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A HYBRID NEURO-FUZZY MODEL FOR FOREIGN EXCHANGE RATE PREDICTION

Hari Sharma, Virginia State University
Dinesh K. Sharma, University of Maryland Eastern Shore
Hari S. Hota, Bilaspur University

ABSTRACT

Foreign exchange (FX) rate movements depend on several factors such as economic conditions and the foreign policy of a country. Therefore, it is important to monitor the economic conditions of a country as well as its foreign policy to assess the impact on exchange rates. Since the FX rate has a nonlinear relationship with its predicting factors, researchers are designing and developing sophisticated models to accommodate the complex relationships between the foreign exchange rates and the predictive variables that are considered the most influential on the currency exchange rates in the short term. Recent research reveals that predictive models developed using Artificial Neural Network (ANN) captures nonlinear trends better than traditional forecasting techniques. Therefore, the focus of this research is to design and develop models that have better predictive power in real time. The authors have accomplished this goal by applying a hybrid of ANN and fuzzy logic in an Adaptive Neuro-Fuzzy Inference System (ANFIS) that can be implemented successfully with non-linear data prediction. This research paper utilizes ANFIS to develop a rule based model with one input and one output variable to predict the FX rates of three Asian countries: China, India, and Japan with respect to the US dollar. Recent time series datasets of five financial years of Chinese Yuan Renminbi/US Dollar (CNY/USD), Indian Rupees/US Dollar (INR/USD) and Japanese Yen /US Dollar (JPY/USD) were obtained and preprocessed to ANFIS for our predictions. A rule based model developed through ANFIS was utilized further for testing of the data. The results are obtained in terms of Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE), and Root Mean Square Error (RMSE) and compared with ANN, which showed that the daily CNY/USD exchange rates has the least MAPE as compared to the other two exchange rates predictions. Thus, the prediction for the daily CNY/USD was more precise than the other two predictions (INR/USD and JPY/USD).

Keywords: *Adaptive Neuro-Fuzzy Inference System (ANFIS), Foreign Exchange (FX) Rate.*

INTRODUCTION

The fluctuations in currency exchange rates require continuous monitoring of the economic and financial variables of a country. The exchange rates of a country's currency with the US dollar depends primarily on the demand of the currency which is determined primarily by the net export position in a given period as well as the accumulated trade deficit (Sharma et al., 2014). The countries selected for the study are close competitors and have demonstrated the demand for their products in the US Market. Since the net export from China to the USA has increased during the period of study, the currency exchange rates of China have remained strong to the US dollar. On the other hand, due to the global economic slowdown and other internal and external factors, the exchange rates of India and Japan did not perform as well. Therefore, we are

interested in testing the predictive power of Artificial Neural Network (ANN) integrated models for these currencies.

Since the collapse of the Bretton-Woods system in 1973, researchers have focused on designing and developing sophisticated models to predict foreign exchange (FX) rates using computational intelligence, signal processing, and econometrics. The forecast of FX rates is important as the currency exchange rates are one of the most significant economic indices which needs ongoing attention in the international monetary markets. The FX market is the largest and most lucrative within the financial markets (Baillie and McMahon, 1989). Researchers have been supporting this market by developing sophisticated models by utilizing tools and techniques for capturing the trends in the economic and financial variables (Kilian and Taylor, 2003; Meese and Rogoff, 1983; Ni and Yin, 2009; Sharma et al., 2014). FX rates are determined by various micro and macroeconomic variables as well as by political and psychological variables. Since the dynamics of the global economy are ever evolving, there is a need for continuous research in designing and developing models using the latest tools and techniques to capture the maximum factor and their impact on FX rates. Thus, modeling for the prediction of FX rates presents challenges and opportunities for researchers and mathematical modelers to predict FX fluctuations.

