and the political environments and the error terms of the audit quality and disclosure compliance constructs may be confusing the relationships. Third, several variables, as discussed above, are construct measures of both the audit quality construct and the disclosure compliance construct.

Table 3 Disclosure Compliance Models Results			
Parameter	LISREL Estimate	T-Values	SMC
Socio/Economic			
Own Revenue	0.349	4.982	0.123
Parameter	LISREL Estimate	T-Values	SMC
Density	0.265	3.473	0.070
Debt	0.475	6.982	0.226
Population	0.871	13.746	0.743
Political			
Form of Government	0.440	5.866	0.180
Regulation	0.355	4.677	0.132
Audit Quality			
Size	1.000		0.498
Number of Funds	0.750	4.798	0.484
Opinion	-0.481	-3.376	0.362
Disclosure			
Number of Funds	0.227	2.410	0.484
Opinion	0.793	7.700	0.362
Single	0.796	14.324	0.592
Index	1.000		0.941

CONTRIBUTIONS

This study makes several contributions to the body of literature. First, the methodology of confirmatory factor analysis has been shown to have definite promise as an alternative to

factor analysis and/or multiple regression. The results provided in this study show that municipal disclosure compliance can be modeled using the system of equations of confirmatory factor analysis. The results, when compared to multiple regression, indicate a higher explanatory power.

Another contribution of the research is the improvement in results, in part, due to the data collection method. The multiple regression results of this study exhibited a greater explanatory power than previous research. A major difference between this research and prior studies, other than the time period, is the source of the data. All financial data and most statistical data was obtained directly from the CAFR of the municipality. This increased explanatory power supports the conclusions of Icerman and Welch (1989) that CAFR data is significantly different that the census bureau data. Due to the census bureau recasting the data for regulatory agencies, imputing missing amounts, and interpolating to cast all municipalities as having a June 30 year-end, the data may be less reliable for research studies.

IMPLICATIONS FOR FUTURE RESEARCH

The methodology used in this study, confirmatory factor analysis, provides the researcher with a tool to examine the relationships between latent constructs. The results presented here indicate that the issue of disclosure compliance may be better model using the methodology of confirmatory factor analysis. Future research should test the model, including refinements, on different samples and at different points in time. Only by retesting the model can a true confirmatory factor model be developed.

The disclosure compliance index measure should be refined to eliminate the problem of all items in the index being of the same weight. Because the audit opinion, the number of funds, and the single audit requirement were found to be significant measures of the construct disclosure compliance, future research should examine these as possible alternatives to the index. Another possibility would be to categorize the disclosure items by importance and weight them accordingly.

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WHY DO SMALL BUSINESSES TAKE ON HIGH LEVELS OF EXTERNAL LOANS? A CENSORED QUANTILE REGRESSION ANALYSIS

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ABSTRACT

A limited number of studies examine capital structure decisions by closely-held small businesses. They utilize the methodologies that assume a constant relation between debt usage and explanatory variables throughout the conditional distribution of the dependent variable. Different than these prior studies, we assess debt decisions of small businesses with high levels of external loans by using Censored Quantile Regression (CQR), which requires no assumptions of the conditional distribution. Furthermore, our study analyzes the 1993 National Survey of Small Business Finances (NSSBF) to focus on a time period that resembles small businesses' debt usage and economic conditions before the recent economic collapse.

There is no evidence that the tax advantage of debt has a significant impact on the loan decisions of small businesses with high levels of external loans. When examining other capital structure factors identified in prior studies, we find that only the industry target leverage consistently affects loan decisions of these small businesses, regardless of their organizational forms. Specifically, debt usage of flow-through entities (Sole Proprietorships, Partnerships, and S-Corporations) is significantly influenced by profitability and firm age while debt usage of C-Corporations is significantly influenced by firm liquidity and owner characteristics. These findings provide a further understanding of small businesses' debt decisions in an overleveraging environment and hopefully help improve their ability to survive.
Keywords: small businesses; external loans; censored quantile regression

INTRODUCTION

Small businesses created 64 percent (14.5 million) of the net new jobs during the period of 1993 – 2008 (U.S. Small Business Administration (SBA), 2009). Though they make significant contributions to the economy, these firms are especially vulnerable to economic downturns. U.S. SBA reports that the number of small business bankruptcies increases from 19,695 in 2006 to 43,546 in 2008. Business failures may be largely influenced by the firms' decisions to take on debt obligations. Accordingly, we focus on the capital structure decisions of small businesses with high levels of external loans. This distinguishes our study from prior

studies that commonly assume consistent impacts of capital structure factors throughout the conditional distribution of debt. Further, we utilize data from a time period that resembles the period preceding the recent economic collapse in terms of small businesses' debt usage and economic conditions. Clarifying the factors of small businesses' debt decisions may help improve their survival during economic downturns given that such decisions in preceding economic expansion can have a long-term impact on business performance.

Tax laws allow businesses to reduce their tax liability by deducting interest expense from taxable income. This lowers explicit costs of interest payments to creditors. The seminal work of Modigliani and Miller (1958; 1963) conjectures that the deductibility of interest expense makes debt a more attractive source of capital than equity. However, borrowings are associated with implicit costs. For example, bankruptcy can occur when a business is unable to meet required interest and/or principal payments. Small businesses often fail to fully factor in the implicit costs of debt during the periods of economic growth. This can be dangerous as these firms generally lack excess assets to survive declining sales revenue and/or higher interest rates during subsequent economic downturns.

Among the suggestions on how to prevent future financial crises, one recommendation from Minneapolis Fed President is to limit the deductibility of interest payments of debt (Reuters, 2011). Similarly, the International Monetary Fund (IMF) presents the argument against the tax incentives of debt financing "given the large potential macroeconomic damage from excess leverage" (IMF, 2009). Though the suggestions on lowering the tax benefits of debt are not specific to small businesses, these firms could be affected by the potential changes in tax regulations. It is therefore necessary to examine whether tax savings from deducting interest payments have a significant influence on small businesses' decisions to take on high levels of debt. Such analysis is made possible through using the Censored Quantile Regression (CQR) that reports the effect of explanatory variables at various points in the conditional distribution of the dependent variable. Specifically, our CQR results of the 90th quantile apply to the firms with external loans that are higher than 90% of other small businesses.

Closely-held small businesses can choose from multiple organizational forms; however, they can be broadly classified as either C-Corporations or flow-through entities based on the firms' tax status. C-Corporations pay income tax while flow-through entities do not. In this case, tax incentives for debt usage may be different between the two types of the entity forms. In addition, unlike C-Corporations, flow-through entities have limited access to equity capital and their owners may not have the protections for the liabilities. We thus study debt usage by different entity forms of small businesses.

We find that marginal tax rates and profitability are subject to the changes in their explanatory power for the debt usage as the level of external loans increases. Otherwise, our results for high levels of external loans are similar to those for medium levels of the loans in terms of the impact of firm characteristics, industry factors, and owner characteristics. The separate examinations of C-Corporations and flow-through entities reveal the differences in their

decisions of debt usage. For flow-through entities, profitability and firm age are significant factors of the debt level; the decisions of C-Corporations are significantly influenced by firm liquidity, owner gender, and owner experience. In spite of these differences, the industry target leverage has the similar impact on debt usage of both small business entities. Small business entrepreneurs may be interested in these results. Our findings help identify the factors that significantly influence their decisions to take on high levels of debt and thus avoid improperly overweighing these factors in the decisions. Moreover, our direct examination of the tax impact on debt usage shows that the tax treatment of interest expense does not contribute to high levels of debt carried by small businesses.

The remainder of this paper proceeds as follows. Section 2 reviews prior research and elaborates our research questions, while Section 3 presents the research methods. Section 4 describes the data and Section 5 discusses the results. Section 6 provides conclusions.

LITERATURE REVIEW & RESEARCH QUESTIONS

Several studies examine firms' capital structure decisions.[1] Modigliani and Miller (1958; 1963) propose that the deductibility of interest expense gives debt the tax advantage over equity if transaction costs are assumed not to exist. Subsequent researchers present the trade-off theory that firms move towards the optimal debt ratio where the tax benefits of debt and the bankruptcy costs of debt are balanced. Conversely, Myers (1984) posits the pecking order theory that firms do not strive for an optimal debt ratio; instead, they have an order of preference for their funding needs as follows: retained earnings, debt, and equity.[2]

The majority of the capital structure research (e.g., Frank & Goyal, 2009) focuses on large publicly-traded companies. Several studies (e.g., MacKie-Mason, 1990) also examine the tax impact on capital structure of these large firms. However, only a few studies extend the analysis to closely-held small businesses. The data source commonly used in the studies of small businesses is the National Survey of Small Business Finances (NSSBF). A unique aspect of the survey data is that it includes both financial information of the firms and personal information of business owners (e.g., owner's gender).[3]

Two studies of domestic small businesses examine the impact of applicable marginal tax rates on debt usage (Cloyd, et al., 1997; Ayers, et al., 2001). They both suggest that the DeAngelo and Masulis' (1980) theory of tax considerations leading to the substitution between non-debt tax shields and interest expense applies to closely-held small businesses. Examining the 1987 NSSBF survey, Cloyd et al. find that small businesses' marginal tax rates are positively related to interest expense. The result holds across different forms of business organizations. Ayers et al. use a more recent NSSBF survey of 1993 and show that the positive impact of marginal tax rates occurs for all organizational forms when analyzing interest expense from external debt rather than shareholder loans. They also find that profitability, liquidity, firm age and business failure rate have significant impacts on small businesses' outside interest expense.

Both studies rely on the Ordinary Least Squares (OLS) models to obtain the estimates of the tax impact that are assumed to be consistent across the conditional distribution of interest expense. Whether these findings apply to the top end of the dependent variable's conditional distribution is subject to further examination.

While Cloyd et al. (1997) and Ayers et al. (2001) analyze the relation between interest expense and alternative tax shields, several studies utilize the NSSBF data to examine the impact of non-tax factors on small businesses' debt. Among them, we focus on Cole's (2011) Weighted Least Squares (WLS) analysis of all available NSSBF surveys for the following reasons. First, Cole analyzes these firms' total loans as a percentage of total assets. Such specification of debt usage excludes non-debt liabilities that may not generate deductible interest expense. We use a similar measure in our study. Second, Cole examines the 1993 NSSBF survey, which is the most recent one reporting interest expense. This survey allows us to estimate the pre-interest taxable income and obtain an appropriate measure of marginal tax rates for examining the tax impact on small businesses' debt usage. Third, Cole's study presents a comprehensive examination of non-tax explanatory variables commonly identified by the capital structure research in the context of small businesses. It provides insights into non-tax factors of small businesses' capital structure, helping construct an appropriate model for our CQR analysis. The significant non-tax factors include profitability, liquidity, tangibility of assets, firm age, industry target leverage, and owner's gender as well as minority status.

Different than prior studies, our study aims to investigate whether the tax deductibility of interest expense, along with traditional capital structure factors, has a significant impact on the decisions of small businesses to take on high levels of external loans. Accordingly, we utilize the CQR analysis to examine the following research questions:

> *RQ 1   Does the significant positive impact of marginal tax rates on debt usage hold for firms with high levels of external loans?*

> *RQ 2   Do the impacts of non-tax explanatory variables on debt usage obtained at medium levels external loans hold for firms with high levels of such loans?*

Small businesses may have different tax status classifications. Owners of C-Corporations are subject to double taxation. A C-Corporation pays federal income tax on its income when earned and its owners pay tax on dividends when distributed. In contrast, flow-through entities are only subject to federal income tax at the owner level. Owners must include their shares of the firm's income on their federal income tax returns in the year when it is earned, regardless of whether any profits are distributed. The tax difference between the two entities suggests that owners may have different tax planning strategies.

Common forms of flow-through entities are S-Corporations, partnerships and proprietorship.[4] Besides the tax difference from C-Corporations, flow-through entities experience more difficulty in raising equity. For proprietorships, the accessible equity is limited

to the capital of sole owners. It is also often difficult for partnerships to include additional owners as a result of partnership agreements. The number of shareholders is limited to 100 for S-Corporations.[5] Other restrictions for S-Corporations include not being allowed to have partnership or corporate shareholders among their owners and have more than one class of stock. Another disadvantage of flow-through entities is that there may be no unlimited liability protection for their owners. These differences between C-Corporations and flow-through entities indicate that the capital structure factors identified in the literature may have different impacts on their decisions of debt usage. Thus, we re-examine *RQ1* and *RQ2* using the separate samples of C-Corporations and flow-through entities.

> *RQ 3*   *Are the impacts of these factors on debt usage consistent across different organizational forms, C-Corporations or flow-through entities, of small businesses?*

RESEARCH METHODS

Model

The purpose of our study is to examine the borrowing decision of small businesses with high levels of external loans. The dependent variable, external loans (*OLOANS*), is defined as the difference between total loans and the loans from owners, normalized by total assets. One explanatory variable of interest is Marginal Tax Rate (*MTR*). When estimating the tax rates, Graham et al. (1998, p. 157) suggest that it is necessary to use the pre-interest taxable income to avoid "a spurious negative relation between debt usage and after-financing tax rates". As such, we derive the *MTR*s for C-Corporations from the ranking of their pre-interest taxable income on the corporate tax rate schedule for the fiscal year.

For flow-through entities, tax is assessed on the income at the individual level rather than at the firm level. To estimate the *MTR*s for these small businesses, it is necessary to obtain the owners' total income (i.e., the income from the business plus the income from other sources). Unfortunately, the NSSBF does not include the information about the income from other sources earned by the owners of flow-through entities. We thus follow Ayers et al. (2001) to estimate the *MTR*s using the allocated pre-interest taxable income based on ownership shares. If there are individuals owning 20 percent or more of a business, the allocated income is the portion of income for the individual with the largest ownership share. In contrast, the allocated income is equal to the total income multiplied by the average ownership share of all owners when all ownership shares are less than 20 percent. The *MTR* of a flow-through entity is the tax rate assessed on the allocated pre-interest taxable income based on the married filing jointly filing status.

In our model, firm characteristics are captured by return on assets (*ROA*), liquidity (*LIQ*), tangible assets normalized by total assets (*TANGAT*), and firm age (*FAGE*).[6] Cole (2011) shows

that these firm characteristics have significant impacts on debt usage of closely-held small businesses. In this study, we add back interest expense to the income when estimating *ROA* to avoid the endogeneity problem with our dependent variable. Similar to Cole, we also account for the industry effects on the firms' capital structure. These variables include the industry target leverage (*TARGET*) and the industry-level business failure rate (*RISK*).[7] The industry target leverage is the median ratio of external loans to total assets for an industry group based on its 2-digit SIC code if there are at least five firms in the group. Otherwise, we define the industry group based on the 1-digit SIC code.

Different than publicly-traded firms, owners are often involved in managing the operation of small businesses. Following Cole (2011), we include owner characteristics of being a minority (*MINORITY*) and female (*FEMALE*) in the model. The prior study shows evidence that both ethnic classification and gender of the primary owner have significant impacts on the capital structure of small businesses based on the 1993 NSSBF data. Instead of using a dummy variable for each minority group, we follow Cole's robustness test and use a single dummy variable for minority-owned firms to simplify the model for the CQR analysis. In addition, Headd (2003) shows that business owner's previous experience has significant explanatory power for the likelihood of business survival. Given the richness of the NSSBF data on owner characteristics, it is possible to estimate the impact of owner experience (*OEXPER*) on external loans.

Model Estimation

With 25.29% of our sample having zero external loans, the traditional econometric method of linear regressions (e.g., OLS) presents inconsistent estimators (Cameron & Trivedi, 2009). A potential alternative method to examine a censored dependent variable is to apply OLS to solely the observations with non-zero values. Such process systematically removes certain observations and valuable information is omitted from the analysis (Kennedy, 2005). To overcome these limitations, the Tobit regression model proposed by Tobin (1958) can be used to analyze the censored data. In spite of its advantages, the Tobit model is similar to the OLS regression in that it estimates explanatory variables' impact at the dependent variable's conditional mean. Since we focus on a group of firms with high levels of external debt, the Tobit model is not the most appropriate in our study. Moreover, the maximum likelihood estimation of the Tobit model requires the satisfaction of the homogeneous and normal error distribution assumptions. The violation of these assumptions leads to inconsistent Tobit estimates (Arabmazar and Schmidt, 1981; 1982).

Koenker and Bassett's (1978) quantile regression (QR) model allows us to analyze non-censored data at various points of the dependent variable's conditional distribution. Utilizing all observations, the QR estimation does not present biased and inconsistent parameter estimates resulting from separate analyses of subsamples (Koenker & Hallock, 2001). The method also benefits from not assuming the distribution of error terms. In the study of the censored data, we

use the Chernozhukov and Hong's (2002) three-step procedure to obtain the Powell (1986) CQR estimator. Specifically, we assess the impact of tax and non-tax factors on the usage of external loans by firms with high levels of such loans through analyzing the 90th quantile of *OLOANS*.

DATA

We obtain the data on U.S. small businesses from the survey conducted for the Board of Governors of the Federal Reserve System and the U.S. SBA. Prior researchers use the survey data to study for-profit, nonfinancial, nonfarm business enterprises with fewer than 500 employees (e.g., Chakravarty & Yilmazer, 2009; Rice & Strahan, 2010). The NSSBF data is available for 1987, 1993, 1998 and 2003.

Our study examines the 1993 NSSBF database for the following reasons. First, the 1993 NSSBF is the most recent survey to report interest expense, which allows us to calculate firms' pre-interest taxable income. The estimation of pre-interest income is critical to construct appropriate marginal tax rates for examining debt financing decisions. Second, the survey is conducted during a period when the debt usage of publicly-traded small firms is similar to that before the most recent economic collapse. For example, the median ratio of total loans to total assets for small firms (i.e., those with less than 500 employees) on Compustat is 0.1140 in 1993 and 0.0974 in 2006.[8] Third, the 1993 survey is constructed during a period of economic growth similar to that occurring prior to the most recent economic collapse. Specifically, the percent change in the Gross Domestic Product based on 2005 dollars was 2.9% and 2.7% in 1993 and 2006, respectively (BEA, 2011).

We start with 4,637 firms included in the 1993 survey. Publicly-traded firms are eliminated to construct a sample of closely-held firms. Our dependent variable is external loans as a percentage of assets. The exclusion of firms reporting zero assets or total loans less than the loans from owners ensures non-negative values for the dependent variable. Further, we require no negative values for pre-interest taxable income and no missing values for all variables necessary in our analysis. Similar to Ayers et al. (2001), firms with negative pre-interest taxable income are excluded given the difficulty in modeling these firms' tax implications. C-Corporations are allowed to carry losses back two years or forward up to twenty years to offset taxable income in other years. In contrast, flow-through entity owners are allowed to offset current-year losses against other income in the same year.[9] Due to data limitations, we do not have the information about prior-year income for C-Corporations as well as other income for flow-through entities and thus are unable to accurately capture tax benefits of current-year losses. Our final sample consists of 3,365 firms, of which are 2,275 flow-through entities and 1,090 C-Corporations. To avoid the potential impact of outliers, we winsorize financial ratios at the 1st and 99th percentiles. The dependent variable, external loans as a percentage of total assets, has a lower boundary at zero and thus is winsorized only at the 99th percentile.

We adjust for the NSSBF weights in all analyses to ensure that our results can be generalized to the target population of closely-held small businesses. The NSSBF data is over representative of the larger and minority-owned firms with less than 500 employees. Thus, it is necessary to incorporate sample weights in the analysis to compensate for the sample design of unequal probabilities.

Table I presents descriptive statistics of continuous variables for the full sample (Panel A), for the subsample of flow-through entities (Panel B), and for the subsample of C-Corporations (Panel C). For all examined samples, the mean value of *OLOANS* is larger than its median value. We also observe the dispersion between the mean and median values of all continuous explanatory variables. The skewed data suggests the possibility of violating the error distribution assumptions of homogeneity and normality required for the Tobit analysis. We use the Lagrange Multiplier tests as described in Cameron and Trivedi (2009, p. 535-538) for these assumptions. Our results show that both assumptions of the Tobit error distribution are rejected.

Table I reveals notable differences between flow-through entities and C-Corporations. First, flow-through entities rely more on *OLOANS*. This is not surprising since flow-through entities encounter more difficulty in raising new capital through equity. Second, flow-through entities have higher levels of *ROA, LIQ* and *TANGAT*. Third, C-Corporations have higher *MTR*s and are older firms.

	N	Mean	Median	90th Percentile
Table I				
Descriptive Statistics				
Panel A: Full Sample				
OLOANS	3365	0.3324	0.2075	0.8459
MTR	3365	0.2105	0.1500	0.3100
ROA	3365	1.3636	0.4110	3.4946
LIQ	3365	0.1978	0.1087	0.5136
TANGAT	3365	0.4336	0.4262	0.9111
FAGE	3365	2.5000	2.4849	3.4012
TARGET	3365	0.2277	0.1882	0.3791
RISK	3365	97.6693	94.0000	157.0000
OEXPER	3365	2.7511	2.8332	3.5553
Panel B: Flow-Through Entities				
OLOANS	2275	0.3421	0.2146	0.8619
MTR	2275	0.2073	0.1500	0.3100
ROA	2275	1.6199	0.5865	4.0549
LIQ	2275	0.2050	0.1162	0.5263
TANGAT	2275	0.4557	0.4545	0.9228

Table I Descriptive Statistics				
	N	Mean	Median	90th Percentile
FAGE	2275	2.4710	2.4849	3.3673
TARGET	2275	0.2301	0.1948	0.3791
RISK	2275	96.7200	89.0000	157.0000
OEXPER	2275	2.7201	2.7726	3.5553
Panel C: C-Corporations				
OLOANS	1090	0.3011	0.1882	0.7915
MTR	1090	0.2211	0.1500	0.3900
ROA	1090	0.5318	0.1007	1.1771
LIQ	1090	0.1744	0.0942	0.4686
TANGAT	1090	0.3618	0.3158	0.8275
FAGE	1090	2.5942	2.6391	3.4340
TARGET	1090	0.2199	0.1871	0.3791
RISK	1090	100.7499	101.0000	157.0000
OEXPER	1090	2.8520	2.9957	3.5553
This table presents descriptive statistics of all continuous variables in our analyses. The definition of these variables is shown in the Appendix. We winsorize financial ratios at the 1st and 99th percentiles while winsorizing the dependent variable, external loans as a percentage of total assets, only at the 99th percentile.				

RESULTS

Full Sample

The results of the Tobit and CQR regressions for our full sample are presented in Table II. We report the CQR results at the 50th quantile for a comparison with the Tobit results, which show parameter estimates at the conditional mean level of the dependent variable as documented in prior studies. The CQR results at the 90th quantile are for the analysis of small businesses with high levels of external loans. Consistent with prior studies, we find that *MTR* has a significant positive impact on external loans at the mean and median levels. However, when examining firms with high levels of external loans, the estimated coefficient for *MTR* is not significant. This insight from the CQR analysis suggests that the tax-shielding benefit from debt usage does not drive small businesses to take on high levels of external debt.

While *ROA* is insignificant in the Tobit and 50th quantile estimates, it is significantly positive at the 90th quantile. The significant impact of profitability on high levels of external loans may result from the better ability of profitable firms to pay back their borrowings. Consistent with the results of *MTR* and *ROA*, most of remaining explanatory variables have qualitatively similar results for the Tobit and the CQR's 50th quantile estimates. As such, our

subsequent discussions of these variables focus on the CQR results at the 50th quantile unless they are notably different from the Tobit estimates. The CQR estimated coefficients for *LIQ* are significantly negative at both the 50th and 90th quantiles. The size of the coefficient at the 50th quantile (-0.3622) is larger than the one at the 90th quantile (-0.2666). That is, the impact of *LIQ* becomes smaller for firms with high external loans than for those with medium levels of the loans. The estimated coefficients for *TANGAT* are significantly positive in both CQR models. Similar to *LIQ*, *TANGAT* has a smaller impact on the usage of external loans as such loans increase. The findings of *LIQ* and *TANGAT* combined suggest that the asset composition has a smaller impact for firms with high levels of external loans than observed at medium levels of the loans. The last variable of firm characteristics examined in our study is *FAGE*, which has a significant negative relation with the level of external loans in both CQR models. We find that the magnitude of firm age's impact increases with the level of external loans.

Considering that a firm's usage of external loans may reflect certain industry characteristics, we include in our analysis two industry-level factors that are closely tied to debt financing. The estimated coefficients for *TARGET* are significantly positive at both the 50th and 90th quantiles. The magnitude of its coefficient is larger for firms with high levels of external loans than for those with medium levels of the loans. For the other industry-based explanatory variable, *RISK*, different regression models present different estimates. Its estimated coefficient is significantly negative in the Tobit model while being insignificant in both CQR models. We regard the CQR estimates of *RISK* as more reliable given that the estimates are robust to the violation of error distribution assumptions. Therefore, our results suggest that the level of business failure within an industry does not affect the firm-level decision on external loans.

Table II Tobit and CQR Analyses for Full Sample			
		Censored Quantile Regressions	
	Tobit Regression	50th Quantile	90th Quantile
Intercept	0.3775	0.2114	0.9819
	0.000	0.002	0.000
MTR	0.2811	0.3049	-0.3015
	0.012	0.017	0.239
ROA	0.0010	-0.0028	0.0302
	0.763	0.507	0.000
LIQ	-0.2689	-0.3622	-0.2666
	0.000	0.000	0.020
TANGAT	0.2040	0.1776	0.1596
	0.000	0.000	0.019
FAGE	-0.0608	-0.0413	-0.0714
	0.000	0.030	0.048

		Censored Quantile Regressions	
Table II **Tobit and CQR Analyses for Full Sample**			
	Tobit Regression	50th Quantile	90th Quantile
TARGET	0.7501	0.7638	1.0665
	0.000	0.000	0.000
RISK	-0.0375	0.0047	-0.0309
	0.043	0.836	0.466
MINORITY	-0.0959	-0.0256	-0.0509
	0.000	0.324	0.307
FEMALE	-0.0351	-0.0141	-0.0172
	0.110	0.594	0.740
OEXPER	-0.0679	-0.0542	-0.0739
	0.000	0.007	0.059
N (N Uncensored)	3,365 (2,514)		
This table presents the CQR results at the 50th and 90th quantiles as well as the Tobit results for our full sample. The definition of all the variables included in the analyses is shown in the Appendix. The dependent variable is external loans as a percentage of total assets. We winsorize financial ratios at the 1st and 99th percentiles and the dependent variable only at the 99th percentile. The estimated coefficients for *RISK* are multiplied by 10^2. *P-values* are presented below the coefficients.			

Different than publicly-traded corporations, closely-held small businesses do not encounter the separation of ownership and control. It is expected that these firms' decision of debt usage may be influenced by owner characteristics. We find that *MINORITY* has a significant negative coefficient in the Tobit model and an insignificant estimate in both CQR models. The rejection of homogeneous and normal error distributions suggests that the Tobit estimate is inconsistent. In this case, we rely on the CQR estimates for *MINORITY*. The estimated coefficients for *FEMALE* are also insignificant in both CQR models. The results suggest that race and gender of small business owners do not affect debt usage of firms with medium or high levels of external loans. In contrast, the estimated coefficients for *OEXPER* are significantly negative at both the 50th and 90th quantiles, showing that the level of external loans decreases with the length of owners' experience with managing businesses. *OEXPER* has a greater impact at high levels than at medium levels of external loans.

Flow-Through Entities vs. C-Corporations

The results for our subsample of flow-through entities are presented in Table III. Similar to the estimates for the full sample, the coefficients for *MTR* change from being significantly positive for flow-through entities with medium levels of external loans to being insignificant for those with high levels of such loans. In regards to remaining explanatory variables, the results for

the subsample are consistent with those for the full sample when examining medium levels of external loans. However, as the level of external loans increases, we observe some changes in the results. *LIQ*, *TANGAT* and *OEXPER* lose their explanatory power for external loans at the 90th quantile. The difference in debt decisions by firms with different borrowing levels becomes more obvious when accounting for the forms of business entities.

		Censored Quantile Regressions	
Table III **Tobit and CQR Analyses for Flow-Through Entities**			
	Tobit Regression	50th Quantile	90th Quantile
Intercept	0.3794	0.2439	1.0555
	0.000	0.001	0.000
MTR	0.3153	0.2770	-0.3614
	0.051	0.079	0.370
ROA	0.0005	0.0043	0.0247
	0.898	0.285	0.015
LIQ	-0.2138	-0.2614	-0.2235
	0.000	0.000	0.118
TANGAT	0.2153	0.1884	0.1561
	0.000	0.000	0.101
FAGE	-0.0737	-0.0648	-0.1066
	0.001	0.003	0.043
TARGET	0.7763	0.7317	1.0535
	0.000	0.000	0.000
RISK	-0.0449	-0.0110	-0.0546
	0.064	0.650	0.359
MINORITY	-0.1212	-0.0279	-0.0576
	0.001	0.316	0.414
FEMALE	-0.0380	-0.0121	-0.0871
	0.180	0.665	0.222
OEXPER	-0.0690	-0.0447	-0.0435
	0.002	0.043	0.392
N (N Uncensored)	2,275 (1,626)		
This table presents the CQR results at the 50th and 90th quantiles as well as the Tobit results for the subsample of flow-through entities. The definition of all the variables included in the analyses is shown in the Appendix. The dependent variable is external loans as a percentage of total assets. We winsorize financial ratios at the 1st and 99th percentiles and the dependent variable only at the 99th percentile. The estimated coefficients for *RISK* are multiplied by 10^2. *P-values* are presented below the coefficients.			

Our results show the importance of considering organizational forms when examining the usage of external loans by small businesses. The level of external loans can be attributed to *ROA*, *FAGE*, and *TARGET* for flow-through entities with high levels of such loans. Among these three factors, *TARGET* has the most explanatory power, suggesting the great impact of industry-level leverage on firm-level debt.

Table IV reports the results for our subsample of C-Corporations. Consistent with the findings for flow-through entities, *MTR* remains significantly positive (insignificant) for C-Corporations with medium (high) levels of external loans. The industry-level variable of *TARGET* also retains its significant positive relation with the level of external loans, regardless of the examined quantiles. However, we observe a few changes in the results for non-tax explanatory variables in comparison with those for flow-through entities. First, among firm characteristic variables, the estimated coefficient for *ROA* becomes insignificant while the estimate for *LIQ* becomes significantly negative at the 90th quantile. Second, another firm characteristic, *FAGE*, no longer has significant explanatory power for external loans at the 50th and 90th quantiles. Third, owner gender becomes a significant determinant of loan usage at both the 50th and 90th quantiles. For medium levels of external loans, the estimated coefficient of *FEMALE* is significantly negative. In contrast, the coefficient is significantly positive for high levels of the loans. The results present additional evidence that empirical findings at the mid-point of the conditional distribution may not apply to the top end of the distribution. Last, the estimate for *OEXPER* is insignificant (significantly negative) for firms with medium (high) levels of external loans.

		Censored Quantile Regressions	
	Tobit Regression	50th Quantile	90th Quantile
Intercept	0.2938	0.1139	0.8009
	0.000	0.253	0.000
MTR	0.2176	0.3188	0.0714
	0.091	0.027	0.849
ROA	-0.0102	0.0011	0.0040
	0.184	0.915	0.755
LIQ	-0.4430	-0.5040	-0.8911
	0.000	0.000	0.000
TANGAT	0.2172	0.1833	0.1756
	0.000	0.000	0.184
FAGE	-0.0475	-0.0138	-0.0241
	0.019	0.576	0.636

Table IV
Tobit and CQR Analyses for C-Corporations

		Censored Quantile Regressions	
Table IV **Tobit and CQR Analyses for C-Corporations**	Tobit Regression	50th Quantile	90th Quantile
TARGET	0.7410	0.7748	1.4503
	0.000	0.000	0.000
RISK	0.0012	-0.0195	0.0559
	0.964	0.556	0.401
MINORITY	-0.0312	0.0478	-0.0172
	0.433	0.214	0.819
FEMALE	-0.0168	-0.0694	0.1798
	0.604	0.097	0.049
OEXPER	-0.0424	-0.0324	-0.1321
	0.066	0.265	0.051
N (N Uncensored)	1,090 (888)		

This table presents the CQR results at the 50th and 90th quantiles as well as the Tobit results for the subsample of C-Corporations. The definition of all the variables included in the analyses is shown in the Appendix. The dependent variable is external loans as a percentage of total assets. We winsorize financial ratios at the 1st and 99th percentiles and the dependent variable only at the 99th percentile.
The estimated coefficients for *RISK* are multiplied by 10^2. *P-values* are presented below the coefficients.

CONCLUSIONS

Prior studies of closely-held small businesses' capital structure utilize traditional linear regression. This methodology relies on the assumption that the relation between loan decisions and explanatory variables remain the same throughout the conditional distribution of external loans. By contrast, our study uses the CQR analysis to examine debt usage of closely-held small businesses with high levels of external loans. These firms are of importance due to their high risk of going bankrupt. An understanding of the factors influencing small businesses' decisions to take on high levels of external loans may help improve their chance of survival. In addition, our study is built on a period resembling pre-2008 economic collapse. Our findings provide insights to these small businesses' debt decisions during a period of economic growth and thus help them survive subsequent economic slowdowns. Specifically, we investigate the tax impact on loan usage of firms with high levels of external loans. We also assess whether other capital structure factors identified in prior studies have significant explanatory power for high levels of external loans. Further, recognizing that organizational forms of closely-held small businesses are subject to multiple differences, we separately examine loan usage of flow-through entities and C-Corporations.

Consistent with previous research, we find that marginal tax rates have a positive impact on medium levels of external loans. When examining firms with high levels of external loans, the tax rates are not significant, suggesting that the tax-shielding benefit of interest expense does not influence small businesses to take on high levels of external loans. Profitability is also subject to a change in its explanatory power with an increase in the level of external loans and has a significant positive impact on loan decisions when the level of such loans is high. Otherwise, firm characteristics, industry factors, and owner characteristics have similar impacts on debt decisions of firms with high levels of external loans as those with medium levels of such loans.

Our further examinations of flow-through entities and C-Corporations reveal some interesting perspectives about the debt decisions of these organizational forms. Marginal tax rates remain insignificant in both subsamples for high levels of external loans. The other consistency between the two subsamples is related to the industry target leverage, which has a significant positive impact on debt levels. In regards to the variables reflecting firm-specific features and owner characteristics, our results suggest differences in debt decisions between the two types of small businesses. For flow-through entities, profitability and firm age have significant impacts on the debt level; the decisions of C-Corporations are significantly influenced by firm liquidity, owner gender, and owner experience.

Our results show several implications of small businesses' debt usage. First, for these businesses, the availability of tax shelter from debt does not contribute to high levels of external loans. Second, small business owners should cautiously depend on current profitability to evaluate their debt capacity. These firms may experience drastic changes in their operating performance as the economic condition deteriorates. Overreliance on current profitability may increase the likelihood of future failure. Last, organizational forms of small businesses are important in explaining high levels of external loans. We find that debt decisions of flow-through entities and C-Corporations are subject to different sets of factors. Besides providing the insights to the factors influencing small businesses to take on high levels of external loans, we hope that our study will help researchers recognize the potential for applying CQR to their studies.

ACKNOWLEDGMENTS

ENDNOTES

1. Frank and Goyal (2008) provide a thorough review of capital structure research.
2. We do not include a discussion of Baker and Wurgler's (2002) market timing theory because it is not applicable to firms that do not utilize publicly traded securities markets.
3. The NSSBF surveys also include the information on the firms' financing characteristics (e.g., the number of commercial banking relationships); however, most of such variables are categorical variables. When

examining banking characteristics, prior studies commonly code these survey variables as dummy variables. Including a large number of dummy variables can lead to the multicollinearity problem in our quantile regression analysis. Thus, we focus on firms' financial information and owner characteristics.

4. While proprietorships technically have no separate legal entities from the owners, these small businesses are similar to S-Corporations and partnerships in that they are not subject to double taxation.

5. S-Corporations were only allowed up to 35 shareholders during our sample period of 1992-1993.

6. Another firm characteristic variable that is commonly included in the capital structure studies is firm size. However, Cole (2011) states that common proxies of firm size (e.g., total assets, sales revenues, and the number of employees) are problematic in the NSSBF as a result of missing values and outliers. Likewise, Ayers et al. (2001) do not include firm size in their study.

7. Cole (2011) tests the default risk at the firm level as whether "Firm has been delinquent". Though Cole shows the significant impact of the firm-level default risk for both 1998 and 2003 NSSBF data, the prior study finds that the risk factor is insignificant based on the 1993 survey data. Instead, Ayers et al. (2001) documents a significant impact of the default risk factor at the industry level for the 1993 data. Thus, we follow Ayers et al. and include the industry-level business failure rate to capture the default risk.

8. Cole (2011, p. 21) provides the details on estimating the ratio of total loans to total assets for publicly-traded small firms.

9. In order for flow-through entity owners to deduct losses, they must satisfy the At-Risk Rules governed by the Internal Revenue Code (I.R.C.) Section 465. Passive Activity Loss Rules under I.R.C. Section 469 may further limit these deductions if the owners do not materially participate within the business.

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Appendix. Variable Definitions		
Variable	Definition	NSSBF Variable Name
OLOANS	The difference between total loans and the loans from owners, normalized by total assets.	S2; F39; ASSETS
MTR	Marginal tax rate of a C-Corporation based on the ranking of pre-interest taxable income on the corporate tax rate schedule for the fiscal year and the tax rate of a flow-through entity assessed on the allocated pre-interest taxable income based on the married filing jointly filing status.	P15ORI; PROFIT; P17ORI; P1; P5ORI; TOTEXP; P8
ROA	Pre-interest taxable income, normalized by total assets.	P15ORI; PROFIT; P17ORI; P1; P5ORI; TOTEXP; P8; ASSETS
LIQ	Cash holdings, normalized by total assets.	R1; ASSETS
TANGAT	Fixed and depreciable assets, normalized by total assets.	R11; R13; ASSETS
FAGE	Natural logarithm of the sum of age of firm and 1.	FIRMAGE
TARGET	The median ratio of external loans to total assets for each two-digit industry group including at least 5 firms; if there are less than 5 firms in a two-digit industry group, it is the median ratio of external loans to total assets for the one-digit industry group.	S2; F39; ASSETS; SIC_2
RISK	The industry-level failure rate obtained from Dun & Bradstreet's *Business Failure Record* (1993).	SIC_2
MINORITY	Equal to 1 if the owner with a ownership share of more than 50% is a minority and otherwise equal to 0.	RACE; HISPAN
FEMALE	Equal to 1 if the owner with a ownership share of more than 50% is female and otherwise equal to 0.	GENDER
OEXPER	Natural logarithm of the length of the owner's experience with managing a business.	EXPER

CHOOSING A PLACE ALONG THE IFRS ADOPTION CONTINUUM:
THE PERSPECTIVE OF U.S. CORPORATE ACCOUNTANTS

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INTRODUCTION

The International Financial Reporting Standards (IFRS) adoption continuum ranges from no formal action to complete IFRS conversion. Currently over 100 countries and 12,000 companies have adopted some form of IFRS; this includes many privately-held U.S. companies. The United States is the last large economic powerhouse to withhold an IFRS mandate for its publicly traded companies. Although most U.S. surveys show widespread agreement that there are clear benefits to having just one set of global accounting standards (for example a reduction in the cost of capital), the U.S. Securities and Exchange Commission has not yet required IFRS adoption.

One reason for the delay is a lack of detailed knowledge about exactly how IFRS will impact businesses. Which companies will experience a reduced cost of capital due to reduced information risks? Is it possible that some companies will have the same level (or a higher level) of information risk they have now because different countries are allowing IFRS implementation in different ways? The reduced cost of capital will not be achieved merely because statements are comparable due to the use of common standards; users will have to understand and believe they are comparable (Nobes and Zeff, 2009).

Concerns over comparability are difficult to combat because few jurisdictions have adopted IFRS without modification. There are differences from country to country, and sometimes by region within a country (Nobes and Zeff, 2008). There must be a balance between standards uniformity and the need to accommodate inter-country differences in cultural and business norms.

Other issues still to be resolved include the relative roles of various standard setting bodies in establishing accounting and auditing standards; whether IFRS use should become mandatory (versus optional); whether the U.S. will allow customization of particularly contentious IFRS standards, and how IFRS will roll into CPA licensure and the CPA exam, among other issues.

Many large U.S. companies are making informed decisions about IFRS and are taking actions commensurate with their views of its eventual likelihood of adoption. On one end of the

adoption spectrum are companies that have taken few actions supporting a change to IFRS. These companies may be taking the most economically-feasible route. It may be unwise to take on the burden of changing to IFRS when the payoff is questionable. If IFRS is not required, capital markets will not punish companies who fail to adopt IFRS by increasing the cost of capital. In fact, the lack of an IFRS mandate may mean that the costs of the change to IFRS may not be recouped in reductions in the cost of capital (Sunder, 2009).

On the other end of the adoption spectrum are companies that have made the full change to IFRS. These companies believe that it is unwise to sit on the sidelines and wait until the benefits of IFRS are completely clear. They see the potential risk disruption of their access to capital as more prominent than the risk of adopting standards that may turn out to be disadvantageous in some way. Many of these companies have international operations in countries that report in IFRS already, providing incentive to move ahead with IFRS to streamline inter-company reporting.

This paper investigates reasons companies choose a particular position along the IFRS adoption continuum outlined above. Interviews were done with high level accountants at ten large U.S. corporations whose adoption strategy ranges from no action at all to complete conversion to IFRS. Common themes and concerns regarding these companies' IFRS implementation are reported and discussed. In general, our results show that IFRS implementation is neither as costly nor as difficult as most studies to date have proposed.