Historically, several traditional statistical prediction models have been used for making economic and financial preconditions. Autoregressive integrated moving average (ARIMA), which was developed by Box and Jenkins (1976), generalized autoregressive conditional heteroskedasticity (GARG) developed by Franses and Ghijsels (1999) and smooth transition autoregressive (STAR) designed by Sarantis (2001) are models which are based on linear relationships. However, traditional econometric and time series methods could not reliably predict the simplest random walk (Meese and Rogoff, 1983; Kilian and Taylor, 2003; Ni and Yin, 2009). Since the market trends are purely random and unpredictable in the short run because of the limitations of the models, largely because of unrealistic assumptions are applied in these classical methodologies. For example, the autoregressive moving average (ARMA) model is subject to the stationary condition in time series. Both the autoregressive conditional heteroskedasticity (ARCH) model introduced by Engle (1982) and the generalized autoregressive conditional heteroskedasticity (GARH) model proposed by Bollerslev (1986) have been useful in modeling the foreign exchange rate movements. However, they have not served as the desired tools for short-term predictions and real-time trading and eventually exhibited less interest due to linear modeling techniques (Shazly and Shazly, 1997; Ni and Yin, 2009).

There are forecasting techniques such as ‘rule induction’ and ‘neural networks’ that allow the detection and modeling of nonlinear data, (Nabney et al., 1996; Shazly and Shazly, 1997). Additionally, there are other most widely used techniques to accommodate nonlinearity such as multilayer perceptron (MLP), radial basis function (RBF) networks, and recurrent networks. We found that there are several Neural Network techniques that are being used for financial time series data predictions. However, there are three prevailing Neural Network systems utilized for the prediction of financial data: (1) Feed forward neural network (FFNN), (2) Recurrent neural network (RNN), and (3) a special type of neural network, Time Delay Neural Network (TDNN). FFNNs are widely accepted and used for financial time series data forecasting where the input is directly mapped to the output. Similarly, RNNs with feedback paths are also used for time series data predictions. TDNNs use input memory which keeps information over time, which is different from the FFNNs and RNNs techniques is not widely accepted by researchers for financial forecasting especially for exchange rate predictions. In the TDNN technique, the output

is calculated based on current input as well as on its previous inputs called input delay and thus makes TDNN a powerful and efficient type of neural network technique for financial time series data predictions.

The foreign exchange market is a very dynamic market. Therefore, it is difficult to apply traditional statistical modeling to make precise predictions. This research study presents an Adaptive Neuro-Fuzzy Inference System (ANFIS) to test the predict power of the model using the FX rates of three Asian countries (China, Japan, and India) with respect to the US dollar.

The research study is organized into several sections. Section two presents a review of the literature, section three is assigned to define the details of the data used and section four describes the ANFIS. Section five provides an analysis of the model results. Finally, section six is the conclusion.

REVIEW OF THE LITERATURE

The literature reveals that ANN is superior to the conventional statistical models (Coats and Faut, 1993; Leonard et al., 1991; Fletcher and Goss, 1993; Salchengerger et al., 1992; Sharma et al., 2013). Over the past two decades, several mathematical models in the financial area have applied ANN to predict the trends for foreign exchange rates successfully. The research work includes (Lapedes and Farber, 1987; Weigend et al., 1991; Refenes et al., 1993; Kodogiannis and Lolis, 2002; Lisi and Schiavo, 1999; Nag and Mitra, 2002; Vojinovic et al., 2001; Yao and Tan, 2000; Chen and Leung, 2004; Chun and Kim; 2003; Davis et al., 2001). Lapedes and Farber (1987) integrated ANN to predict foreign exchange rates. Weigend et al. (1991) integrated a feed forward network to predict foreign currency rates. Refenes (1993) integrated MLFN with a constructive learning algorithm to predict exchange rates. The study also used the technique for constructing and training a hidden unit with the network architecture. De Matos (1994) developed a recurrent network model to predict Japanese yen futures. Kuan and Liu (1995) presented a comparison of the performances of MLFN and recurrent network applied to the forecasting of commonly traded exchange rates. Hsu et al. (1995) designed a clustering neural network model to predict the future direction of movements in the USD/DEM exchange rates. The experimental results suggested that their proposed model provided better forecasting performance as compared to other models. Similarly, Tenti (1996) developed a recurrent neural network model to forecast exchange rates. Gencay (1999) compared the predictions of the neural network and GARCH models in forecasting daily spot exchange rates for several currencies including the Deutsche Mark, the British Pound, the Japanese Yen, the French Franc, and the Swiss franc. His research findings revealed that forecasts generated by the neural network are superior to those of the random walk and GARCH models. Leung et al. (2000) studied the prediction accuracy of MLFN with that of GRNN. The study revealed that GRNN has a greater forecasting potential as compared to MLFN techniques based on tests of a variety of currency exchanges. Zhang and Berardi (2001) adopted a different approach and instead of using single network architecture, they investigated the usefulness of ensemble methods to exchange rate predictions. Finally, the study proved the use of systematic and serial partitioning methods to build ensemble models consisting of different neural network structures. The results of the study provided consistency in their predictions and advanced the idea that the ensemble network can consistently outperform a single network design (Chun and Kim; 2003; Chen and Leung, 2004).