DIFFERENCES IN IFRS PREPAREDNESS

The AICPA and the Big Four accounting firms are in agreement about the need for IFRS preparation. Surveys by PWC, Ernst and Young and Grant Thornton in 2009 all detail actions being taken by these large firms to motivate clients to begin preparing for IFRS (see Deloitte, 2009; PWC, 2009; Ernst and Young, 2009, Grant Thornton, 2009). The firms all advocate for a preliminary IFRS needs assessment. This initial assessment helps identify the areas in the organizations that would be impacted by a move to IFRS. Most companies find that impacts are concentrated in these broad areas: personnel and training, policies, procedures and processes, and information systems.

There are many conflicting findings regarding the state of IFRS preparations in the U.S. For example, AICPA (2010) found that 60% of survey respondents from U.S. public companies were delaying preparations for IFRS until the SEC announces a mandatory adoption date. An update of this survey in October 2010 indicated that "movement in the U.S. accounting profession has been on hold since May 2010 with no significant changes to the results found in the May 2010 study (AICPA, October 2010).

This differs from Deloitte (2009), which found that nearly 90% of financial executives believed that IFRS conversion was highly or somewhat likely to become mandatory in the U.S. and 67% indicated that they had dedicated a person or team to focus on IFRS or monitor IFRS

developments. At the time of that survey, 80% of executives reported having completed (or were planning to complete) an IFRS needs assessment. Interestingly, PWC (2009)'s survey of CFOs found that only one third of multinationals had done (or were planning to do) an IFRS needs assessment.

AICPA (2010) found that overall IFRS familiarity had not changed since 2008, and most public companies reported they were still not prepared for IFRS adoption. When asked about the largest challenges they will face in implementing IFRS, the responses from business and industry identified education, updating accounting policies, managing the transition and updating or changing IT systems as their greatest concerns. Deloitte (2009) identified these same implementation issues.

IFRS AND U.S. GAAP

Why haven't all companies in the U.S. who are doing business internationally (who are permitted to) adopted IFRS? One explanation is that the differences between U.S. GAAP and IFRS cause concern. Concerns include a lack of transparency (e.g. Byrnes, 2009), reduced comparability (e.g. Chlala and Lavigne, 2009), increased fraud potential (e.g. Graziano and Heffes, 2008) and low quality of IFRS compared with U.S. GAAP (e.g. Brackney and Witmer, 2005).

The premise that GAAP is more rules-based and IFRS is more principles-based also causes concern because U.S. business practices are so ingrained with our rules-based system. A shift to a principles-based system could lead to widespread changes in business practices, and auditing (and other regulation) of those practices.

Companies' familiarity with local GAAP facilitates transactions, contracting, information systems and planning. Introducing uncertainties such as those arising from changing to IFRS may cause companies to consider adoption too complex and too costly to undertake until the change is mandated (and therefore all competitors bear the same burdens).

Some companies see past these uncertainties and move toward IFRS because IFRS specifically allows for inter-country differences, a concept Thomas (2009) refers to as carve-outs. The enterprise 'IFRS to-do' list is extensive and fraught with both risks and opportunities; company's reputation with investors can be harmed if adequate planning for the migration does not take place (Singer, 2009). For example, different carve-outs are available in different countries, so adoption for companies doing business across many countries may be very complex.

OUR STUDY

Our study investigates the experiences and opinions of large multinational U.S. companies that are moving toward IFRS. Insights into these companies' IFRS-related activities

are interesting because the opportunity to implement a widespread change in accounting (such as the change from U.S. GAAP to IFRS) is not common. IFRS adoption differs in the details for every company, but all companies are likely to end up addressing a common set of issues having similar concerns. Our study begins to identify those specific issues and concerns.

We interviewed those responsible for IFRS reporting and/or planning at ten Fortune-500 corporations (9 public, 1 privately held). The sample is small and non-representative, but provides important information regarding IFRS preparation and the concerns of those who will be responsible for transitioning to IFRS. Companies were chosen for inclusion in this project purely based on the authors' access to high level accountants at the companies. Participating companies all chose to remain anonymous in this project; all companies are in different industries, none are service companies and all have operations inside and outside the U.S.

All 10 participating companies report under IFRS in some countries due to statutory reporting requirements. Eight of the public companies are required to report using U.S. GAAP and one company reports under both U.S. GAAP and IFRS (with IFRS being the primary reporting standards). The privately held company currently reports under U.S. GAAP.

The companies have all taken steps to learn more about IFRS. Some are better prepared than others for a transition, but none of the eight public companies which currently report primarily under U.S. GAAP have moved beyond the initial assessment stage. They are all currently taking a wait and see stance in regard to whether or not the SEC will mandate the change. Without that mandate, and a date certain as to when it will be required, they are not making any further preparations. The general consensus is that the change will take several years to complete and cost a great deal of money, but they are not losing any sleep over whether the SEC mandates the change or not.

None of the companies say they would have elected IFRS in any of their locations if not for a requirement to do so. The company that reports under both GAAP and IFRS was required to adopt IFRS due to its ownership structure. Each of the companies has some IFRS statutory reporting requirements that arise from other countries; all of the 10 companies felt their IFRS specific-country reporting requirements were minimal compared with their overall reporting requirements.

For the nine U.S. GAAP-reporting companies, the extent of IFRS statutory reporting requirements ranged from a few entities in a couple jurisdictions to hundreds of entities in multiple jurisdictions. The overall level of IFRS knowledge within the selected organizations was driven to some extent by these IFRS statutory reporting requirements.

Interviews were not structured, although we had a working set of issues to discuss with each company. We were interested in understanding how the implementations worked in the basic areas of personnel and training, policies, procedures and processes, and information systems. Prior research discusses IFRS implementation in these areas and we sought to provide additional details in those areas.

The interviewees were all relatively high up in the corporate accounting areas of their organizations, reporting to the controller or equivalent. All were CPAs and all had duties beyond the evaluation and or implementation of IFRS. All Interviewees were very knowledgeable in regard to IFRS, gaining that knowledge as the result of actual IFRS implementations/conversions and, or through self-study.

The sections below describe common preparation issues reported by the companies, and details the explanations provided by participants about how the companies decided to address those issues. The public companies have some experiences with their IFRS work to date, allowing them to provide interesting insights into what really is involved in a transition to IFRS.

THE PRELIMINARY NEEDS ASSESSMENT

All of the companies in our sample had performed a least one IFRS needs assessment. Some outsourced this task to an independent accounting firm while others performed the analysis in house. As noted above, there is great variability in companies' participation in a preliminary IFRS needs assessment. This assessment is a large undertaking; participants reported the assessment more useful in some areas than others.

One goal of the preliminary assessment is to identify significant differences between GAAP and IFRS that would result in large changes to the financial statements. Our participants reported this topic was only addressed at the surface level initially. All the companies (other than the dual reporter) determined that it was too complicated to determine the full magnitude of such a change to their bottom line or equity positions because IFRS continues to change frequently.

The companies did use the assessments to address details in the areas of personnel and training, policies, procedures and processes, and information systems issues; the nature of the issues in these areas differed across the companies, as discussed below.

PERSONNEL AND TRAINING

This area of the interview addressed the need to hire additional accounting staff, the need to provide IFRS-specific training, the breadth of personnel who would need to be trained in IFRS, the nature of training they had obtained, who was involved in the implementation and what types of post-implementation issues they had encountered. These decisions regarding personnel and training about IFRS are interesting because prior research theorizes that adoption of IFRS in the U.S. will require a major effort by accountants (Jamal, Bloomfield, et al., 2010).

Our participants have all developed expertise regarding IFRS, but the number of employees gaining that expertise was relatively small. IFRS implementation teams were generally under 10people organization-wide. None of the companies had specifically hired anyone in anticipation of an SEC mandate, but most believed that some minimal level of

additional hiring would be required to make a full transition to IFRS. Most participants felt that the majority of the work could be absorbed by existing personnel.

None of the organizations had done any widespread training surrounding IFRS. The people we interviewed were considered the knowledge experts in their organizations, with very few others having anywhere near their same level of knowledge surrounding IFRS.   All participants thought that training would take time, and did not believe that training in regard to IFRS would be any different than training surrounding the introduction of any new accounting standard. Personnel would be trained as required to serve the company.

Further, the participants reported using relatively small implementation teams to successfully implement IFRS. This sharply contrasts with Dulitz (2009) and others, who suggest starting an IFRS implementation project with internal education rather than assessment (Dulitz, 2009). Others have proposed that a migration to IFRS is a multiyear project requiring an interdisciplinary team that is trained in IFRS. They propose that this team be comprised of members from areas such as Accounting, Financial Reporting, Internal Audit, Tax, Information systems, Human Resources, Manufacturing and Sales (Dulitz,2009; Arnold, 2009; Singer, 2009; Deloitte, 2009). Our companies reported achieving successful IFRS implementation without that extensive use of either time or resources.

Regarding a need for training post implementation, all of the participants reported having created policies, procedures and processes specific to IFRS. This was characterized as time consuming and detailed work, but not difficult work.

All participants noted that the work of the company has never been driven by accounting standards, and that most employees technically do not know, or have to know, that they are following one standard versus another. The conversion from IFRS to GAAP is automated and centralized at the corporate headquarters. Where there are impacts on business practices, employees are made aware of the new requirements, but this is not widespread.

POLICIES, PROCEDURES AND PROCESSES

This area of the interview addressed whether (and which) IFRS had driven development of policies, procedures and processes beyond those needed by the organization under U.S. GAAP. There is a substantial body of research proposing that changes in these areas would be voluminous (e.g. Cancino, 2009). Love and Eickemeyer (2009) suggest that it is imperative to examine the possible effect of IFRS on legal actions against boards of directors, audit committees, management, accountants, auditors and consultants.

Others suggest that the increased judgment under IFRS may require companies to consider broad changes to policies in many areas (Cancino, 2010; Langmead and Michenzi, 2010; Marden and Brackney). Cancino (2010) further suggests that a fraud risk assessment be performed as part of the IFRS conversion to help identify the risks that are inherent in standards which require more judgment and less reliance on bright line rules.

Our respondents were confident that they could easily identify which policies, procedures and processes need to be changed and make those changes: accounting is not brain surgery. As one of our participants put it, "We can easily get a bunch of smart people in a room and figure out what to do."

Where IFRS does not specifically prohibit U.S. GAAP's existing treatment of a particular item, all participants agreed that they would simply continue to follow their existing policies and procedures. They indicated that the flexibility that exists within IFRS would allow them to do just that. They indicated that following the existing rules they have in place through U.S. GAAP will make it much easier for them to insure consistency of application of each standard where allowable to do so.

Our respondents did not report a need to develop significant bodies of policies and procedures specifically related to IFRS. Where IFRS lacked specificity, they were confident that any new policies, procedures and processes needing to be developed would provide the guidance required to insure correct and consistent application of whatever accounting standard they needed to follow. In general, while they were in agreement that there would be a large amount of work to be accomplished on the front end, but the actual transition would be just like any other change in accounting standards.

INFORMATION SYSTEMS

This area of the interview addressed how the companies had handled changes to their information systems in this process. Prior research suggests that most accounting systems will need to be substantially modified, upgraded or replaced to handle the many levels of accounting and reporting. Dulitz (2009) suggests that in the initial year of adoption, companies may be audited under three or more GAAPs (U.S. GAAP, IFRS and Statutory GAAP).

A company's information systems team must build the architecture and reporting to complete the consolidation of financial statements under the desired versions of GAAP. Even if systems can currently handle multiple levels of accounting and reporting, the underlying infrastructure needs to be assessed to insure they can handle the increased load, ensuring the company will avoid significant processing lags (Arnold, 2009).

Prior research surrounding systems and IFRS appears to match with the actions and concerns of our respondents. The work performed by those we interviewed ranged from simply determining what their systems could, or could not, handle to determining the exact specifications for a new system. While all expressed concerns over systems, they had more to do with the amount of time and the cost it would take to get their systems to where they needed to be versus their ability to implement any required changes.

Our participants considered the area of systems and report generation to be the potentially most time consuming, expensive and complicated part of transitioning away from U.S. GAAP. All had looked at their current systems to determine whether they could handle the dual reporting

required should they have to move to IFRS. Their expectation was that they would be required to simultaneously report under both standards for up to three years, in essence maintaining two complete sets of books. There were concerns over not only the ability of their systems to dual report, but whether the additional load on their systems might cripple them.

One of the companies was going through a major system replacement, so they incorporated the IFRS reporting requirements and load issues into that new system. Another company had two budgets for 2011, one of which included a system upgrade should IFRS be mandated in 2011 and one which did not include the expenditure. Clearly, the uncertainty regarding the status of IFRS caused each company a great deal of uncertainty with regard to its information system requirements.

CONCLUSION

Our study examines the actions necessary for IFRS implementation at 10 U.S. companies. The companies each has implemented IFRS to some extent for reporting outside the U.S., but only one of the 10 companies is currently reporting all activities under IFRS. Our interviews show that IFRS implementation is expensive, but not as difficult or all-consuming as some research has suggested will be the case.

Our participants all appear confident in their ability to adopt IFRS and implement these new standards. One of their biggest concerns at this time is the uncertain status of an IFRS mandate in the U.S. Anticipating that the effort will be expensive and requires substantial corporate coordination, the companies all report needing lead time before an IFRS mandate becomes effective. Their biggest concern surrounds the need for systems changes.

One of our respondents said it best in regard to everything being written about the impact to U.S. companies should the SEC mandate its adoption "In reality, IFRS is more 'hype' than 'substance'". They went on to note that Accounting standards do not drive operations; they merely provide a way to consistently report on them. They wonder if the SEC has lost sight of that fact.

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COMPREHENSIVE VARIANCE ANALYSIS BASED ON EX POST OPTIMAL BUDGET

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ABSTRACT

This article presents a new framework for flexible budgeting, cost of capacity, and inventory variance analysis. Three features are central to the proposed comprehensive variance analysis. First, the traditional concept of flexible budget is replaced with the concept of optimal ex post flexible budget. Second, practical capacity substitutes budgeted capacity for determining fixed overhead rates. Third, inventory variance and cost of capacity variances are specifically incorporated into the proposed comprehensive framework. Collectively, these modifications to traditional flexible budgeting and variance analysis enhance the theory and application of variance analysis.

Keywords*:* Variance analysis; Flexible budgeting; Inventory variances; Cost of capacity; Unused capacity

INTRODUCTION

This study offers a new framework for measuring and interpreting profit, cost, and inventory variances. An *optimized revision* of the static budget developed at the end of the budget period constitutes the core of the proposed method. The proposed framework offers an alternative to the traditional flexible budgeting and enables management to obtain new insight into the firm's operations and financial conditions. Under the traditional approach, flexible budget is a merely revision of the static budget based on *actual* sales volume. In contrast, the proposed flexible budget is a completely revised and *ex post optimal* budget.[1] An ex post optimal budget is a revision of the static budget using the latest data available to management by the end of the budget period. Every budget parameter, including sales volumes and prices, and input quantities and prices are subject to change. Under the proposed method, several new variances will be introduced such as planning variance, inventory-change variance, and budgeted unused capacity variance. Following similar articles in this area[2], the methodology adopted here is descriptive and based on numerical examples. Additionally, the current paper utilizes a linear programming model for computation of variances in a multi-product, multi-divisional setting.

Following earlier studies in accounting and marketing literature such as (Demski, 1967), (Hulbert and Toy, 1977), and (Yahya-Zadeh, 2002), the present study redefines flexible budget

as an *ex post optimal* budget. The optimality of the ex post flexible budget proposed here requires the use of an optimization procedure. The linear programming procedure used in this study makes it possible to view annual budgeting as an optimization exercise and to overcome some of the limitations of the traditional approach. Traditional flexible budgeting is constrained by the number of products and departments it can accommodate. The present approach overcomes this constraint. The use of the linear programming technique enables management to seek optimal production levels taking advantage of company-wide resources. Traditional budgeting treats resource allocation as reconciliation between divisional resource demands and company resource supplies. In contrast, the proposed approach achieves optimal profits through a reallocation of company resources in response to changing market and production conditions. The distinction is not trivial since the mere resource reconciliation does not achieve optimality. Critical management decisions concerning capacity utilization levels are incorporated in the overall optimization program. Traditional flexible budgeting often fails to examine the differences between budgeted and actual inventory levels. The present study explicitly incorporates a measure of inventory variance into the analysis.

Traditional budgeting procedures have been widely criticized in academic literature and in popular business media.[3] A frequently cited weakness of traditional budgeting is the absence of timeliness and therefore, relevance. Clearly, the frequency of budget revisions and the timeliness of the information used in those revisions affect the relevance of budgeting. A budget that lacks optimal goals, or loses its optimal goals soon after its introduction, will be a hard sell among managers. The present study offers a solution to this problem. By using an optimization procedure based on the latest available data, optimality of the budget and its relevance can be enhanced.

Traditional flexible budgeting has also been criticized for generating the wrong signals for management decisions. Goldratt and Cox (1990), among other critics, argue that traditional variance analysis treats the cost of unused capacity as an unfavorable variance and penalizes a manager for underutilizing her divisional full capacity. He argues that under traditional variance analysis, increased production is treated as favorable, thus incentivizing managers to increase production to the maximum capacity. Likewise, under traditional budgeting, decreased production is viewed negatively. The present study argues that the extent of unused capacity in a firm should be a function market conditions. Maximum capacity utilization should not always be treated as desirable, nor should capacity underutilization be always viewed as undesirable. Profit maximization may demand that sometimes capacity be utilized fully, and sometimes be left idle.

Budgeting and variance analysis have been the subject of other criticisms. Jensen (2003) argues that the basic premise of budgeting, setting targets for production, sales, costs, and the like, motivates managers to game the budget system. Managers try to influence the budgeting process by setting targets that are easily achievable, and once those targets are set, they work hard to meet those targets even when it damages the company to do so.

The criticisms referred to above indicate that traditional budgeting and variance analysis suffers from numerous shortcomings. The introduction of the new paradigm, Beyond Budgeting (Hope and Fraser, 2003), is clearly an attempt at addressing those shortcomings. The present proposal is a more modest attempt at offering certain solutions without throwing out budgeting altogether. The proposed method adds value to variance analysis by refining the definition of a flexible budget, by seeking optimal departmental capacity targets, and by offering meaningful capacity variances.

The management accounting literature has dealt with capacity variance reporting in limited ways. Cooper and Kaplan (1992) call for clear differentiation between the cost of resources supplied (i.e., cost of available capacity) and the cost of resources (capacity) used. They argue that reporting the cost of unused capacity is essential for managerial decisions. To achieve this goal, they made a distinction between budgeted and practical capacity and argued in favor of using practical capacity for computation of activity rates in activity-based costing. Kaplan (1994) extended this idea. He suggested decomposing activity rates to their *committed* (i.e., fixed) and *flexible* (i.e., variable) components. He used these rates to determine *budgeted unused capacity costs* and *capacity utilization variances* for each activity and to integrate activity-based costing and flexible budgeting. Balakrishnan and Sprinkle (2002) presented an alternative framework for profit variance analysis that specifically identified and reported *the cost of planned unused capacity* and *the cost of unplanned use of idle capacity*. In addition, they introduced *inventory change variance* as an integral part of profit variance computations. Their improved variance analysis was based on the use of practical capacity for computing overhead rates and capacity variances. The present study extends the concepts developed in the earlier studies by identifying an optimal capacity level as the benchmark for capacity variance computations.

The new approach should be of interest to academia, and management consultants. Using the examples in the current paper, accounting professors will find new ways to discuss the relevance and effectiveness of budgeting. Consultants, on the other hand, can further develop the concepts presented here for the implementation of strategic budgeting projects. Additionally, the present study can assist corporate managements to revise certain budgeting procedures for optimization and timely approval of operational plans set forth by divisional managers. Traditional flexible budgeting hampers swift management actions since unplanned mid-year changes in production levels could result in unfavorable variances. In contrast, the present approach rewards swift management actions to adjust to new market conditions.

The methodology of the present study constitutes of a linear programming model of variances explained through a numerical example. The use of linear programming follows Yahya-Zadeh (2002) and other management accounting studies (Kee,1995). Using numerical examples to develop variance analysis techniques is also well established in the literature. Examples of the use of such approach include (Shank and Churchill, 1997) and (Cheatham and Cheatham, 1996).

Numerical Example

Consider a firm with two production departments and two products, X and Y. The firm's budgeted and actual data are shown in Table 1. The static budget (SB) is the outcome of an optimization procedure.[4] It indicates that during the upcoming year the firm plans to sell 5,800 of product X and 2,600 units of product Y. Manufacturing one unit of product X requires 0.90 labor hours in Department 1 and 0.20 labor hours in Department 2. Product X has a budgeted selling price of $60 and a budgeted unit variable manufacturing cost of $32. Beginning inventory for Product X is 500 units and the desired ending inventory is 580 units (set at 10% of budgeted sales volume for the current period). The corresponding Static Budget quantities and prices for product Y, and the corresponding figures in Ex Post Flexible Budget, are interpreted in a similar manner.

Table 1						
Initial Data Regarding Sales, Prices, Production and Inventory						
Panel A	**Actual Results**		**Ex Post Flexible Budget**		**Static Budget**	
	X	**Y**	**X**	**Y**	**X**	**Y**
Sales volume [a] (units)	4,500	3,700	4,248	4,152	5,800	2,600
Unit price ($)	58.50	56.10	59.10	55.50	60.00	55.00
Unit Variable cost ($)	32.10	28.15	32.10	27.50	32.00	28.00
Unit contribution margin ($)	26.40	27.95	27.00	28.00	28.00	27.00
Beginning inventory (units)	500	360	500	360	500	360
Desired ending inventory (% of current sales)	12%	15%	10%	10%	10%	10%
Desired ending inventory (units)	540	555	425	415	580	260
Production volume (units)	4,540	3,895	4,173	4,207	5,880	2,500
Labor hours per unit, Dept. 1	.90	.30	.90	.30	.90	.30
Labor hours per unit, Dept. 2	.20	.80	.20	.80	.20	.80
Panel B: Additional information					**Department 1**	**Department 2**
Current year practical capacity (labor hours)					6,042	4,200
Current year budgeted capacity (labor hours)					6,042	3,176
Budgeted fixed manufacturing overhead (years 1,2)					$72,504	$54,600
Actual fixed manufacturing overhead – current year					$74,000	$56,000
Overhead rate based on practical capacity					$12.00	$13.00
Overhead rate based on budgeted capacity					$12.00	$17.19
Total market demand for products X and Y: 8,400 units						

The lower part of Table 1 exhibits the data on budgeted and practical capacities and fixed costs. In particular, it indicates that the *practical* capacities of Departments 1 and 2 are 6,402 and 4,200 labor hours, respectively. Likewise, the current year's *budgeted* capacity of Departments 1

and 2 are 6,402 and 3,176 hours, respectively. Departments 1 and 2 have budgeted fixed annual manufacturing overhead costs of $72,504 and $54,600, respectively. Table 1 also provides two overhead rates for each department. For instance, the budgeted overhead rate using budgeted capacity for Department 2 is $17.19, while its overhead rate based on practical capacity is $13.

Budgeted total demand for the two products is 8,400 (5,800+2,600) units. Buyers can substitute one product for another because of similarity of their functions and features. Actual results at the end of the year indicate that the firm has sold 4,500 units of product X at an average price of $58.50 and 3,700 units of product Y at average prices of $56.10. Actual unit variable costs of products X and Y are $32.10 and $28.15, respectively. Actual ending inventories of products X and Y are 540 and 555 units, respectively. These figures exhibit increased inventory levels for both products when compared with SB targets. Actual fixed overhead cost in Department 1 is $74,000 and actual fixed overhead in Department 2 is $56,000. Observe that in this example Department 1 is budgeted to operate at its full practical capacity (6,402 hours), whereas Department 2 is budgeted to operate under capacity ($3,176 = 5,880 \times 0.2 + 2,500 \times 0.8$). Changes in market or operational conditions may end the optimality of the static budget such that operating Department 2 at full capacity may become optimal at some point during the budget period.

COMPARISON OF TRADITIONAL AND EX POST FLEXIBLE BUDGETING

Table 2 offers a preliminary comparison of the traditional and the proposed flexible budgeting methods. Panel A exhibits the traditional flexible budget (FB) with contribution margins and the related variances. Column 3 is computed using actual sales volumes of the two products. Comparing Columns (3) and (5), observe the key features of the traditional approach: the difference in total contribution margins of the SB and FB budgets is due to their different sales volumes. All other budget data such as input and output prices, and unit contribution margins are identical in the static and flexible budgets.

Panel B of Table 2 presents the new approach to flexible budgeting. Computation of Column (3) of Panel B follows the new approach. To determine flexible budget figures, management undertakes *an ex post review* of the static budget and revises *all* its budgetary assumptions based on the latest available data. Referring to the FB Column of Table 1, observe that by the end of the year, a review of market conditions indicates that the best achievable market prices for product X, when averaged for the entire budget period, is $59.10. Likewise, the best achievable price for product Y is $55.50. Given these and other revised market and production data, the optimal product sales volumes for X and Y is revised by management to 4,248 and 4,152 units, respectively.[5] Consequently, the maximum achievable sales revenue is revised to $481,495 ($4,248 \times $59.10 + 4,152 \times 55.50). Subtracting FB sales revenue from the SB sales revenue yields $$9,505 of unfavorable sales-volume variance, renamed as the *planning variance*. Comparing Panels A and B, observe that the flexible budget sales revenue variance

increases to $10,675 under the new approach. These variances explain the sharp drop in actual sales revenue from the SB targets. The former variance ($9,505 U) is due to planning errors in setting the SB optimal sales volumes and prices on an ex ante basis. The responsibility for this error is attributable only to the budget committee and top management. The FB sales revenue variance ($10,675 U) is the responsibility of sales managers. Comparing actual and FB sales figures indicates that sales managers sold more of product X by offering a lower price for this product (than market averages), and they sold fewer units of product Y by charging a higher price for it. Management should investigate such sales decisions and determine who may be at fault. The unfavorable sales variance can sometimes be attributed to adverse market conditions and at other times it may be the result of conscious decisions by sales managers. In the present example, one should look for built-in incentives in sales managers' compensation formula that may encourage them to increase the sales price of Y and drive its sales down.

Table 2 Comparison of Traditional and Proposed Flexible Budgeting					
Panel A: Traditional Approach to Flexible Budgeting					
	Actual Results (1)	**Flexible Budget Variances (2)=(1)-(3)**	**Flexible Budget (3)**	**Sales-Volume Variances (4)=(3)-(5)**	**Static Budget (5)**
Sales revenue	$ 470,820	$ 2,680 U	$ 473,500	$ 17,500 U	$ 491,000
Variable cost of goods sold	248,605	1,005 U	247,600	10,800 F	258,400
Contribution Margin	222,215	3,685 U	225,900	6,700 U	232,600
FOH - Department 1	74,000	1,496 U	72,504	-	72,504
FOH - Department 2	56,000	1,400 U	54,600	-	54,600
Operating income *	$ 92,215	$ 6,581 U	$ 98,796	$ 6,700 U	$ 105,496
Panel B: Ex Post Approach to Flexible Budgeting					
	Actual Results (1)	**Flexible Budget Variances (2)=(1)-(3)**	**Ex Post Flexible Budget (3)**	**Planning Variance (4)=(3)-(5)**	**Static Budget (5)**
Sales revenue	$ 470,820	$ 10,675 U	$ 481,495	$ 9,505 U	$ 491,000
Variable cost of goods sold	248,605	1,938 F	250,543	7,857 F	258,400
Contribution Margin	222,215	8,737 U	230,952	1,648 U	232,600
FOH - Department 1	74,000	1,496 U	72,504	-	72,504
FOH - Department 2	56,000	1,400 U	54,600	-	54,600
Operating income *	$ 92,215	$ 11,633 U	$ 103,848	$ 1,648 U	$ 105,496
* The general, selling and administrative expenses are assumed to be zero.					

The corresponding variances under traditional approach are not as informative as those under the new approach. Sales-volume variance and flexible budget sales variance under the traditional approach are $17,500 U and $2,680 U, respectively. The unfavorable sales-volume variance ($17,500) is due to actual sales volume falling short of SB sales targets. The sales-

volume variance fails, however, to inform management that the budgeted sales volumes of products X and Y are no longer optimal given the changes in market prices.

Turning to traditional flexible budget sales revenue variance, the unfavorable variance of $2,680 (Table 2, Panel A) is simply a proxy for an unfavorable *price* variance. In the absence of objective price standards for X and Y, it is hard to evaluate the performance of sales managers. Imagine a hypothetical situation where average market prices drop by 20%, yet the company's sales prices drop by only 15%. The traditional approach fails to recognize the superior sales performance in this situation. Sales revenue variance under the traditional approach is obtained by simply flexing the static budget based on *actual* sales volume. Under this method, sales managers cannot be held accountable for any shortfall of sales, but they will be rewarded for producing a favorable sales price variance. The likely outcome of such a reward system tends to be higher sales prices and lower sales volumes than are called for in the static budget. Clearly, the traditional approach to flexible budgeting fails to send proper signals to management.

Ex post flexible budgeting reveals new cost variances unavailable under the traditional approach. Under the traditional approach, flexible budget variable cost of goods sold (COGS) is the sum-product of *actual* sales volumes and ex ante budgeted unit variable costs. In contrast, under the new approach the variable cost of goods sold is the sum-product of ex post budgeted sales volumes and ex post budgeted unit variable costs. Thus, to determine favorable or unfavorable COGS variances, management may compare actual costs with costs determined to be optimal on an ex post basis.

Assume that a thorough examination of budgetary assumptions at the end of the year reveals that the budgeted unit variable costs ($32.00 and $28.00) are incorrect and should be revised to $32.10 and $27.50. The proposed approach can accommodate this adjustment in the ex post flexible budget. Examining variable COGS variances in panels A and B of Table 2, a shift in emphasis can be observed. Panel A of table 2 reports an unfavorable flexible budget variance of $1,005, and a favorable sales-volume variance of $10,800.[4] The former variance ($1,005 U) is simply the result of higher unit costs of both products ($32.10 instead of $32 for X; $28.15 instead of $28.00 for Y). The favorable sales-volume COGS variance ($10,800 F) results from the decreased sales volume for X and the increased sales volume of Y (refer to Table 1). In other words, selling less of the high cost product and more of the less low cost product helped reduce variable COGS. Under the new approach, the FB cost variance is $1,938 F. Contrast this with the corresponding variance under the traditional approach ($1,005 U). Clearly, the new variance implies different management actions.

Panels A and B of Table 3 further decompose the components of Ex Post planning variances found in Table 2, Panel B. Focusing on COGS, Panel A exhibits a favorable input price variance of $1,651 and a favorable volume variance of $6,206. Comparing the static and the flexible budget data of Table 1, observe the increase in unit variable cost of X (from$32 to $32.10) and the decrease in unit variable cost of Y (from $28 to $27.50). It follows that the favorable COGS variance of $7,857 (=$1,651+$6,206) results from selling less of product X and

more of product Y than were planned under the static budget. Observe that overall sales volume under static budget and under ex post flexible budget are equal (8,400 units for both budgets). Turning to FB Variances in Panel B, observe an unfavorable input price variance of $2,405, and a favorable sales-volume variance of $4,343. The unfavorable input price variance ($2,405) is the result of a higher input price for Y than planned in the ex post flexible budget ($28.15 as opposed to $27.50). Observe further that the favorable sales-volume COGS variance of $4,343 results from producing more of product X, whose actual input price equals its budgeted input price, and less of Y whose actual input price exceeds its budgeted input price.

	Ex Post Flexible Budget	Planning Input Price Variances		SB Volumes, FB Input Prices	Planning Volume Variances		Static Budget
Table 3 Components of Planning Variance under the New Approach							
Panel A. Planning Variances: Prices and Sales Volumes							
	(1)	(2)=(1)-(3)		(3)	(4)=(3)-(5)		(5)
Sales revenue	$ 481,495	$ 5,585	U	$ 487,080	$ 3,920	U	$ 491,000
Variable COGS	250,543	1,651	F	252,194	6,206	F	258,400
Contribution Margin	$ 230,952	$ 1,552	U	$ 229,400	$ 3,200	U	$ 232,600
Panel B. Flexible Budget Variances: Prices and Volumes							
	Actual	FB Sales and Input Price Variances		Actual sales, FB prices	FB Sales-volume variance		Ex Post Flexible Budget
	(1)	(2)=(1)-(3)		(3)	(4)=(3)-(5)		(5)
Sales revenue	$ 470,820	$ 480	U	$ 471,300	$ 10,195	U	$ 481,495
Variable COGS	248,605	2,405	U	246,200	4,343	F	250,543
Contribution Margin	$ 222,215	$ 2,885	U	$ 225,100	$ 5,852	U	$ 230,952

Tables 2 and 3 use a contribution margin format to establish the core differences between the traditional and the ex post flexible budgeting approaches. The next section extends ex post budgeting methodology to incorporate inventory and fixed cost (capacity) variances using a gross margin format.

EXTENSION OF EX POST FLEXIBLE BUDGETING TO INCLUDE INVENTORY AND CAPACITY VARIANCES

First, let us make a distinction between the budgeted capacity and the practical capacity of production. Practical capacity (in labor hours) is the maximum production capacity of a department under normal production conditions and achievable labor standards. In contrast, budgeted capacity represents the total *budgeted* labor hours and is capped by practical capacity.

Practical capacity remains fairly stable from one year to the next, whereas budgeted capacity may change each year.

Table 4 Overhead Rates and Unit Product Costs		
Panel A:Overhead Rates		
	Department 1	**Department 2**
Overhead rates - budgeted capacity	$12.00	$17.19
Overhead rates - practical capacity	12.00	13.00
Panel B: Unit standard costs using budgeted capacity as denominator		
Variable costs per unit	$32.00	$28.00
Fixed overhead cost per unit	14.24	17.35
Budgeted cost per unit	$46.24	$45.35
Panel C: Unit standard costs using practical capacity as denominator		
Variable costs per unit	$32.00	$28.00
Fixed overhead cost per unit	13.4	14.00
Cost per unit - beginning inventory for current period	$45.40	$42.00
Panel D: Unit normal costs using budgeted capacity as denominator		
Variable costs per unit	$32.10	$28.15
Fixed overhead cost per unit	14.24	17.35
Actual cost per unit	$46.34	$45.50

Table 4 presents alternative computations of overhead rates using budgeted and practical capacities. Under the traditional approach, application of overhead costs to production is based on budgeted overhead costs and budgeted labor hours (as a measure of capacity). Kaplan (1994) and Balakrishnan and Sprinkle (2002), in contrast, use practical capacity. The advantage of their approach is that it lessens the fluctuation of overhead rate from one year to the next. Additionally, when budgeted capacity is less than practical capacity, a new variance called *budgeted unused capacity*, can be reported separately. Panel B exhibits unit standard costs using budgeted overhead rates. Panel C calculates unit standard costs using overhead rates based on practical capacity. In Panel D normal costing is used to obtain unit costs of products X and Y based on budgeted overhead rates ($12.00, $17.19).

Table 5 exhibits a traditional flexible budget using a gross margin format. The planned and actual increases in the firm's inventories make it necessary to distinguish between unit costs in the beginning inventory and unit costs in current period production. I assume that practical capacity is used in computation of unit costs in the beginning inventories (see Table 4, Panel C). Further, I use LIFO as the inventory flow assumption.[7]

Table 5, Column 5, states that budgeted gross margin for the period is $105,235 and fixed overhead spending and volume variances are both zero. The traditional flexible budget (Column 3) is obtained by substituting actual sales and actual production/inventory levels into the static budget, leaving SB prices and unit costs unchanged. In particular, the flexible budget continues to assume that product prices for X and Y are $60 and $55, respectively. The flexible budget generates a gross margin of $102,749. The traditional flexible budget obtained in this manner is

the benchmark for calculating two sets of variances: flexible budget variances and sales-volume variances.

The unfavorable flexible budget variance of $6,581 is caused by an unfavorable sales revenue variance ($2,680), an unfavorable variance in cost of goods manufactured ($1,038), a favorable ending inventory variance ($33), and an unfavorable fixed overhead spending variance ($2,896).

Table 5 **Traditional Approach to Flexible Budgeting Including Fixed Overhead Cost Variances**								
	Actual	**FB Variances**		**Flexible Budget (actual sales and inventories)**	**Sales-Volume Variances**		**Static Budget**	
	(1)	**(2)=(1)-(3)**		**(3)**	**(4)=(3)-(5)**		**(5)**	
Sales revenue [a]	$470,820	$2,680	U	$473,500	$17,500	U	$491,000	
Beginning inventory [b]	37,820	-		37,820	-		37,820	
Cost of goods manufactured (using budgeted rate) [c]	387,611	1,038	U	386,572	1,308	U	385,264	
Less: ending inventory (LIFO) [d]	48,547	33	F	48,513	11,194	F	37,319	
Unadjusted cost of goods sold (LIFO)	376,884	1,005	U	375,879	9,886	F	385,765	
Spending Variance [e]	2,896	2,896	U	-	-		-	
Production-volume variance [f]	5,128	-		5,128	5,128	F	-	
Adjusted Cost of goods sold	374,652	3,901	U	370,751	15,014	F	385,765	
Gross margins (Full absorption method)	$96,168	$6,581	U	$102,749	$2,486	U	$105,235	

Notes
[a] Actual sales revenue = (4,500 × $58.50 + 3,700 × $56.10); Flexible budget revenue = (4,500 × $60 + 3,700 × $55); Static budget revenue = (5,800 × $60 + 2,600 × $55);
[b] Beginning inventory = (500 × $45.40 + 360 × $42)
[c] Cost of goods manufactured: Actual = (4,540 × $46.34 + 3,895 × $45.50); Flexible budget = (4,540 × $46.24 + 3,895 × $45.35); Static budget = (5,880 × $46.24 + 2,500 × $45.35);
[d] Inventory assumption used for computation of inventory and cost of goods sold is LIFO. Further, for consistency and comparability of Tables 5 and 7, I assume that overhead rate per direct labor hour for the units in beginning inventory are based on practical capacity.
Actual ending inventory (LIFO) = (40 × $46.34 + 195 × $45.50 + 500 × $45.40 + 360 × $42) = $48,547.
Flexible budget ending inventory (LIFO) = (40 × $46.24 + 195 × $45.35 + 500 × $45.40 + 360 × $42) = $48,513.
Ending inventory under the static budget (LIFO) = (40 × $46.24 + 500 × $45.40 + 260 × $42) = $37,319.
[e] Fixed overhead spending variance =$74,000+$56,000-$72,504-$54,600= $2,896 U
[f] Fixed overhead production-volume variance = Applied fixed overhead - Budgeted fixed overhead =
 ((4,540 × 0.9 + 3,895 × 0.3) × $12 + (4,540 × 0.20 + 3,895 × 0.80) × $17.20) – ($72,504 + $54,600) = $5,128

The unfavorable sales-volume variance of $2,486 results from the flexible budget's departure from the static budget sales targets and production and inventory levels. Its first key component is an unfavorable sales revenue variance of $17,500 resulting from a decrease in total sales volume and a change in the sales-mix in favor of the lower-priced product Y. Its second component is the unfavorable variance of cost of goods manufactured ($1,308). These unfavorable variances are partially offset with a favorable ending inventory variance of $11,194. Placing excess fixed overhead cost in ending inventory is the source of this favorable variance. The fourth key component is the favorable production-volume variance of $5,128 resulting from the increased total production volume (observe that the total production under flexible budget is greater than total production under the static budget: 8,435 > 8,380).

The individual variances obtained under the traditional approach may offer the wrong signals for managerial decision-making. For instance, the unfavorable sales revenue variance signals the need to increase the sales of X and decrease sales of product Y. Traditional flexible budgeting does not, however, address the feasibility or the desirability of such a move. In the present example, given that market prices have changed in favor of product Y, continuing to follow the static budget sales targets is no longer optimal. Changes in market prices of X and Y further signal a need to cut back on inventory of product X (given deteriorated demand for this product) and to increase inventory of Y. Traditional flexible budgeting treats any increase in ending inventories as favorable since they cause a reduction of cost of goods sold and an increase in net income. The proposed flexible budgeting technique addresses these issues.

A NEW APPROACH TO FLEXIBLE BUDGETING

Following Yahya-Zadeh (2002), the static and flexible budgets are viewed as outcomes of optimization procedures. At the start of the budgeting period, management approves a budget which it considers to be the optimal plan for the company.

This will be referred to as the static (or *ex ante*) budget. The proposed, or *ex post*, flexible budget is based on a thorough revision and re-optimization of the static budget using the latest market and manufacturing information available to management at the *end* of the budget period. As market and production conditions change, they render the static budget suboptimal. Therefore, instead of a mere rescaling of the static budget, as is done in traditional budgeting, management undertakes a thorough revision of the static budget (see Note 4). All assumptions of the static budget regarding sales volumes, sales-mix, input quantities and mix, input and output prices and productivity rates will be scrutinized and revised. Contrast this with the traditional flexible budget where the static budget is revised by replacing budgeted sales volumes with actual sales volumes. The use of actual sales volumes as the basis for revising the static budget implies that profit center managers need not be held accountable for any decline in budgeted sales volumes. Measuring managerial and profit performances based on outdated, ex ante, standards has produces informational value.