Fulcher et al. (2006) applied Higher Order Neural Networks for predicting the AUD/USD exchange rate with a 90% accuracy. Panda and Narasimhan (2007) used ANN for a one-step-ahead prediction for weekly Indian Rupee/US Dollar (INR/USD) exchange rates and compared

the forecasting accuracy of ANN with that of both the linear autoregressive and the random walk models. Andreou et al. (2008) developed a model integrating NNs to forecast and trade European options, but the results were disappointing. Kiani and Kastens (2008) designed a model to be applied for the GBP/USD, the CAD/USD and the JPY/USD exchange rates using an integrated feed forward and recurrent NNs and benchmarked several ARMA models. Yang et al. (2008) employed ANN and other regression techniques to track the Euro exchange rate's potential martingale behavior in the context of out-of-sample forecasts. Matas et al. (2010) developed an algorithm integrating neural networks and GARCH models to predict the trend of a heteroscedastic time series. Dhamija and Bhalla (2011) applied several variants of the MLP and RBF networks to predict five different exchange rates with satisfactory results. Yuan (2013) developed a model to capture movement direction in exchange rates with a polynomial support vector machine. Sharma and Rababaah (2014) developed a model integrating signal processing and ANN to predict the US stock market trends. Additionally, Rababaah and Sharma (2015) enhanced the model by incorporating two different signal processing techniques with ANN.

FOREIGN EXCHANGE DATA AND MEASURES

Foreign exchange (FX) rates data for three Asian countries; India, China and Japan against the US dollar from January 4, 2010 to December 31, 2015 were selected for training and testing (Web URL http://fx.sauder.ubc.ca). The data base is maintained by the University of British Columbia (Sauder School of Business, Pacific exchange rate service) under the supervision of Professor Werner Antweiler. The details of the FX data are given in Table 1, which reflects that there are 1200 daily observations considered as training data while 302 observations are considered as testing data with the appropriate partitioning of the training-testing data so that the model should not be biased towards a particular nature of data. For ensuring the smooth convergence of the Neuro-Fuzzy model, the data was normalized by dividing the highest value with all the observations from each data set.

Table 1
DETAIL OF FX RATE DATA USED FOR THE STUDY

Data range	Total no. of samples	No. of training samples	No. of testing samples
1-4-2010 to 12-31-2015	1502	1200 (Approx. 80%)	502 (Approx. 20%)

The power of any predictive model may be verified using various performance matrices. One of which is the Mean Absolute Percentage Error (MAPE) that reflects the performance of the predictive model in a more practical and understandable manner. Others are the Mean Absolute Error (MAE) and the Root Mean Square Error (RMSE), which are also used to verify the models. The following are the mathematical formulae of these matrices:

$$\text{MAE}=\frac{1}{n}\sum_{i=1}^{n}|Pi - Ai| \quad (1)$$

$$\text{MAPE} =\frac{100}{n}\sum_{i=1}^{n}\frac{|Pi-Ai|}{Ai} \quad (2)$$

$$\text{RMSE}=\left[\sqrt{\frac{1}{n}\sum_{i=1}^{n}(Pi - Ai)^2}\right] \quad (3)$$

Where, P_i is predicted output, A_i is actual output and n is a total number of observations.

ANFIS FOR FOREIGN EXCHANGE RATE PREDICTION

The Artificial Neural Network (ANN) is a learning technique which has a better learning power for a nonlinear pattern in comparison to traditional techniques like ARIMA. The learning performance varies with many parameters such as momentum and learning rate. Several types of ANN are being used for development of the predictive models and are also successfully utilized for solving real-world problems, including the forecasting of financial time series data. Financial time series data is highly nonlinear, unstable and volatile, and it is extremely difficult to predict the data trends. Feed-forward ANN with Error back-propagation algorithm (EBPA), known as Error Back Propagation Network (EBPN), is one of the most popular networks widely used for pattern recognitions, predictions and classifications. ANN is gaining popularity among researchers for financial time series data forecasting because of its ability to extract and process complex nonlinear and interactive effect.