Table 6
Basic Data for Modified Ex Post Flexible Budget

	Actual sales and actual inventory		Modified Ex post FB (optimal sales and actual inventory)		Ex Post FB (optimal sales and optimal inventory)		Static Budget	
	X	Y	X	Y	X	Y	X	Y
Sales volume	4,500	3,700	4,248	4,152	4,248	4,152	5,800	2,600
Sales price per unit	58.50	56.10	59.10	55.50	59.10	55.50	60.00	55.00
Variable cost per unit	32.10	28.15	32.10	27.50	32.10	27.50	32.00	28.00

	Actual sales and actual inventory		Modified Ex post FB (optimal sales and actual inventory)		Ex Post FB (optimal sales and optimal inventory)		Static Budget	
	X	Y	X	Y		X	Y	X
Contribution margin per unit	26.40	27.95	27.00	28.00	27.00	28.00	28.00	27.00
Beginning inventory (units)	500	360	500	360	500	360	500	360
Desired ending inventory as a % of sales	12%	15%	NA	NA	10%	10%	10%	10%
Desired ending inventory	540	555	540	555	425	415	580	260
Production volume	4,540	3,895	4,288	4,347	4,173	4,207	5,880	2,500
Processing hours								
Department 1 (hours)	0.90	0.30	0.9	0.3	0.9	0.3	0.9	0.3
Department 2 (hours)	0.20	0.80	0.2	0.8	0.2	0.8	0.2	0.8

Tables 6 presents data used in the preparation of the proposed flexible budgeting method. Table 6 is obtained by adding two columns to Table 1. The added columns are labeled "modified ex post flexible budget" for X and Y.[8] Observe that modified flexible budget differs from ex post flexible budget in ending inventories and in production levels. FB optimal ending inventories are replaced with actual ending inventories and the production targets are modified to meet the assumed sales and inventory levels. The desired ending inventories in the modified flexible budget are no longer given percentages of sales volumes.

Table 7 details the proposed procedure of the present study. The ex post flexible budget of Table 7 is the benchmark for measuring all variances. Contrast this with the traditional approach which views the static budget as the key budget. The ex post flexible budget shown in Table 7 (column 3) is a thorough revision of the static budget. Specifically, it revises the static budget sales volumes, sales prices and unit variable costs to reflect the latest changes in market and production conditions. The revised sales volumes (4,248 units of X and 4,152 units of Y) constitute the revised *optimal* sales levels. Likewise the revised inventory and production levels are optimal. Collectively, the revised sales, inventory and production levels maximize contribution margin given input prices, output prices and management's inventory policy (i.e., 10% of current sales).[9]

	Table 7 **Proposed Approach to Variance Analysis using Ex Post Flexible Budget and Overhead Rates based on Practical Capacity**						
	Actual sales and actual inventory		**Modified FB (ex post optimal sales and actual inventory)**		**Ex Post FB (optimal sales and optimal inventory)**		**Static Budget**
	(1)		**(2)**		**(3)**		**(4)**
Sales revenue [a]	$470,820		$ 481,495		$ 481,495		$ 491,000
Beginning inventory [b]	37,820		37,820		37,820		37,820
Add: COGM (using budgeted overhead rate) [c]	369,706		377,251		366,149		371,952
Less: ending inventory (LIFO) [d]	47,826		47,826		36,724		37,252
Unadjusted cost of goods sold (LIFO)	359,700		367,245		367,245		372,520
Spending Variance [e]	2,896	U	0		0		0
Cost of budgeted unused capacity [f]	12,288	U	12,288	U	12,288	U	12,288	U
Unplanned use of idle capacity [g]	(550)	F	(3,501)	F	-		1,024	U
Adjusted Cost of goods sold	374,334		376,032		379,533		385,832
Gross margin	$ 96,486		$ 105,463		$ 101,962		$ 105,168
Overall Variances			8,977 U		3,501 F		3,206 U
			Flexible Budget Variance		Inventory-Change Variance		Planning Variance

Notes

[a] Actual sales revenue = (4,500 × $58.50 + 3,700 × $56.10); Flexible Budget and Modified FB revenues = (4,248 × $59.10 + 4,152 × $55.50);

  Static budget revenue = (5,800 × $60 + 2,600 × $55);

[b] Beginning inventory = (500 × $45.40 + 360 × $42)

[c] Cost of goods manufactured: Actual = (4,540 × $45.40 + 3,895 × $42); Modified Flexible budget = (4,288 × $45.40 + 4,347 × $42);

  Flexible Budget = (4,137 × $45.40 + 4,207 × $42); Static budget = (5,880 × $45.40 + 2,500 × $42);

[d] Ending inventory: Actual = (540 × $45.40 + 555 × $42) ; Modified flexible budget = (540 × $45.40 + 555 × $42)

  Ex post flexible budget = (425 × $45.40 + 415 × $42) Static budget = (580 × $45.40 + 260 × $42)

[e] Fixed overhead spending variance = ($74,000 +$56,000) – (72,504+$54,600)

[f] Cost of budgeted unused capacity measures variances from ex post flexible budget and its computation involves three steps:

Cost of available capacity: $127,104 = 6,042 × $12 + 4,200 × $13 = $72,504 + $54,600

Cost of budgeted used capacity under ex post flexible budget: $114,816 = (4,173 × 0.9 + 4,207 × 0.3) × $12 + (4,173 × 0.2 + 4,207 × 0.8) × $13)

Cost of budgeted unused capacity = Cost of available capacity – Cost of used capacity under ex post flexible budget = $127,104 - $114,816 = $12,288

  Costs of budgeted unused capacity for all four columns are identical.

[g] The variance for unplanned use of idle capacity is measured from ex post flexible budget and its computation involves two steps. Below the steps for computation of this variance under "Actual", "Modified Ex Post Flexible Budget" and "Static Budget" are shown

i) Actual cost of used capacity = (4,540 × 0.9 + 3,895 × 0.3) × $ 12 + (4,540 × 0.2 + 3,895 × 0.8) × $ 13 = $115,366

ii) Cost of unplanned use of idle capacity = Cost f used capacity – Cost of budgeted used capacity under ex post FB = $115,366 - $114,816 = $550 F

iii) Cost of used capacity under modified flexible budget = (4,288 × 0.9 + 4,347 × 0.3) × $ 12 + (4,288 × 0.2 + 4,347 × 0.8) × $ 13 = $118,317

iv) Cost of unplanned use of idle capacity = Cost of used capacity – Cost of planned used capacity under ex post FB = $118,317 - $114,816 = $3,501

v) Cost of used capacity under static budget = (5,880 × 0.9 + 2,500 × 0.3) × $12 + (5,880 × 0.20 + 2,500 × 0.80) × $13 = $113,792

vi) Cost of unplanned use of idle capacity = Cost of used capacity under static budget – Cost of planned used capacity under ex post FB = $113,792 - $114,816 = - $1,024

Column 1 of Table 7 indicates an actual profit of $96,486. The static budget, shown in column 4 reports a profit of $105,168. These amounts differ from the respective amounts of Table 5 due to using unit costs of Panel C (Table 4) instead of unit costs given in Panels B (for Column 4) and D (for Column 1). This change makes it possible to introduce two new fixed cost variances. The two new variances, "Cost of Budgeted Unused Capacity" and "Unplanned Use of Idle Capacity", replace the traditional concept of production-volume variance (see Table 5).

Table 7 may be used to derive revenue and cost variances. I highlight three important variances shown in this table. The *planning variance* ($3,206 unfavorable) is the difference between the gross margin under ex post flexible budget and the gross margin under static budget. The unfavorable planning variance measures the decrease in budgeted gross margin attributable to a planning error. Contrast the planning variance with sales-volume variance of Table 5. Top management, rather than divisional managers, must be held accountable for this variance and should use it to improve budget preparation in the future.

Column 2 reports a gross margin of $105,463. This amount represents an increase of $3,501 over the optimized gross margin under the ex post flexible budget. Following Balakrishnan and Sprinkle (2002), I call this the *inventory-change variance*. It measures the contribution to income caused by increasing production beyond optimal levels of the ex post flexible budget and creating excess inventory. Observe that the inventory-change variance equals the cost of unplanned use of idle capacity shown in column 2. The inventory-change variance measures the *unplanned use* of the capacity that is budgeted to remain idle under the ex post flexible budget. The unplanned increase in inventory levels signals a deliberate management policy to boost earnings. In fact, $3,501 equals fixed overhead costs placed in inventory by increasing inventory levels beyond the ex post budgeted levels.[10]

Table 7 highlights a third variance, namely, the flexible budget variance of $8,977. This component of the unfavorable flexible budget is due to the departure of actual production volumes from the ex post budgeted volumes.

Additional variances highlighted by Table 7 deal with cost of capacity. Column 1 of Table 7 exhibits three components of adjustment to cost of goods sold. The first component is an unfavorable fixed overhead spending variance defined as the difference between budgeted and actual fixed overhead spending ($127,104, - $130,000 = $2,896).

The use of practical capacity to compute overhead rates allows the computation of cost of capacity variances. As shown in Table 4 (Panel A), overhead rates based on practical capacity for Departments 1 and 2 are $12 and $13, respectively. I will refer to these as *practical-capacity overhead rates*.

Firm's fixed overhead cost may be viewed as the cost of making its practical capacity available for production ($127,104 = 6,042 × $12 + 4,200 × $13). When budgeted capacity is less than practical capacity, we may report a new variance, namely, *the cost of budgeted unused capacity*. This variance is computed in three steps:

i. Determine cost of available capacity:
$127,104 (= 6,042 × $12 + 4,200 × $13 = $72,504 + $54,600)

ii. Determine cost of budgeted capacity under ex post flexible budget:
$114,816 [= (4,173× 0.9 + 4,207× 0.3) × $12 + (4,173× 0.2 + 4,207× 0.8) × $13]

iii. Determine cost of budgeted unused capacity = cost of available capacity – cost of budgeted capacity under ex post flexible budget
$12,288 (= $127,104 - $114,816)

This variance is unfavorable in that it increases cost of goods sold and reduces gross margin.

The third component of cost of capacity variances is *unplanned use of idle capacity*. This variance is defined as the cost of current capacity less cost of budgeted capacity under ex post flexible budget. Column 1 exhibits a favorable unplanned use of idle capacity of $550. Computation of this variance follows three steps:

Step 1: Determine applied overhead (for actual production) using practical-capacity overhead rates
$115,366 = ((4,540× 0.9 + 3,895× 0.3) × $12 + (4,540× 0.2 + 3,895× 0.8) × $13)
Step 2: Calculate applied overhead (for ex post flexible budget) using practical-capacity overhead rates:
$114,816 [= (4,173× 0.9 + 4,207× 0.3) × $12 + (4,173× 0.2 + 4,207× 0.8) × $13]
Step 3: Determine cost of unplanned use of idle capacity = overhead applied to actual production – overhead applied to production volumes under ex post flexible budget:
$550 (= $115,366 - $114,816)

FIGURE 1
COST OF CAPACITY VARIANCES

Cost of unused capacity
$11,678 U

Cost of planned unused capacity **$12,228 U**

Unplanned use of idle capacity **$550 F**

See Table 7 for detailed computation
of above variances
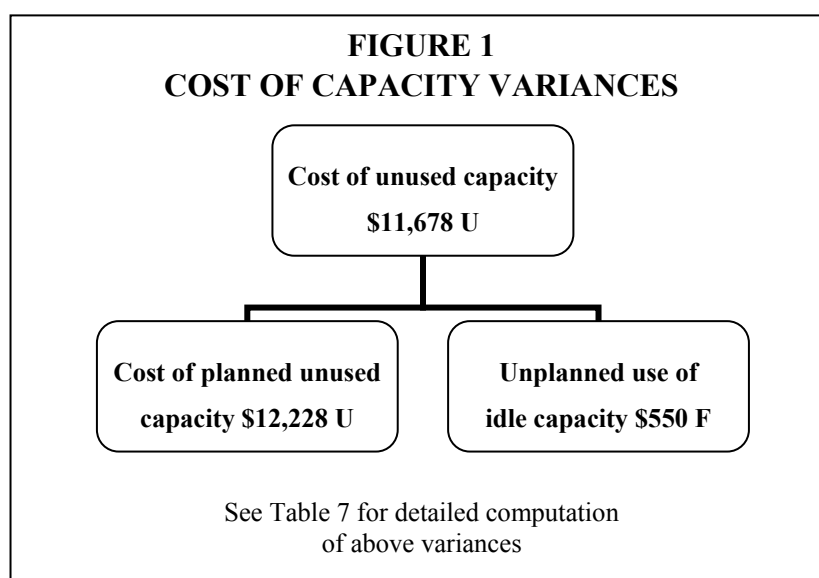
The unplanned use of the capacity that was initially budgeted to remain idle reduces fixed costs per unit and increases gross margin. Alternatively state, the unplanned use of idle capacity equals fixed overhead cost placed into inventory account by increasing inventory levels beyond the ex post budgeted levels. Mathematically, this is a favorable variance since it increases gross margin. Yet, management should examine any unplanned increase in inventory to understand its causes.

Table 8						
Different Treatment of Unused Capacity under Static and Ex Post Flexible Budget						
Panel A: Capacity costs using static budget						
	Department 1		**Department 2**		**Company Total**	
	Hours	**Cost ($)**	**Hours**	**Cost ($)**	**Hours**	**Cost ($)**
Practical capacity [a]	6,042	$ 72,504	4,200	$ 54,600	10,242	$ 127,104
Budgeted unused capacity [b]	-	-	(1,024)	$(13,312)	(1,024)	$(13,312)
Budgeted capacity usage (static budget) [c]	6,042	$ 72,504	3,176	$ 41,288	9,218	$ 113,792
Unplanned use of idle capacity [d]	(788)	$ (9,450)	848	$ 11,024	61	$ 1,574
Actual capacity utilization [e]	5,255	$ 63,054	4,024	$ 52,312	9,279	$ 115,366
Panel B: Capacity costs using ex post flexible budget [f]						
	Department 1		**Department 2**		**Company Total**	
	Hours	**Cost ($)**	**Hours**	**Cost ($)**	**Hours**	**Cost ($)**
Practical capacity	6,042	$ 72,504	4,200	$ 54,600	10,242	$ 127,104
Budgeted unused capacity	(1,024)	$(12,288)	-	-	(1,024)	$(12,288)
Budgeted capacity usage (ex post flexible budget)	5,018	$ 60,216	4,200	$ 54,600	5,018	$114,816
Unplanned use of idle capacity	237	$ 2,838	(176)	$(2,288)	61	$ 550
Actual capacity utilization	5,255	$ 63,054	4,024	$ 52,312	9,279	$ 115,366

Notes

[a] Actual sales revenue = $(4,500 \times \$58.50 + 3,700 \times \$56.10)$; Flexible budget revenue = $(4,500 \times \$60 + 3,700 \times \$55)$; Static budget revenue = $(5,800 \times \$60 + 2,600 \times \$55)$;

[b] Beginning inventory = $(500 \times \$45.40 + 360 \times \$42)$

[c] Cost of goods manufactured:
Actual = $(4,540 \times \$46.34 + 3,895 \times \$45.50)$; Flexible budget = $(4,540 \times \$46.24 + 3,895 \times \$45.35)$; Static budget = $(5,880 \times \$46.24 + 2,500 \times \$45.35)$;

[d] Inventory assumption used for computation of inventory and cost of goods sold is LIFO. Further, for consistency and comparability of Tables 5 and 7, I assume that overhead rate per direct labor hour for the units in beginning inventory are based on practical capacity.
Actual ending inventory (LIFO) = $(40 \times \$46.34 + 195 \times \$45.50 + 500 \times \$45.40 + 360 \times \$42)$ = $48,547.
Flexible budget ending inventory (LIFO) = $(40 \times \$46.24 + 195 \times \$45.35 + 500 \times \$45.40 + 360 \times \$42)$ = $48,513.
Ending inventory under the static budget (LIFO) = $(40 \times \$46.24 + 500 \times \$45.40 + 260 \times \$42)$ = $37,319.

[e] Fixed overhead spending variance = $74,000 + $56,000 - $72,504 - $54,600 = $2,896 U

[f] Fixed overhead production-volume variance = Applied fixed overhead - Budgeted fixed overhead =
$((4,540 \times 0.9 + 3,895 \times 0.3) \times \$12 + (4,540 \times 0.20 + 3,895 \times 0.80) \times \$17.20) - (\$72,504 + \$54,600) = \$5,128$

Departmental Capacity Utilization

With the introduction of ex post flexible budget, capacity cost variances, shown in Table 8, find new interpretations. Panel A exhibits capacity usages under the static budget. Under this budget, Department 1 is planned to operate at full capacity (6,042 hours) and Department 2 is budgeted to operate under capacity (3,176 hours). Consequently, costs of budgeted unused capacity in Departments 1 and 2 are, respectively, $0 and $13,312.

To determine unplanned use of idle capacity in each department, compare actual usage with planned usage under the static budget. In Department 1, actual capacity is less than budgeted capacity by 788 hours resulting in an unfavorable unplanned increase in idle capacity of $9,450. Unplanned use of idle capacity in Department 2, on the other hand, is 848 excess hours resulting in a favorable unplanned decrease in idle capacity of $11,024. For the company as a whole, unplanned use of idle capacity is $1,574 favorable.

Panel B modifies Panel A by replacing the static budget (row 3) with ex post flexible budget. If market prices change during the year by a significant amount, the static budget may no longer be *optimal*. The company-wide budgeted unused capacities shown in Panels A and B are fairly close. The planned capacity usages at the level of individual departments, however, are quite different. Under ex post flexible budget the company should operate Department 2 at full capacity and Department 1 under capacity. In both departments, the unplanned use of idle capacity is much smaller than was the case in Panel A. Department 1 exhibits a favorable variance of $2,838 compared with an unfavorable variance of $9,450. Department 2 exhibits an unfavorable variance of $2,288 compared with a favorable variance of $11,024. Therefore, the insight generated by the new approach to flexible budgeting may be diametrically opposed to that of the traditional approach. Panel B of Table 8 signals the need to swiftly revise the production plans of the two departments to meet the changed market conditions, whereas Panel A generates misleading signals.

SUMMARY AND LIMITATIONS

This study integrates the concept of ex post flexible budget (Yahya-Zadeh 2002) and the variance analysis methodology developed by Balakrishnan and Sprinkle (2002). The integration of the two approaches yields a new approach for flexible budgeting and for computation of capacity and inventory variances. This study's distinct contributions are:

The proposed framework for variance analysis highlights the cost of management's failure to swiftly respond to the changing market conditions. For instance, consider the FB sales revenue variances in Panels A and B. Observe from Table 2, that the traditional unfavorable variance of $2,680 is solely due to unfavorable sales prices whereas the unfavorable sales revenue variance of $10,675 under the new approach is the outcome of incorrect production/sales decisions as well as that of unfavorable selling prices. Observe further, that the FB profit

variance increases from $6,581 U under the old approach to $11,633 U under the new approach. The corresponding sales-volume variances decrease from $6,700 U to $1,648 U. Such sizable changes in variances signal the need for a new course of action. Under the traditional approach, reducing the unfavorable sales-volume and flexible budget variances are achievable only if actual production, inventory and prices converge to static budget amounts. Under the new approach, avoiding unfavorable flexible budget variance is possible by swiftly moving away from the static budget to achieve the revised ex post flexible budget production and sales targets.

The proposed approach defines three critical variances. These are (i) inventory-change variance, (ii) budgeted unused capacity, and (iii) unplanned change in idle capacity. Inventory-change variance signals whether a favorable profit variance is caused, at least partially, by an unplanned and unjustified increase in inventory. The second variance, budgeted unused capacity variance, measures management's plans for underutilization of capacity. Controlling this variance mitigates the incentive to build inventory merely to exhibit full utilization of capacity and to achieve a favorable fixed overhead production-volume variance. The third variance, unplanned use of idle capacity, indicates whether sales and production levels are better than planned, and it also signals unnecessary build up of inventory for the purpose of window-dressing earnings.

Additionally, budgeted unused capacity and unplanned use of idle capacity are reported at the department level producing effective managerial information. For instance, Table 8 (Panel A) reports full capacity utilization in Department 1 and budgeted unused capacity in Department 2. Under the new approach, however, Department 1 is planned to operate under capacity and Department 2 to operate at capacity. These have important managerial implications. First, it indicates that due to change in market conditions, the ex ante departmental budgets have lost their relevance. Second, it implies that a planned reduction in Department 1's production should not be viewed as unfavorable. Likewise, Panel B implies that a planned increase in production of Department 2 should not be viewed as an effort to unjustifiably increase inventory. These new departmental reports should be helpful to management in determining if divisional managers respond properly to market changes. The revised approach further helps management control capacity costs by downsizing departments that routinely report large budgeted unused capacity variances.

Within its limited scope, the present study makes very few assumptions. One such assumption is critical to the use of linear programming. Products X and Y were assumed to be perfect substitutes to make gradual change of market demand away from product X towards product Y possible. This restrictive assumption is not, however, critical to the proposed variance analysis approach. Demand for products X and Y may take any configuration if a different optimization tool is used. Using integer programming, instead of linear programming, would allow us to relax this critical assumption and the remaining computations of the study remain intact. Integer programming has not been widely used in management accounting and it was felt that the added benefit of using integer programming does not justify its added complexity for this study.

A second limitation of the present study is its assumption that divisional managers truthfully reveal their private information to the central management and do not seek to game the budget system. Alternatively stated, information is symmetrically available at the top and the bottom. This critical assumption is at the heart of much criticism against the traditional budgeting approach (See Jensen 2003, for example). The present study is not immune from this weakness. Future extensions of this study should incorporate such internal information asymmetry as a key assumption.

ENDNOTES

1   The use of ex post optimal budget in flexible budgeting has previously been proposed by Yahya-Zadeh (2002).

2   See, for instance, Shank and Churchill (1977), Cooper and Kaplan (1992), Kaplan (1994), Cheatham and Cheatham (1996), Balakrishnan and Sprinkle (2002), and Yahya-Zadeh (2002), all of whom use the descriptive approach in developing new variances.

3   See Jensen (2001), Jensen (2003), Stewart, T.A., and V. Fauerbach, (1990), Hope, J, and R. Fraser (2003) for examples of budget criticisms by academicians, consultants, and business media reporters.

4   The static budget sales and production figures shown in Table 1 and the subsequent tables assume, implicitly, that management utilizes an optimization procedure to derive its budget targets and any subsequent revisions to the budget. For instance, the optimal sales levels of products X and Y are the solutions to the following linear programming problem:

Maximize total contribution margin: $28 X + $27 Y

Subject to:
Department 1 production constraint: $0.90 (1.10 X – 500) + 0.30 (1.10 Y – 360) \le 6{,}042$
Department 2 production constraint: $0.2 (1.10 X – 500) + 0.8 (1.10 Y – 360) \le 4{,}200$
Demand constraint: $X + Y \le 8{,}400$
Positivity constraints $X \ge 0, Y \ge 0$

The objective function of this problem is the total contribution margin of the firm from the sales of its two products. The firm has an inventory policy of setting ending inventory of each product to 10% of its current sales level. Therefore, with 200 units of X in the beginning inventory, the expression (1.10 X – 500) represents the production volume of product X for the current year. Likewise, the expression (1.10 Y – 360) represents the production volume of product Y. The first production constraint states that total labour hours required to meet the production targets of the two products should not exceed the practical capacity of Department 1 (6,042 hours). Interpretation of the second constraint is similar.

The optimal solutions to this problem (after rounding) are:
X= 5,800, Y=2,600.
The budgeted ending inventories of the two products are:
    Ending inventory of product X = 10% × 5,800 = 580
    Ending inventory of product X = 10% × 2,600 = 260
Thus, the decision about budgeted sales, production and ending inventories are all internalized using a linear programming problem.
The Ex Post Optimal Budget sales and production figures shown in Table 1 and the subsequent tables assume are derived in a similar manner. The optimal sales levels of products X and Y under the Ex Post Flexible Budget are the solutions to the following linear programming problem:

Maximize total contribution margin: $27 X + $28 Y

Subject to:
   Department 1 production constraint: $0.90 (1.10 X – 500) + 0.30 (1.10 Y – 360) \leq 6{,}042$
   Department 2 production constraint: $0.2 (1.10 X – 500) + 0.8 (1.10 Y – 360) \leq 4{,}200$
   Demand constraint: $X + Y \leq 8{,}400$
   Positivity constraints $X \geq 0, Y \geq 0$

The optimal solutions to this problem (after rounding) are:
   X= 4,248, Y=4,152
The budgeted ending inventories of the two products are:
   Ending inventory of product X = 10% × 4,248 = 425 Ending inventory of product X = 10% × 4,152 = 415

5   See the previous note for the linear programming problem used in revising the static budget and deriving the flexible budget.

6   In Columns (1), (3) and (5) of Table 2 (Panel A), it is assumed that for each product, unit variable cost in the beginning inventory equals unit variable cost in the current period. This assumption makes it possible to ignore the cost flow assumption. I will address the cost flow assumption in the second part of this article. The same assumption applies to all product costs in Tables 2 and 3.

7   These assumptions are consistent with Balakrishnan and Sprinkle (2002). The use of practical capacity for determination of unit costs in the beginning inventory is for consistency and comparability of Tables 5 and 7.

8   In preparing Table 6, I modify the technique developed by Balakrishnan and Sprinkle (2002). The term "flexible budget" in their study has been replaced by "modified flexible budget".

9   Future extensions of this study should consider endogenizing the choice of inventory levels. The present study does not deal with inventory management and its optimization procedure.

10   To see this, subtract the cost of fixed overhead in ending inventory of column 2 from the cost of fixed overhead in the ending inventory of column 3. Cost of fixed overhead in ending inventory of column 2 is $15,006 (540 × $13.40 + 555 × $14). Cost of fixed overhead in the ending inventory of column 3 is $11,505 (425 × $13.40 + 415 × $14). Inventory-change variance equals the difference between these amounts ($3,501 = $15,006 - $11,505).

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GREECE DEBT CRISIS:
CAUSES, IMPLICATIONS AND POLICY OPTIONS

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ABSTRACT

Following the global financial meltdown of 2007-2008, Greece accumulated massive deficits and public debt levels; by 2010, a sovereign debt crisis was pronounced in Greece. The Greek government operated at a deficit of 10.4% of GDP in 2010, and in spite of a number of euro rescue deals agreed upon by EU leaders, market volatility persisted through the end of 2011 and debt rose to 147.3% of GDP. The paper examines the probabilities of Greece default, explores possible causes of the crisis and its implications, exploring a range of policy options to get the country out of this crisis. The paper finds the Greece's debt crisis is a result of improper economic policies that resulted in its high government spending and weak revenues, accompanied with structural rigidities, and inadequate intra-euro fiscal monitoring, following its adoption of the euro in an environment of a global recession. Greece can find its way out under conservative assumptions, if it chooses to tackle the root causes rather than the symptoms of the crisis, focusing on growth and productivity and ensuring that the appropriate fiscal and structural reforms are fully implemented, which can happen only under external financial assistance otherwise Greece could be forced to default on, or leave the Euro. The crisis highlighted the economic interdependence of the EU, and questions the future of the euro.

INTRODUCTION

After joining the Economic and Monetary Union (EMU) of the EU in 2001, Greece ran large deficits averaging 7 percent of GDP between 2003 and 2008. Although the outbreak of the global financial crisis in fall 2008, the Greek government borrowed heavily in international capital markets to fund government budget and current account deficits; as a result the government debt grew exceptionally large. In 2009, the budget deficit reached 15.6% of GDP, and the external debt reached 115% of GDP. The maturing debt obligations reached about €54 billion ($72.1 billion) for 2010 and the general government debt reached 147.3% of the GDP.

Both Greece's budget deficit and external debt level are well above those permitted by the rules governing the EU's Economic and Monetary Union (EMU), which calls for budget deficit ceilings of 3% of GDP and external debt ceilings of 60% of GDP.

1-Greek Policy Responses

The Greek government adopted sets of procedures to confront the crisis:

1-1 Fiscal Austerity

In October 2009, the Greek government has unveiled three separate packages of fiscal austerity measures aimed at bringing Greece's government deficit down from an estimated 13.6% of GDP in 2009 to below 3% by 2012. In total, the measures are worth an estimated €16 billion ($21.6 billion), or 6.4% of GDP. In March 2010, the parliament approved another austerity measures which aimed to increase revenues through a rise in the average value-added tax rate. On the expenditure side as shown in figure (1), most of the spending cuts announced focused on the civil service. The Greek social security system has been facing chronic and structural problems (George Hondroyiannis and Evangelia Papapetrou (2002), thus the government decided to reduce pension funds, cuts in pay and non-pay expenses, a substantial increase in prices for services offered by SOEs, and limits on subsidization. The government also announced to tighten public regulation and restructure Greece's public administration by consolidating local governance structures through reducing the levels of local administrative authorities.

Figure (1): Fiscal measures in the medium-term fiscal strategy for 2011
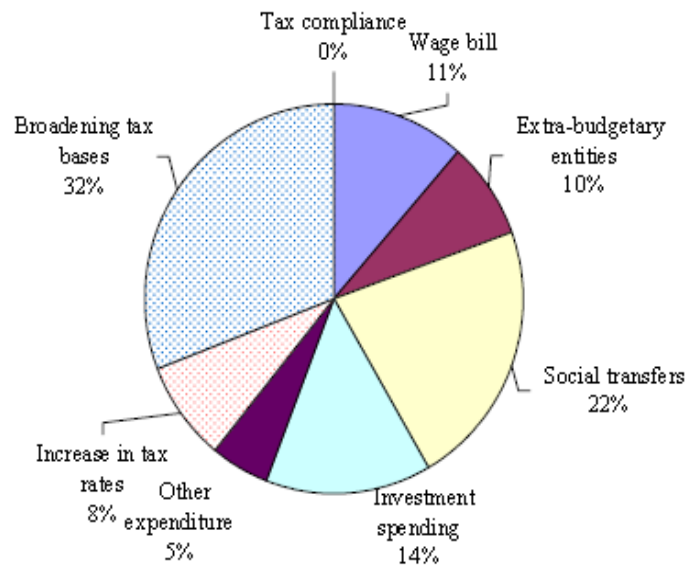
Source: The Economic Adjustment Programme for Greece (Spring 2011).
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1-2 Long term structural reform

The government announced wide-ranging reforms to the pension and health care systems and to Greece's public administration, and boosting Greek economic competitiveness by enhancing employment and economic growth, fostering private sector development, and supporting research, technology, and innovation.

In spite of Greece's relatively drastic contractionary fiscal policies, and steps of the structural reform, the economic growth rate contracted by 2% in 2009, 2.5% in 2010 and by 0.7% in 2011, and registered unemployment reached 12.6% in 2010, as shown in the table (1).

Table (1): Greece real GDP growth, unemployment rate, imports and exports (2003-2010)									
	Unit	2003	2004	2005	2006	2007	2008	2009	2010
Real GDP growth	Annual growth %	5.9	4.4	2.3	5.2	4.3	1.0	-2.0	-4.5
Unemployment rate	% of labor force	9.7	10.5	9.9	8.9	8.3	7.7	9.5	12.6
Imports of goods and services	% of GDP	32.3	32.4	31.5	33.0	34.6	36.3	29.6	29.4
Exports of goods and services	% of GDP	20.0	22.4	22.4	22.5	22.7	23.4	18.8	21.0
OECD data									

The Greek government tried attracting new foreign investment in Greece by boosting exports of goods and services, as well as focusing on trade and investment, shipping and tourism sectors using its geographic location. However Greek exports dropped in 2009 to 18.8% as shown in table (1), and Greek businesses have become increasingly uncompetitive in domestic and international markets.

1-3 Request financial assistance

On April 2010, the Greek government requested financial assistance from other European countries and the IMF to help cover its maturing debt obligations. However European leaders and the IMF requested additional measures to meet budget deficit targets in exchange for financial assistance which included economic structural reforms, while Germany and France (which are providing the largest loan) requested sever austerity measures.

Sebnem Kalemli et al. (2010) argue that it is important to provide liquidity to the banking sector during financial crises especially if the domestic banking sector is the main source of financing for the firms.

2-Possible Causes of the Crisis

Greece's current economic problems have been caused by a mix of domestic and international factors.

2-1 Domestic Factors

- **Improper Economic policies that involved high government spending and weak government revenues**

Table (2): General Government revenues and expenses									
		2003	2004	2005	2006	2007	2008	2009	2010
General Government Revenues	% of GDP	39.0	38.1	38.6	39.2	40.0	39.9	37.3	39.1
General Government expenditures	% of GDP	44.7	45.5	44.0	45.2	46.6	49.7	52.9	49.5
Source: OECD data									

As shown in table (2), between the years 2003 and 2010 while general government expenditures increased from 44.7% of GDP to 49.5% of GDP, its revenues grew only from 39.0 % of GDP to 39.1% of GDP, leading to budget deficit reaching -10.4 % of GDP in 2010, and pointing to a large and inefficient public administration in Greece.

Between 2000 and 2009 as shown in figure (2), Greece's GDP growth rates were driven primarily by increases in private consumption rather than investment. In addition, Greece relied more on government employees in the production process than private sector producers and service providers.

Figure (2): Costs of Government-produced and government funded goods and services (2000-2009)
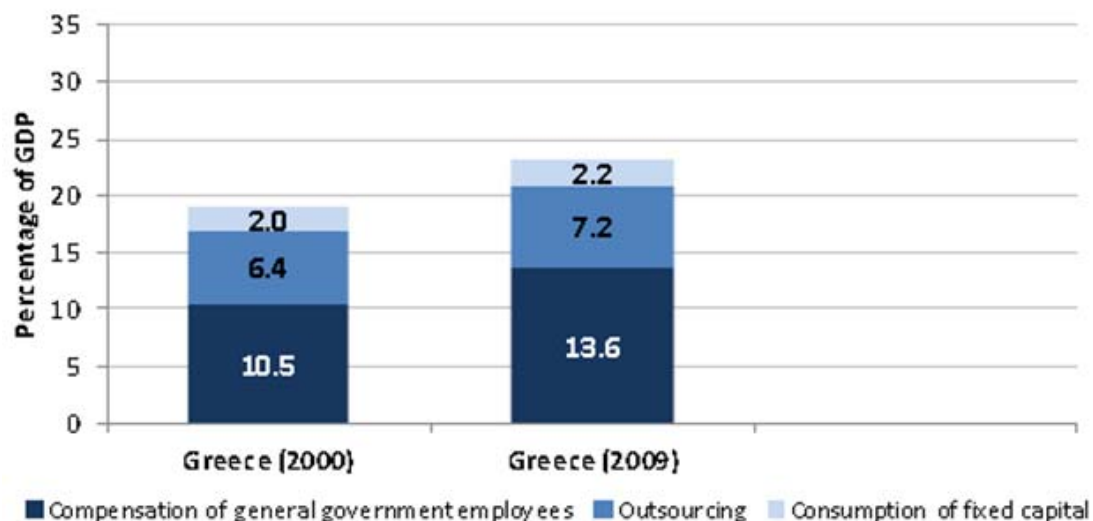
Source: OECD National Accounts

Weak revenue collection has also contributed to Greece's budget deficits. Many economists suggest that tax evasion - that costs the government around €20 billion a year -and Greece's unrecorded economy are major factors behind the deficits. Stavros Katsios (2006) argues that the main reasons of tax evasion in Greece are high levels of taxation, corruption, excessive regulation, and inefficiency in the public sector.

- pre-crisis trade policies in Greece

Prior to the financial crisis of 2008 Greece suffered from improper trade policies, entering the downturn with an already weak fiscal position.

Figure (3): Evolution of the current account balance and its components (billion €)
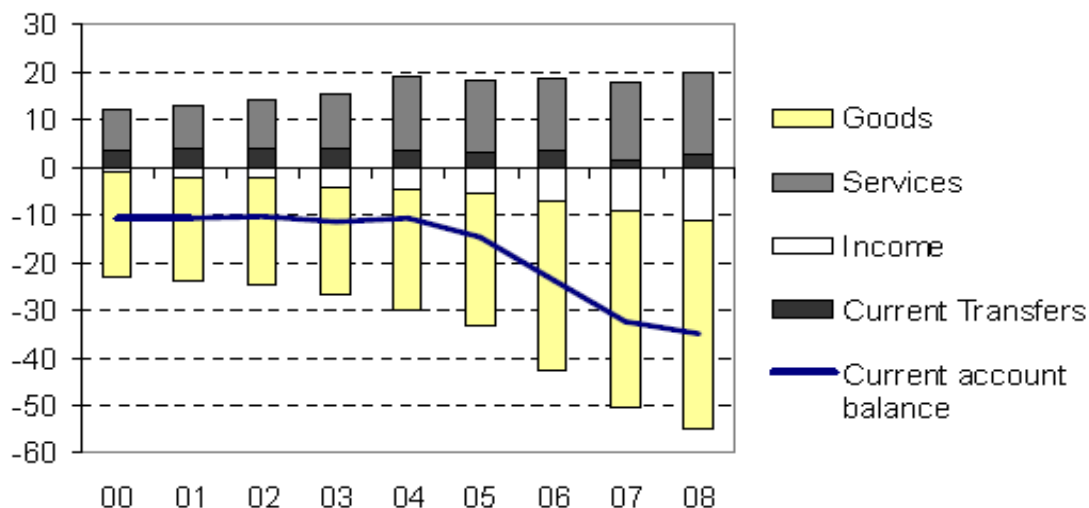
Source: National Accounts of Greece, 2000-2008.

Figure (3) shows high and increasing current account imbalances over the period 2000-2008 leading to rapidly rising foreign obligations. Greece's gross external debt reached 149% of the country's GDP in 2008. In addition to high public sector debt, the private sector's debt burden increased heavily over the period, as a result of the rapid credit expansion to households and private businesses (Ersi Athanassiou, 2009). Greece also focused on the services sector which is highly depended on global economic conditions. Stoyan Totev (2002) argues that the service sector is the area through which economic relations mainly with the adjacent countries can be realized. The evolution of Greece's external deficit reflects strong imbalances in the trade of goods, as well as a rapid deterioration of the incomes' balance.

Table (3) shows net savings in the Greek economy over the period 2000-2007. A negative net savings on the average reaching -2.7 % of GDP in 2008 with high public deficits and rapidly increasing private sector debt will leave no option but to finance through external borrowing. Greece's net annual external borrowing was on average equal to 10% of its GDP over this period, caused a critical augmentation of the country's external debt.

Table (3): Evolution of net saving of the Greek economy (% of GDP)	
Year	Net saving
2000	-0.1
2001	0.2
2002	0.0
2003	0.0
2004	1.4
2005	-0.6
2006	-0.6
2007	-2.2
2008	-2.7
Source: National Statistical Service of Greece, Bank of Greece	

- Declining International Competitiveness

The current account imbalances over the period (2000-2008), reflect a serious deficiency in competitiveness. Greece has been losing its international competitiveness due to high relative wages and low productivity. (Rebecca M. Nelson, 2011) argues that wages in Greece have increased from 2001 to 2010 about double the average rate in the Eurozone as a whole.
Wage agreements for 2008–2009 incorporated high inflation expectations, resulting in 12 % nominal wage hikes over this period (figure 4). With inflation declining at end-2008, real wage growth turned up, assisting household incomes. High wage growth over the euro average has led to competitiveness deterioration.

A major factor for boosting competitiveness is concentrating on productivity through enhancing educational outcomes. Despite progress over the past decades, educational attainment in most age groups in Greece is below the OECD average (Education at a Glance 2011, OECD indicators).

Figure (4): Increase in wages in Greece (2000-2008)
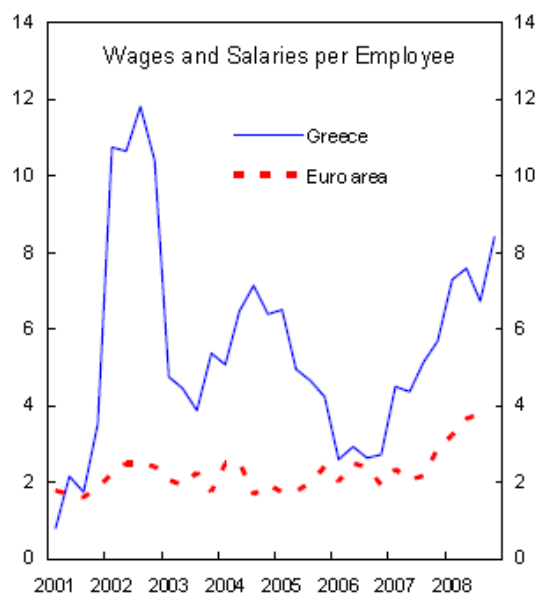
Sources: Eurostat; and IMF staff calculations

3- International Factors

3-1 Recession -fall 2008

The financial crisis of 2008 caused capital markets to become more illiquid, which had its impacts on the GDP growth and exports and hindered Greece's progress, as well as its access to financial assistance from other countries as the crisis spread to the Eurozone. The reliance on financing from international capital markets left Greece highly dependent on the global economic conditions.

The Economic slowdown that faced most countries in 2008 has had its impact on Greece's economy which faced deterioration of economic conditions bringing the real GDP growth rate down to -2.0 %, and unemployment up to 9.5% in mid-2009 as shown in table (1).

3-2 European Integration and EU Rules Enforcement

As a result of the European integration, Greece was able to borrow funds at low interest rates; at the same time- losing its currency- was unable to devalue the Euro to reduce the value of foreign debt, consequently Greece was able to accumulate this debt.

4- Implications of Greece's Crisis

Greece's debt crisis questioned having a common monetary policy with different fiscal policies. Some economists argue that the decision to adopt the Euro was partly dictated by non-economic rather than economic factors.

If Greece defaults, the crisis could spillover to other Southern European countries, including Portugal, Ireland, Italy, and Spain. These countries have borrowed heavily from international markets and have encountered high levels of government debts as shown in table (4).