On the other hand, a combination of ANN and ANFIS Fuzzy logic is also popular as a hybrid of these two techniques. The benefits of using ANFIS is to generate a rule based model which can easily be generated once Membership functions (MFs) are tuned. ANFIS was first applied by Jang (1993) by embedding the Fuzzy Inference System (FIS) into their framework of adaptive networks. ANFIS supports Sugeno-type FIS whose output is always crisp, unlike Mamdani type FIS where output is always fuzzy. ANFIS uses least-square and back propagation gradient descent methods along with a hybrid learning algorithm to identify the parameters and fuzzy if-then rules with a single output. An adaptive network is a structure consisting of various nodes connected by directional links with five layers as shown in Figure 1 (Jang et al.,1997) with two input variables x and y and one output variable. Each layer is described below:

Layer One: Node in this layer produces membership value, after receiving an input x.

$$O_i^1 = \mu_{Ai}(x)$$

Where A_i is the linguistic variable and O_i^1 is output from this layer. This layer is also known as fuzzification layer.

Layer Two: Each node in this layer is labeled with Π.This layer calculates the firing strength of each rule by mathematical multiplication.

$$O_i^2 = W_i = \mu_{Ai}(x) \times \mu_{Bi}(y), \qquad \text{for i=1,2}$$

Layer Three: This layer is a normalization layer which normalizes the strength of all rules according to the following equation.

$$O_i^3 = w'_i = \frac{w_i}{w_{1+W2}} \qquad \text{for i=1,2}$$

Layer Four: This is a defuzzification layer where the output of each node in this layer is the product of a first order polynomial and the normalized firing strength.

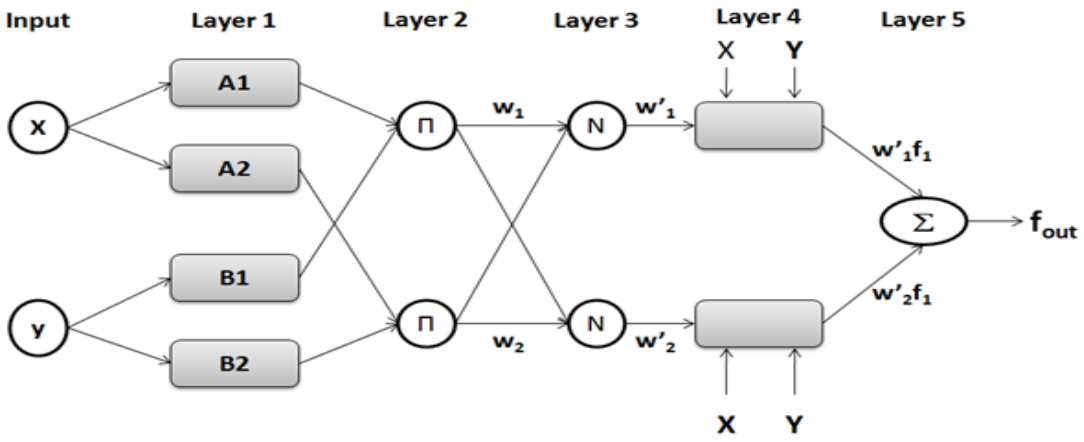
$$O_i^4 = w'f_i = w'_i\,(p_i x + q_i y + r_i) \qquad \text{for i=1,2}$$

Where w'_i is the output of layer 3 and parameters p_i ,q_i and r_i are designated as consequential parameters.

Layer Five: The node in this layer computes the overall output as the summation of all incoming signals.

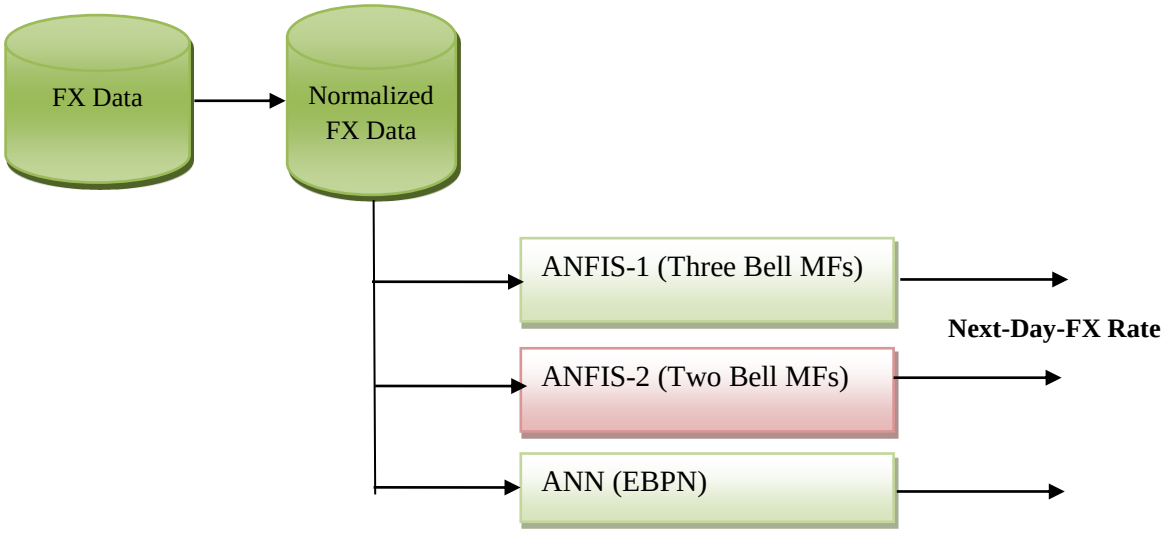
$$O_i^5 = f_{out} = \sum w'fi \qquad \text{for } i=1,2$$

Figure 1
BASIC ARCHITECTURE OF ANFIS



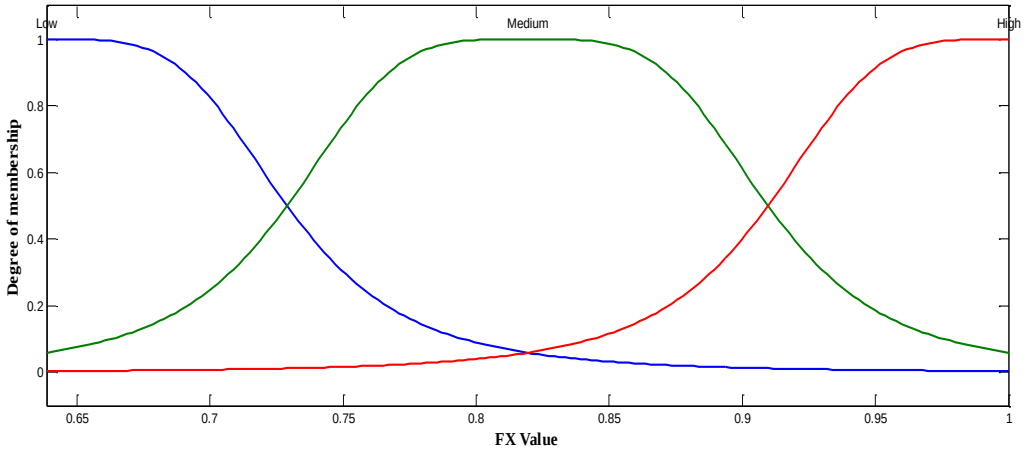
The framework for developing FX rate predictive models with ANN and ANFIS techniques is explained in Figure 2. ANN (i.e., EBPN) is established against various learning parameters.

Figure 2
MODEL FRAMEWORK



ANFIS is specifically analyzed in terms of the number of MFs, which is a bell-shaped membership function. This function is considered for ANFIS because of its capability for capturing knowledge as compared to other MF models, i.e. triangular MF, because it may have more than one highest degree of membership values for multiple input values, unlike triangular MF. A sample of a bell shape MF with three linguistic variables: Low, Medium and High is shown in Figure 3 with normalized FX values as inputs from 0 to 1, which receives normalized current day FX rate data as input to produce next-day FX values of three different FX currencies. One ANN and two ANFIS models are tested. ANFIS learns the patterns and produces output with the help of five layers. The predicted ANFIS output is compared with the actual FX rate in terms of performance matrices MAE, MAPE, and RMSE using equations 1, 2 and 3, respectively. The results are also compared with the EBPN. The entire simulation work is accomplished using self-written MATLAB code.