Table (4): Debt as a percent of GDP					
	Greece	Portugal	Ireland	Italy	Spain
2008	118.1	80.7	49.6	114.7	47.7
2009	133.5	86.3	72.7	127.1	62.4
2010	149.1	92.9	104.9	126.1	72.2
2011	165.1	98.7	112.7	127.7	78.2
Source OECD					

Greece's debt crisis has its implications for the United States as the United States and the EU have strong economic ties, those implications involve losing confidence in the future of the Eurozone, as the value of the euro will weaken, which can lower U.S. exports to the Eurozone and increase U.S. imports from the Eurozone, widening the U.S. trade deficit.
Furthermore widespread financial instability in the EU could impact trade and growth in the region, which in turn could impact the U.S. economy, as it has a large financial stake in the EU.

CONCLUSION

Greece, losing its currency, suffering from high public debt and loss of competitiveness, in a recessionary environment and difficult economic situation in most partners, is likely to have a debt default. Greek crisis points to the need for stronger EU economic governance, in the form of a tighter and more enforceable Stability and Growth Pact.

The option of leaving the EU is an unlikely policy, as this would make future borrowing costs much higher for Greece. The Greek government cannot change the obligations from euros to New Drachmas. This would make it more expensive for the Greek debtors to repay the loans, and could lead to bankruptcies of Greek investors, and the Greek banks associated with them.

Applying a mix of two fiscal policy tools at the same time; tax increases and sharp spending cuts could lead to higher unemployment and more recession in the country. Greece is facing two major economic issues; large government budget deficits (which requires contractionary fiscal policies) and a cyclical economic downturn (which requires expansionary fiscal policies), following the current path will involve continuing long term austerity measures

with fewer results that will end with wider recessionary gap, lower standard of living and more political upset, causing finally more debt burden.

Greece should aim to promote export-led growth, such as wage moderation to keep the costs of production low and make exports competitive, combined with conservative fiscal policies that promote high levels of savings, as well as increasing an efficient privatization process to decrease the SOEs burden on the government. However the export-led growth may be difficult to realize under the global economic recession. Furthermore Greece's reliance on tourism and shipping which are highly affected by economic conditions raises real questions about focusing on trade to boost the economy.

Monetary policy can be ineffective when the banking system is in distress and fiscal policy becomes ineffective under high levels of government debts, therefore the way to a recovery for Greece can be in the long run under condition of financial assistance from other countries. Loss of confidence of consumers and investors causes demand to go down, therefore gives the government the need to step in with a demand stimulus, increasing spending on investment rather than consumption, but it can't do that in a difficult fiscal position. The government has to make hard choices of where it can spend money and where it can make cuts.

These decisions have to be based on accurate data and evidence about how much the government spends what they do and how well they do it (efficiency). The outcome of the above step will be in the long run under the condition of external finance from the EU as well as other related countries. However Greece's reliance on external financing for funding budget can be difficult decision since other countries will have less appetite to lend Greece while at the same time most EU countries are themselves experiencing financial difficulties. If the financial assistance of the other parties is not enough Greece could be forced to default on, or leave the Euro.

Although the nature of this crisis is economic the solution can be political, as it seems that Greece joined the EU before getting economically and competitively ready.
The Greek crisis also points to the idea that economic liberalization as a policy is not always a blessing.

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ROLE OF SPECULATORS IN AGRICULTURAL COMMODITY PRICE SPIKES DURING 2006-2011

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ABSTRACT

The press, governments, institutions and some researchers have blamed investors in the agricultural futures markets as the major cause for the recent price spikes in agricultural commodities mainly because of the significant inflow of investment funds into the futures markets by commodity index traders. Consequently, there have been many proposed government and institutional policies and programs such as increased financial regulation, strict supervision, and transparency aimed at curbing speculation in the commodities and futures markets. This study evaluates "excessive" speculation or the lack thereof in these markets using hedging ratios, speculative ratios, Working's speculative 'T' index, and Granger causality tests to examine the investment activities of commodity index traders and speculators on CFTC COT supplemental data for 12 agricultural commodities. The results of the study show that there is no "excess" speculation in the agricultural markets over the 2006-2011 periods. Indeed, the speculation levels found in this study are not significantly different from historical results reported in other studies and accepted as normal and necessary for the efficient functioning of the markets. The implications are that current speculative activities in the commodities and futures markets may possibly reflect necessary liquidity needs for the smooth functioning and stability of the markets. Therefore, the recent proposed policies aimed at curbing speculation in the commodities and futures markets may be potentially counterproductive.

Keywords: Agricultural commodity futures markets, agricultural commodity prices, commodity index trading, Commitment of Traders, excessive speculation, speculators, speculative ratio, Working's T-index, Granger causality tests

INTRODUCTION

Agricultural futures markets primarily function as a mechanism for discovering prices, facilitating financing, and managing market risks associated with price variability and stock holding. Unfortunately, recent volatility and high commodity prices in the commodity futures markets provide uncertainty for agricultural producers, food processors and manufacturers in their price discovery processes. FAO and World Bank data show that food and commodity prices started to rise in 2006 and peaked in 2008 and 2011 (FAO, 2009; FAO, 2011). Other reports

indicate that these high agricultural commodity prices have caused inflationary pressures and posed great concern for the global economy and the outlook is that world agricultural prices will continue to remain high and volatile (Abbott, 2009; FAO, 2011)).

Many researchers and institutions have linked the recent rise in commodity prices to fundamental economic factors of demand and supply, while others have blamed the speculation in the commodity futures contracts by hedge funds and investors in commodity indexes (CHSGA, 2008; AFPC, 2008; FAO, 2009; Sanders et al, 2010; US Senate, 2009) as the cause of the high prices. Despite these allegations, many investors and financial institutions continue to invest in agricultural commodities through index linked instruments and over-the-counter (OTC) swaps because investments in agricultural commodities are considered low risk against inflation or provide higher return than other asset classes (Kaufman, 2010). These have resulted in significant flow of funds into the agriculture commodity futures markets in recent years. Furthermore, these investments were never viewed as high risks until early 2008 when commodity prices skyrocketed (Sanders et al, 2010). Many argue that the rise of these new class of investments (especially long-only commodity index funds) into the agricultural futures markets may be speculative investments that possibly create "price distortions" and may potentially disrupt traditional cash-futures convergence pattern (AFPC, 2008; Henriques, 2008; US Senate, 2009). Consequently, there have been visible world-wide policy changes to control the role of swap dealers and index traders in commodity futures markets. Indeed, many G-20 governments and several international agencies such as IOSCO, OECD, IFPRI and UNCTAD, have expressed interest in implementing policies and programs (e.g. increased financial regulation, strict supervision and transparency in commodity derivatives markets) that will curb the high agricultural commodity prices by the end of 2012 (G-20 Agricultural Ministers, 2011). Particularly, the US Congress passed HR 4173 (Dodd-Frank Wall Street Reform and Consumer Protection Act) in 2011 that is intended to regulate the role of swap dealers and index traders in commodity futures markets (US Congress, 2011).

The number and type of investors in the agricultural futures markets, their classifications, and the type of positions they hold potentially impact the price levels in these markets. There have been controversies over the classification of swap dealers and hedge funds in the agriculture commodity futures markets. There is the belief that CFTCs traditional categories of Commitment of Traders (COT) are ambiguous especially when swap dealers are classified as commercials (Peck, 1982; Ederington and Lee, 2002; Sanders, Boris, and Manfredo, 2004). For example, although institutional investments in commodity futures markets are considered speculative, yet the Commodity Exchange Act (CEA) governing futures trading does not prohibit investors from using the futures markets to gain exposure to commodity indexes. Moreover, there may be incentive for speculators to self-classify their activities in commodity futures markets as commercial hedging to circumvent speculative position limits. Indeed, the CFTC has classified the trading activities of swap dealers in the commodity futures market as commercial rather than noncommercial because swap dealers use futures markets for hedging their price risks (US

Government Accountability Office, 2009). In addition, the Employee Retirement Income Security Act (ERISA) governing pension plans does not prohibit these plans from investing in commodity futures markets. Furthermore, pension plans investments with commodity-index exposures are considered legitimate and potentially useful investment strategy (Williams, 2009). Since mid-2000s, pension plans, endowments, and other institutional investors have increasingly used investments in commodity indexes in order to diversify their portfolios or hedge inflation risks (US Government Accountability Office, 2009). Commercial banks have also continued to participate in futures markets to hedge OTC commodity index swaps. The concerns of their activities compelled the CFTC to compile the Bank Participation in Futures Markets report (BP) which contains the positions held by commercial banks in 12 major commodity futures having at least five banks with open positions.

As previously indicated, these index investments and banks participation in the agricultural commodity futures markets are allowed by the regulatory bodies and exchanges under the classification of hedgers or commercials. However, traditionally, hedgers tend to be farmers, commodity processors, traders, etc., who have or would have control over the physical commodities being traded. This contradiction has created controversies in the classification of swap dealers and hedge funds under the commercial category of market participant in the commodity futures markets. For example, Till indicates that when swap dealers hedge the exposure of their swaps with positions in the futures markets, they are indeed hedging, and must thus be treated as speculators (Till, 2009).

Evidence in the investment industry suggests that commodity futures portfolios have generated returns comparable to equities (Gorton and Rouwenhorst, 2006). As a result, the industry has developed products that allow individuals and institutions to "invest" in commodity markets through OTC swaps that are linked to commodity indices, such as the Goldman Sachs Commodity Index (Acworth, 2005). Many researchers (Master *et al*, 2011; Till, 2009; Kaufman, 2010) have indicated that these investments especially commodity index trading have created excessive speculation and are possibly the main cause of price volatility in the commodity markets. Indeed, UNCTAD and some researchers have classified these investments as "financialisation of commodity markets" and indicated that these will potentially cause futures market quotations to be driven more by the speculative activities of financial investors and less by fundamental supply and demand factors (Domanski and Heath, 2007; UNCTAD, 2011).

The conventional method of monitoring speculative positions in the futures markets is through the CFTC's Commitments of Traders (COT) reports. Given the misunderstanding of the real causes of recent price increases in the commodity futures markets and the impact or the lack thereof of speculators in index funds in these markets, additional research efforts are needed to better understand the potential impact and role of speculators in these markets. This paper analyzes the roles of long and short positions of hedgers and speculators in the commodity futures markets and their potential impact on recent commodity price increases or volatility. In order to assess the extent and impact of excessive speculation caused by Commodity Index

Traders in these markets, CFTC data from Disaggregated Commitment of Traders (DCOT) in 12 commodity futures market are be analyzed. Specifically, COT data, including positions held by long-only index funds - reported in the Commodity Index Trader (CIT) report are analyzed to better understand the nature and impact of speculation in the commodity futures markets. This study examines the role of commodity-index investments by hedgers and speculators in US agricultural futures markets and their potential impacts on recent prices rise of agricultural commodities – i.e. the "adequacy of speculation" in agricultural futures markets since 2006.

DATA AND METHODS

The study uses CFTCs COT disaggregated open interest data of futures positions, and delta-adjusted futures positions from January 2006 to September 2011. 302 contract observations for 12 commodities (Wheat, Corn, Soy, Soy-oil from CBOT; Wheat from KCBT; Lean Hogs, Live Cattle, Feeder Cattle from CME; and Cotton No.2, Sugar No.11, Coffee C & Cocoa from ICE) are used in the analyses. Index Investments (2007 to Sept 2011) and CFTCs bank participation (BP) data (August 2009 to Sept 2011) are also used in the analyses.

The relative "excessiveness" or adequacy of speculative and hedging activities in agricultural commodity futures markets are generally measured using hedging and speculative ratios, and Working's Speculative "T" Index. These three measures are supplemented with Granger's Causality tests to evaluate the causal effect of the traders' activities (i.e., CIT) on commodity futures prices. The study groups the traders into three main categories in order to use the ratios to evaluate their relative speculative and hedging activities.

Category 1: Includes only reporting and non-reporting traders in commercials (hedgers) and non-commercials (speculators) respectively - i.e. it excludes CIT in commercials and non-commercials and thus assumes that there are no index traders in the market.

Category 2: Consists of reporting and non-reporting traders in commercials (hedgers) and non-commercial (speculators) respectively combined with CIT in commercials (hedgers).

Category 3: Includes reporting and non-reporting traders in commercials (hedgers) and non-commercial (speculators) respectively and CIT in non-commercials.

The Hedging Ratios (HR) used to measure the extent of excess long or short hedging are:

$$HR = HL/HS \qquad \text{if HS > HL} \qquad (1a)$$
$$HR = HS/HL \qquad \text{if HL > HS} \qquad (1b)$$

where HR is hedging ratio, HL is long hedging, and HS is short hedging. The Speculative Ratios (SR) measure the extent of excess speculation in the market in relation to the amount of hedging adjusted for non-reporting traders and CIT for hedgers and speculators respectively – i.e. they determine how long/short hedging positions are offset by long/short speculation. They are:

$$SR = SL/HS \qquad \text{if } HS > HL \tag{2a}$$

$$SR = SS/HL \qquad \text{if } HL > HS \tag{2b}$$

where SR is speculative ratio, HL is long hedging, HS is short hedging, SL is long speculation and SS is short speculation. Working's Speculative Index "T" is used to measure the adequacy of speculative positions needed to balance hedging positions held by commercial traders, i.e. it assists in identifying "excessive" or "inadequate" speculation relative to hedging activities in the futures markets. The "T" index is estimated as:

$$T = 1 + SS/(HL + HS) \qquad \text{if } HS > HL \tag{3a}$$

$$T = 1 + SL/(HS + HL) \qquad \text{if } HL > HS \tag{3b}$$

where "T" is the Working's Speculative Index, SS is short speculation, SL is long speculation, HL is long hedging, and HS is short hedging. Generally, "T" values greater than 1 reflect the extent of speculation in excess of the minimum needed to fill the long and short hedging gaps. It therefore, represents the amount of "unnecessary" speculation in the market (Working, 1960). Historically, "T" values in the range of 15% to 35% have been accepted as economically normal for the stability or smooth functioning of commodity futures markets (Sanders et al, 2010; Peck, 1981; Peck ,1982; Leuthold, 1983).

The study used the Granger Causality Test to evaluate the causal effect of traders' activities (i.e., CIT) on commodity futures prices. This is a <u>statistical hypothesis test</u> for determining whether one <u>time series</u> is useful in determining another (Granger, 1969). Granger causality states that:

> "x_t is causing y_t if we are better able to predict y_t using all available information than if the information apart from x_t had been used" (Granger, 1969, p. 428).

The definition of Granger Causality has given rise to a set of procedures for testing the causality and the direction of causality between economic variables that avoids the problem of correlation and `spurious regression` (Granger and Newbold,1974; Pierce and Haugh,1977; and Feige and Pearce, 1979). The process involves employing stationary time series of lagged values

of x and y in a univariate auto-regression model to test (through t-tests and F-tests) the null hypothesis that *x* does not Granger-cause y. The first step involves making the series stationary and estimate the appropriate lag length. Several procedures exist to test for the presence of stochastic trends in time series data. The most commonly applied is the Dickey-Fuller (1979) test, specified as:

$$\Delta X_t = \mu + \delta_t + \rho X_{t-1} + \sum_{j=1}^{k} \gamma_j \Delta X_{t-j} + \varepsilon_t \qquad (4)$$

The null hypothesis, $\rho = 0$ can be tested using a t-statistic. The lag length of the augmentation terms, j, is chosen as the minimum necessary to reduce the residuals to white noise. Critical values for this Dickey-Fuller (DF) test have been calculated using Monte Carlo methods, most accurately by MacKinnon, et al. (1991). Each of our series was subjected to standard unit root tests (Dickey and Fuller, 1979; Phillips and Perron, 1988). All our results (not presented here) are consistent with each series being characterized as I(1) or first difference stationary.

The SIC (Schwarz Information Criterion) is used to run the VAR Lag Order Selection Criteria for selecting the optimal lag length – i.e., the causality for futures prices to index trading and vice versa are tested in a VAR framework by regressing each variable on its own stationary lagged values and the others in the model:

$$Y_t = \beta_0 + \sum_{j=1}^{J} \beta_j Y_{t-j} + \sum_{k=1}^{K} \gamma_k X_{t-k} + \mu_t \qquad (5a)$$

where Y and X are the price series for futures and commodity index traders' long open interest positions respectively for CFTC's 12 agricultural commodities (i.e. CBOT wheat, KCBT wheat, corn, soy, soy oil, cotton no. 2, lean hogs, live cattle, feeder cattle, cocoa, sugar no. 11, coffee C), and J and K are optimal lags. F-tests and p-value analyses are then performed on the results to test for causality, i.e. the null hypothesis that the coefficients in the model are jointly zero. The "reverse" model is estimated to determine the causal direction in the series by using:

$$X_t = \beta_0 + \sum_{j=1}^{J} \beta_j X_{t-j} + \sum_{k=1}^{K} \gamma_k Y_{t-k} + \mu_t \qquad (5b)$$

These models assist in testing whether commodity futures prices do or do not Granger cause commodity index trading long positions and vice versa – i.e. whether commodity index trading long positions do or do not Granger cause commodity futures prices.

EMPIRICAL RESULTS AND DISCUSSION

Hedging and Speculative Ratio Results:

The results of the hedging and speculation ratios for the 12 CFTC COT Supplemental products are presented in Table 1, 2, and 3. Ratio values close to 1 indicate that there are no differences between long and short hedging positions and imply that small participation of open interests may be required from speculators to fill the gap. However, ratio values that are significantly lower than 1 indicate wide differences between the long and short hedging positions and imply that a larger participation of long or short speculations may be needed to fill the gap.

All the hedging ratios (HR) in Tables 1, 2, and 3 are below 1 (except 2009 KCBT wheat and CBOT soyoil in category 2 that has a ratios of over 1.00), implying that there are significant differences between the long and short hedging positions. Indeed, all the HR ratios in categories 1 and 3 (Tables 1 and 3) are below 0.75, implying that the markets require larger participation of speculators to fill the gap. However, most HR ratios in category 2 (Table 2) are more than 0.75 or closer to 1.00, implying that only a small participation of speculators are needed to fill the gap. Therefore, hedgers (i.e. investments in CIT in category 2 or Table 2) play a significant role in the commodity futures markets than speculators whose activities are less needed to bridge the long and short hedging imbalances in the markets.

Generally, the larger the SR value the greater the amount of speculation in the market, although SR is also affected by the amount of imbalance between the short and long hedging components (Daigler, 1991). With the exception of feeder cattle futures contracts in CME market, the SR results for all commodities in Table 1 are significantly lower than 1.00 (i.e. below 0.50). This implies that there were low levels of speculation in the markets to meet the long/short hedging gaps. Furthermore, all SR values in Table 2 are also below 0.50, except CME feeder cattle futures contracts in CME market. More importantly, all total values of both HR and SR in Table 2 are more than 1.00, but lesser than 1.35. These results imply that there is a low level of speculation in the markets after meeting the demand for long/short hedging gaps. A potential reason for the limited speculation in the markets could be attributed to the activities of CIT in commercials (hedgers) whose data are included in Table 2 – i.e. role of CIT in commercials in these markets made it unnecessary for large infusion of long speculative positions. Therefore, it can be concluded that the investment of long index funds (CIT in commercials) in markets that are traditionally dominated by short hedging, should be considered as market saviors (i.e. improves market stability) rather than causing instability in the markets.

CFTC COT Sup. Product		2006	2007	2008	2009	2010	2011
CBOT Wheat	HR	0.39	0.38	0.33	0.40	0.45	0.39
	SR	0.24	0.30	0.30	0.31	0.27	0.28
	Total	0.63	0.68	0.63	0.71	0.72	0.68
KCBT Wheat	HR	0.33	0.43	0.61	0.58	0.47	0.42
	SR	0.54	0.46	0.30	0.31	0.39	0.42
	Total	0.86	0.89	0.91	0.89	0.86	0.84
CBOT Corn	HR	0.48	0.55	0.60	0.64	0.44	0.46
	SR	0.32	0.28	0.23	0.25	0.35	0.36
	Total	0.79	0.83	0.83	0.89	0.80	0.82
CBOT Soy	HR	0.74	0.42	0.43	0.46	0.45	0.45
	SR	0.29	0.35	0.31	0.30	0.33	0.34
	Total	1.03	0.77	0.74	0.77	0.77	0.79
CBOT Soyoil	HR	0.44	0.40	0.59	0.64	0.44	0.49
	SR	0.31	0.34	0.18	0.22	0.28	0.30
	Total	0.75	0.74	0.77	0.86	0.72	0.80
ICE Cotton No.2	HR	0.44	0.34	0.41	0.26	0.38	0.49
	SR	0.29	0.33	0.23	0.29	0.30	0.26
	Total	0.73	0.67	0.65	0.55	0.68	0.75
CME Lean Hogs	HR	0.28	0.32	0.26	0.36	0.18	0.23
	SR	0.31	0.33	0.35	0.45	0.39	0.38
	Total	0.58	0.65	0.61	0.80	0.57	0.61
CME Live Cattle	HR	0.43	0.30	0.30	0.43	0.16	0.30
	SR	0.34	0.36	0.37	0.40	0.48	0.38
	Total	0.78	0.66	0.67	0.83	0.64	0.68
CME Feeder Cattle	HR	0.70	0.59	0.82	0.80	0.56	0.57
	SR	0.69	0.64	1.00	0.83	0.76	0.59
	Total	1.39	1.24	1.82	1.63	1.32	1.16
ICE Cocoa	HR	0.74	0.50	0.51	0.55	0.64	0.69
	SR	0.33	0.47	0.50	0.40	0.32	0.23
	Total	1.07	0.96	1.02	0.95	0.96	0.92
ICE Sugar No.11	HR	0.51	0.58	0.43	0.51	0.50	0.43
	SR	0.23	0.23	0.21	0.21	0.23	0.27
	Total	0.75	0.80	0.64	0.72	0.73	0.69
ICE Coffee C	HR	0.46	0.44	0.40	0.41	0.36	0.50
	SR	0.39	0.43	0.29	0.29	0.31	0.23
	Total	0.85	0.86	0.69	0.71	0.67	0.73

Table 1: H and S Ratios: Non-Reporting and Reporting Traders, Category 1

Table 2: H and S Ration: Non-Reporting, Reporting and CIT in Commercials, Category 2							
CFTC COT Sup. Product		2006	2007	2008	2009	2010	2011
CBOT Wheat	HR	0.94	0.93	0.89	0.81	0.85	0.93
	SR	0.24	0.28	0.27	0.27	0.24	0.25
	Total	1.18	1.21	1.16	1.08	1.09	1.18
KCBT Wheat	HR	0.53	0.71	0.92	1.00	0.81	0.69
	SR	0.54	0.46	0.30	0.30	0.38	0.40
	Total	1.07	1.17	1.22	1.30	1.19	1.09
CBOT Corn	HR	0.87	0.86	0.93	0.95	0.89	0.78
	SR	0.31	0.28	0.22	0.24	0.34	0.33
	Total	1.18	1.14	1.15	1.19	1.24	1.12
CBOT Soy	HR	0.82	0.76	0.84	0.88	0.90	0.81
	SR	0.28	0.35	0.30	0.29	0.31	0.32
	Total	1.10	1.11	1.14	1.17	1.21	1.13
CBOT Soyoil	HR	0.80	0.70	0.92	1.01	0.90	0.84
	SR	0.31	0.34	0.17	0.21	0.27	0.29
	Total	1.11	1.03	1.10	1.22	1.16	1.13
ICE Cotton No. 2	HR	0.94	0.81	0.84	0.77	0.73	0.78
	SR	0.29	0.32	0.23	0.29	0.29	0.24
	Total	1.23	1.13	1.07	1.06	1.02	1.02
CME Lean Hogs	HR	0.96	0.95	0.98	0.87	0.78	0.85
	SR	0.31	0.33	0.34	0.43	0.38	0.37
	Total	1.27	1.28	1.32	1.30	1.16	1.22
CME Live Cattle	HR	0.97	0.96	0.97	0.94	0.66	0.84
	SR	0.34	0.36	0.36	0.39	0.47	0.37
	Total	1.31	1.32	1.33	1.33	1.13	1.22
CME Feeder Cattle	HR	0.95	0.93	0.68	0.73	0.97	0.94
	SR	0.69	0.64	0.93	0.77	0.73	0.57
	Total	1.64	1.57	1.61	1.50	1.70	1.51
ICE Cocoa	HR	0.87	0.63	0.73	0.75	0.92	0.98
	SR	0.33	0.47	0.49	0.40	0.31	0.23
	Total	1.19	1.10	1.22	1.14	1.22	1.21
ICE Sugar No.11	HR	0.80	0.96	0.86	0.82	0.81	0.79
	SR	0.23	0.22	0.19	0.18	0.20	0.24
	Total	1.03	1.18	1.05	1.00	1.01	1.02
ICE Coffee C	HR	0.89	0.82	0.85	0.85	0.81	0.87
	SR	0.39	0.42	0.29	0.29	0.30	0.22
	Total	1.28	1.24	1.13	1.14	1.11	1.09

Table 3: H & S Ratios: Non-Reporting, Reporting Traders, CIT in Non-Commercials, Category 3							
CFTC COT Sup. Product		2006	2007	2008	2009	2010	2011
CBOT Wheat	HR	0.39	0.38	0.33	0.40	0.45	0.39
	SR	0.94	1.03	1.24	1.31	1.16	1.10
	Total	1.33	1.41	1.57	1.71	1.60	1.50
KCBT Wheat	HR	0.33	0.43	0.61	0.58	0.47	0.42
	SR	0.75	0.75	0.62	0.74	0.75	0.72
	Total	1.07	1.18	1.23	1.32	1.21	1.14
CBOT Corn	HR	0.48	0.55	0.60	0.64	0.44	0.46
	SR	0.72	0.60	0.59	0.73	0.84	0.76
	Total	1.19	1.15	1.19	1.36	1.28	1.22
CBOT Soy	HR	0.74	0.42	0.43	0.46	0.45	0.45
	SR	0.78	0.70	0.74	0.77	0.81	0.77
	Total	1.53	1.12	1.18	1.23	1.26	1.21
CBOT Soyoil	HR	0.44	0.40	0.59	0.64	0.44	0.49
	SR	0.69	0.64	0.53	0.64	0.80	0.70
	Total	1.12	1.04	1.12	1.28	1.23	1.19
ICE Cotton No. 2	HR	0.44	0.34	0.41	0.26	0.38	0.49
	SR	0.91	0.81	0.69	0.83	0.68	0.62
	Total	1.35	1.15	1.10	1.08	1.06	1.11
CME Lean Hogs	HR	0.28	0.32	0.26	0.36	0.18	0.23
	SR	1.08	1.08	1.15	1.29	1.02	1.02
	Total	1.35	1.40	1.41	1.64	1.20	1.25
CME Live Cattle	HR	0.43	0.30	0.30	0.43	0.16	0.30
	SR	0.89	1.03	1.11	1.04	1.00	0.94
	Total	1.32	1.32	1.42	1.47	1.16	1.24
CME Feeder Cattle	HR	0.70	0.59	0.82	0.80	0.56	0.57
	SR	0.89	1.03	1.11	1.04	1.00	0.94
	Total	1.59	1.62	1.93	1.84	1.56	1.51
ICE Cocoa	HR	0.74	0.50	0.51	0.55	0.64	0.69
	SR	0.45	0.61	0.75	0.61	0.63	0.55
	Total	1.20	1.10	1.26	1.16	1.26	1.24
ICE Sugar No.11	HR	0.51	0.58	0.43	0.51	0.50	0.43
	SR	0.55	0.66	0.71	0.64	0.66	0.71
	Total	1.06	1.24	1.14	1.15	1.16	1.14
ICE Coffee C	HR	0.46	0.44	0.40	0.41	0.36	0.50
	SR	0.83	0.82	0.75	0.75	0.78	0.64
	Total	1.28	1.25	1.15	1.17	1.14	1.15

Table 3 shows the HR and SR values for non-reporting traders, reporting traders and CIT in non-commercials. All the SR values in Table 3 are between 0.70 and 1.36 and are significantly larger than the HR values. This indicates excess speculations after meeting the demand for long/short hedging gap during the period for most commodities. One potential reason for the excess speculation (high SR values) in this category is the inclusion of CIT in non-commercials

(speculators) who are not considered as traditional participants in these markets but have been blamed for the rise in commodity prices.

Working's Speculative "T" Index Results:

The results of the "T" Index analyses are presented in Tables 4, 5, and 6. The "T" Index values for all the three categories of traders are greater than 1.00, indicating relative evidence of some level of excess speculation in the markets.
The "T" values for markets investments or contracts that exclude CIT in commercials (hedgers) and CIT in non-commercial (speculators) are reported in Table 4. With the exception of feeder cattle contracts, all the "T" values range from 5% to 25%. These values indicate the existence of low level excess speculation in these markets that have no index fund investments and these may be economically necessary for the stability or smooth functioning of the markets.

Table 4: "T" Index: Non-Reporting and Reporting Traders, Category 1						
CFTC COT Supplemental Product	2006	2007	2008	2009	2010	2011
CBOT Wheat	1.19	1.21	1.23	1.22	1.19	1.20
KCBT Wheat	1.05	1.32	1.19	1.19	1.27	1.30
CBOT Corn	1.08	1.18	1.14	1.15	1.25	1.25
CBOT Soy	1.24	1.25	1.22	1.21	1.23	1.23
CBOT Soy oil	1.10	1.24	1.11	1.13	1.20	1.20
ICE Cotton No:2	1.27	1.24	1.17	1.23	1.22	1.18
CME Lean Hogs	1.22	1.25	1.28	1.33	1.33	1.31
CME Live Cattle	1.15	1.28	1.28	1.28	1.42	1.29
CME Feeder Cattle	1.32	1.40	1.55	1.46	1.49	1.37
ICE Cocoa	1.13	1.31	1.33	1.26	1.19	1.14
ICE Sugar No.11	1.04	1.14	1.15	1.14	1.15	1.19
ICE Coffee C	1.21	1.30	1.21	1.21	1.22	1.15

Table 5 reports the "T" values for market investments or contracts (category 2) that include CIT in commercials (hedgers) but exclude CIT in non-commercial (speculators). Again, with the exception of feeder cattle contracts in CME market, all the speculative "T" values are below 25% for all commodities in all markets. These low "T" values indicate low or minimum levels of excess speculation which are generally considered as economically necessary or needed for the stability or smooth functioning of the markets (Sanders et al, 2010; Peck, 1981; Peck, 1982; Leuthold, 1983).

Table 5: "T" Index: Non-Reporting, Reporting Traders and CIT in Commercials, Category 2						
CFTC COT Supplemental Product	2006	2007	2008	2009	2010	2011
CBOT Wheat	1.11	1.14	1.13	1.12	1.11	1.12
KCBT Wheat	1.04	1.08	1.07	1.12	1.09	1.05
CBOT Corn	1.07	1.05	1.05	1.09	1.09	1.05
CBOT Soy	1.18	1.04	1.05	1.06	1.08	1.06
CBOT Soy oil	1.08	1.04	1.07	1.12	1.10	1.08
ICE Cotton No:2	1.19	1.09	1.05	1.05	1.03	1.03
CME Lean Hogs	1.15	1.16	1.17	1.20	1.08	1.11
CME Live Cattle	1.11	1.13	1.18	1.19	1.06	1.08
CME Feeder Cattle	1.34	1.31	1.38	1.32	1.26	1.16
ICE Cocoa	1.12	1.08	1.14	1.10	1.12	1.12
ICE Sugar No.11	1.03	1.10	1.05	1.02	1.02	1.02
ICE Coffee C	1.16	1.14	1.08	1.08	1.07	1.05

Table 6 presents the "T" values for category 3 investments in the markets - i.e. market investments or contracts that include CIT in non-commercial (speculators) but exclude CIT in commercials (hedgers). The "T" values in Table 6 reflect excess speculation in markets that consider index investments as speculative contracts. Consequently, any large "T" value in Table 6 will indicate excessive speculation and may be the main cause of price spike in that market. However, all "T" values in Table 6 are below 25% with the exception of CBOT wheat contracts (20-47%) and CME feeder cattle contracts (20-72%). Overall, these low "T" values indicate lack of excessive speculation in the markets.

The "T" values reported in Tables 4, 5, and 6 for all the three categories of investments show no significant difference from historical values of 15% -35% reported in other studies and accepted as normal and economically necessary for the stability or smooth functioning of commodity futures market (Working, 1960; Laby and Granger, 1970; Peck, 1981; Peck, 1982; Leuthold, 1983; Sanders et al, 2008). Table 7 compares this study's upper and lower speculative indexes with previous research results. The comparative results show that there is no pervasive evidence that speculative levels in 2006-2011 are in excess of those recorded historically for agricultural futures markets even after accounting for index trader positions. Therefore, the results of the speculative "T" indexes from this study show that these agricultural futures markets do not have high level of speculative activities. Consequently, the current speculative activities may reflect commercial needs for the stability and smooth functioning of the markets.

Table 6: "T" Index: Non-Reporting, Reporting Traders and CIT in Non-Commercials-Category 3							
CFTC COT Supplemental Product		2006	2007	2008	2009	2010	2011
CBOT Wheat		1.20	1.26	1.39	1.47	1.38	1.33
KCBT Wheat		1.05	1.10	1.09	1.17	1.13	1.09
CBOT Corn		1.09	1.06	1.09	1.16	1.15	1.12
CBOT Soy		1.25	1.06	1.09	1.12	1.14	1.13
CBOT Soy oil		1.10	1.05	1.09	1.19	1.18	1.14
ICE Cotton No:2		1.27	1.14	1.09	1.09	1.06	1.09
CME Lean Hogs		1.22	1.27	1.30	1.45	1.15	1.18
CME Live Cattle		1.16	1.19	1.26	1.28	1.11	1.13
CME Feeder Cattle		1.32	1.32	1.72	1.64	1.37	1.22
ICE Cocoa		1.13	1.09	1.19	1.12	1.17	1.15
ICE Sugar No.11		1.06	1.17	1.12	1.12	1.13	1.11
ICE Coffee C		1.22	1.19	1.12	1.13	1.11	1.11

Granger Causality Test Results:

Despite the limited level of speculation reported by the results of the "T" indexes, HR and SR analyses, yet there were price spikes or volatility during the same period (2006-2011). These may have created the impression that the flow of commodity index investments into the markets are possibly the cause of the price spikes during the period and that there may be potential causal relationship between index investments and price distortions in the markets. Therefore, the causal relationships between the futures prices and open interest positions of commodity index traders were tested.

Table 8 presents the results of models 5a and 5b used for the causality tests. The results for nine (wheat, soybean, soybean oil, lean hogs, cocoa, coffee, cotton, and sugar) out of the twelve commodities indicate that the futures prices do not Granger cause CIT long open interest positions and vice versa. Generally, these results imply that neither the future prices nor CIT long open interest positions influence the price behavior of the other. However, the results for live cattle, feeder cattle and corn provided different causation effects.

	Working[a]	Labys & Granger[b]	Peck[c]	Leuthold[d]	Sanders et al. CIT Adjusted[e]	CITf	CITg
Market	1954-58	1950-65	1972-77	1969-80	2006-08	2006-11	2006-11
CBOT Wheat	1.22	1.19	1.09-1.32		1.19-1.49	1.11-1.14	1.20-1.47
KCBT Wheat			1.01-1.05		1.05-1.36	1.04-1.12	1.05-1.17
Corn	1.16	1.19	1.05-1.20		1.06-1.34	1.05-1.09	1.06-1.16
Soybeans	1.28	1.31	1.06-1.31		1.10-1.45	1.04-1.18	1.06-1.25
Soybean Oil	1.14	1.18			1.07-1.15	1.04-1.10	1.05-1.19
Cotton	1.27				1.16-1.27	1.03-1.19	1.06-1.27
Lean Hogs				1.10-8.69	1.18-1.68	1.08-1.20	1.15-1.45
Live Cattle			1.57-2.17	1.05-2.34	1.13-1.60	1.06-1.18	1.11-1.28
Feeder Cattle				1.08-3.80	1.14-2.61	1.16-1.38	1.22-1.72
Cocoa						1.08-1.14	1.09-1.17
Sugar						1.02-1.10	1.06-1.17
Coffee						1.05-1.16	1.11-1.22
Average	1.21	1.22	1.16-1.41	1.08-4.94	1.12-1.55	1.06-1.16	1.10-1.29

Table 7: Comparison of "T" Index with Previous Research Indexes

[a.] Working (1960), Table 3. p. 194. Non-reporting traders are allocated to hedging or speculating based on the levels of hedging and speculating in reported positions (see Working's appendix 2, pp. 214-216

[b.] Laby's and Ganger (1970), Table 5-6, p. 127. Non-reporting traders allocated to hedging or speculating based on the levels of hedging and speculating in reported positions following Working (1960) method.

[c.] Peck (1980), Table 1 and Table 2. Peck estimates an upper (lower) bound by assuming all non-reporting traders are speculators (hedgers). The date range represents the most inclusive time period over which the index was calculated across the markets.

[d.] Leuthold (1983), Table VI, p. 131. Leuthold estimates an upper (lower) bound by assuming all non-reporting traders are speculators (hedgers). The date range represents the most inclusive time period over which the index was calculated across the markets.

[e.] Sanders *et al.*(2010), Table 10, p.26. Upper (lower) range results from assuming that non-reporting traders are speculators (hedgers).

[f-g.] Upper (lower) results from assuming CIT as commercials (hedgers) and non-commercials (speculators).

Table 8 shows that live cattle future prices Granger cause CIT long open interest positions and vice versa – i.e. there is a bidirectional relationship between the two series or that market information flows between the index investments and futures prices of live cattle in CME market and vice versa. Furthermore, Table 8 also shows a unidirectional causation between future prices and CIT long open interest positions in feeder cattle on CME and corn on CBOT markets – i.e. the null hypotheses that CIT open interests do not Granger cause futures prices in feeder cattle and corn are rejected in both markets. The implication is that index investment flows do influence future prices of feeder cattle and corn. The "T" index and ratio results confirm these causal findings. With the exception of live cattle, feeder cattle and corn, the results

from the ratios, "T" indexes, and Granger causality analyses generally provide significant indication that CIT in agricultural commodity futures markets do not influence or have no causation effects on the future prices in most of the markets. The implication is that CIT in agricultural futures markets do not seem to play insignificant role or are potentially not responsible for the recent price variability in these markets and that these investments seem to provide liquidity needed for the efficient functioning of the markets.

Table 8: Granger Causality Test Results			
Product	Null Hypothesis	F-Statistic	P- Value
CBOT Wheat	OI does not cause FP	1.43832	0.239
	FP does not cause OI	0.63571	0.5303
KCBT-Wheat	OI does not cause FP	2.97406*	0.0526
	FP does not cause OI	0.54395	0.5810
CBOT-Corn	OI does not cause FP	**5.16984***	**0.0062**
	FP does not cause OI	2.86551	0.0586
CBOT-Soybeans	OI does not cause FP	2.89319	0.0570
	FP does not cause OI	1.04706	0.3523
CBOT-Soybean Oil	OI does not cause FP	0.08039	0.9228
	FP does not cause OI	1.34802	0.2614
ICE-Cotton #2	OI does not cause FP	1.83453	0.1615
	FP does not cause OI	1.52900	0.2185
CME-Lean Hogs	OI does not cause FP	0.58104	0.5600
	FP does not cause OI	2.38197	0.0942
CME-Live Cattle	OI does not cause FP	**3.23073**	**0.041**
	FP does not cause OI	**4.06562**	**0.0182**
CME-Feeder Cattle	OI does not cause FP	**3.07442**	**0.0477**
	FP does not cause OI	2.17181	0.1158
ICE-Cocoa	OI does not cause FP	2.21197	0.1113
	FP does not cause OI	0.44551	0.6409
ICE-Sugar #11	OI does not cause FP	1.15443	0.3167
	FP does not cause OI	0.70165	0.4966
ICE-Coffee 'C'	OI does not cause FP	0.60053	0.5492
	FP does not cause OI	0.23097	0.7939
**Rejected at 5% level of significance ***Rejected at 1% level of significance (OI) Open Interest (FP) Future Price			

SUMMARY AND CONCLUSIONS

Although prices in the agricultural commodity futures markets have risen significantly in recent years, the results of this study support those of many previous studies that concluded that investments of commodity index traders and speculators in the futures markets are not the major causes of the price increases. While the analyses in this study do not directly test for price impacts, the overall results of the ratio analyses, "T" indexes, and Granger Causality tests show that there is no "excess speculation" in the commodities futures markets. However, the ratio and speculative index results revealed a relative low level of abnormality only in CBOT wheat and CME feeder cattle markets. The Granger Causality tests revealed that index investments do not Granger cause futures prices in 9 out of the 12 commodities. Index investments Granger caused futures prices only in CBOT corn and CME feeder cattle markets. These results debunk the assertion that speculators are to be blamed for the recent increases in commodity prices and that their activities in the futures markets must be curbed. Indeed, the results of this study indicate the possibility that speculators and commodity index traders potentially play appropriate roles in the futures markets by providing liquidity needed for the smooth functioning of the markets.

The results of the study imply that commodity index traders in agricultural commodities do not change futures markets primarily from hedging to "excessive" speculative markets. As a result, the potential causes of the recent price spikes in agricultural commodities may potentially be the results of market fundamentals. Consequently, recent proposed government policies and programs aimed at curbing speculation in the commodities and futures market may potentially be counterproductive in terms of needed liquidity in the markets to ensure stable price levels and market stability.

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