Figure 3
A SAMPLE OF BELL SHAPE MEMBERSHIP FUNCTION WITH THREE LINGUISTIC VARIABLES: LOW, MEDIUM AND HIGH



RESULT ANALYSIS

The model development is carried out by using MATLAB for the study as discussed previously. The partition of FX rates data of INR, CNY and JPY for training as well as for testing are accomplished using EBPN and ANFIS models with two and three membership functions (MFs). The predicted outputs are compared with actual outputs in terms of performance matrices: MAPE, MAE, and RMSE. The trained ANFIS and ANN models are tested with the latest 20% of the testing observations and comparative graphs in between actual and predicted output for CNY/USD, INR/USD, and JPY/USD are shown in Figures 4, 5 and 6 respectively. These figures clearly reflect that the predictions are closer to the real data. However, the predictions are more precise in the case of CNY/USD as compared to the other two FX rates. The calculated performance matrices for three FXs for EBPN and ANFIS are also given in Tables 2, 3 and 4. The table values for MAPE and the other two measures in the case of two and three MFs are negligible. Also, results are consistent during training as well as during the testing stages. MAPE values were lower in cases of three MFs when compared to two MFs for each FX rate data. However, the trend appeared to be just opposite for testing samples, for

example, MAPE for CNY/USD with two MFs is 0.0868 which is lower than MAPE (0.8670) with three MFs except for JPY/USD. The lower value of MAPE with fewer MFs is always appreciated since it will generate fewer number of rules to be stored in the rule base of ANFIS. A comparative bar graph (Figure 7) reveals that the results are promising with two MFs and also have smaller MAPE values for CNY/USD. The results also reveal that the Chinese economy is more stable than the economies of the other two countries.

The comparative results between ANN and the best ANFIS models during the testing stages are depicted in Figure 8 which show that the ANFIS model produces better performance than the ANN model. Also, there is little difference between these two models in terms of MAPE. Additionally, with regard to the other matrices, ANFIS also yielded better results than ANN.

Figure 4
COMPARISON OF ACTUAL AND PREDICTED FX RATE OF CNY/USD USING ANFIS WITH TWO MFs

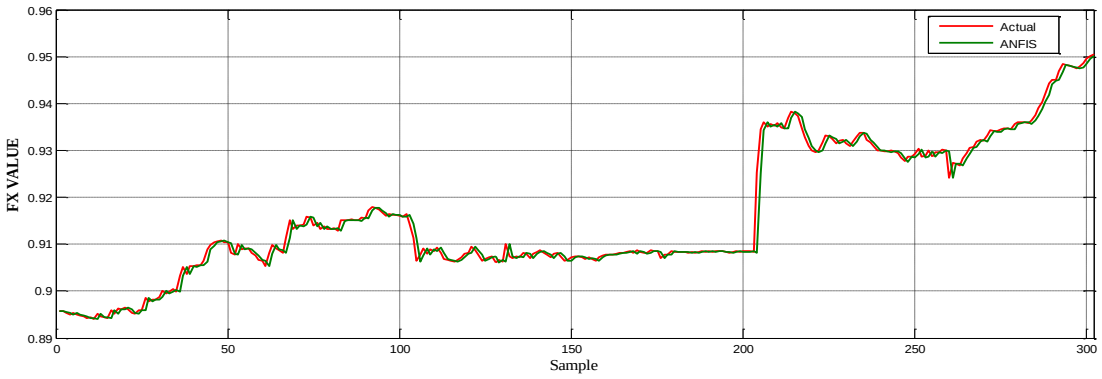


Figure 5
COMPARISON OF ACTUAL AND PREDICTED FX RATE OF INR/USD USING ANFIS WITH TWO MFs

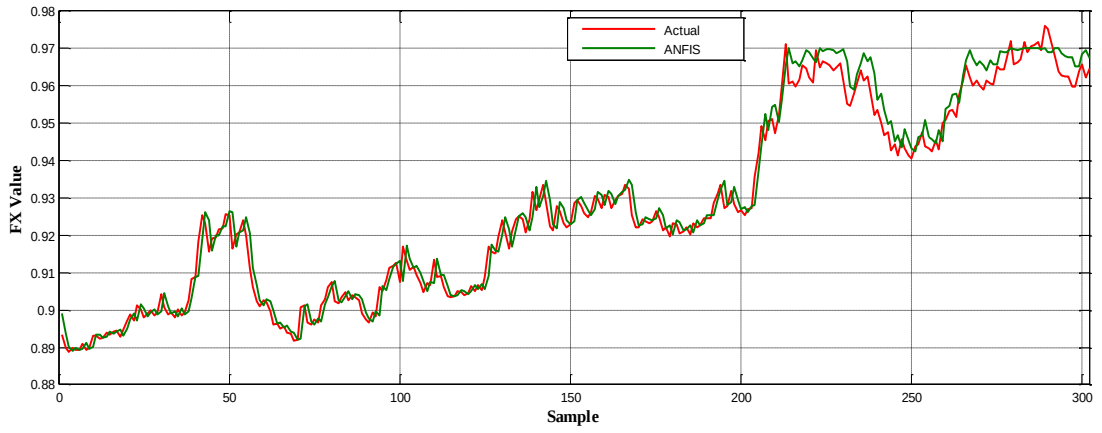


Figure 6
COMPARISON OF ACTUAL AND PREDICTED FX RATE OF JPY/USD USING ANFIS WITH TWO MFs

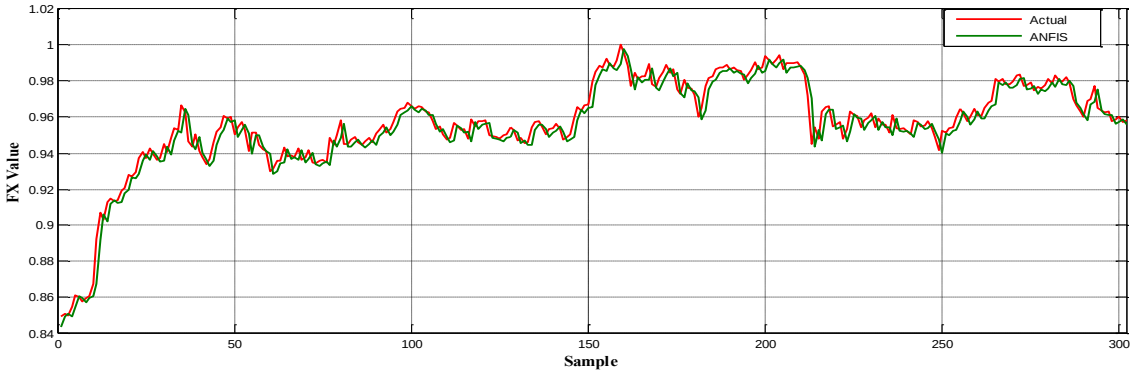


Table 2 SUMMARY OF RESULTS OF ANN				
Currency	Training/ Testing	MAE	MAPE	RMSE
CNY/USD	Training	0.0008	0.0926	0.0012
	Testing	0.0009	0.1009	0.0012
INR/USD	Training	0.0504	6.7494	0.0651
	Testing	0.0529	7.2103	0.0682
JPY/USD	Training	0.0036	0.4791	0.0048
	Testing	0.0038	0.4947	0.0050

Table 3 SUMMARY OF RESULTS OF ANFIS WITH BELL MEMBERSHIP FUNCTION AT TRAINING STAGE				
Currency CX	No of MF	MAE	MAPE	RMSE
CNY/USD	2	0.0006	0.0734	0.0010
	3	0.0006	0.0730	0.0010
INR/USD	2	0.0032	0.4116	0.0046
	3	0.0032	0.4103	0.0046
JPY/USD	2	0.0030	0.4263	0.0043
	3	0.0030	0.4246	0.0043

Table 4 SUMMARY OF RESULTS OF ANFIS WITH BELL MEMBERSHIP FUNCTION AT TESTING STAGE				
Currency	No of MF	MAE	MAPE	RMSE
CNY/USD	2	0.0007	0.0868	0.0015
	3	0.0007	0.0870	0.0015
INR/USD	2	0.0030	0.3248	0.0039
	3	0.0032	0.3447	0.0042
JPY/USD	2	0.0043	0.4507	0.0058
	3	0.0043	0.4551	0.0057

Figure 7
COMPARATIVE MAPE (TESTING) IN TERMS OF NUMBER OF MF USING ANFIS FOR THREE FX (CURRENCIES)

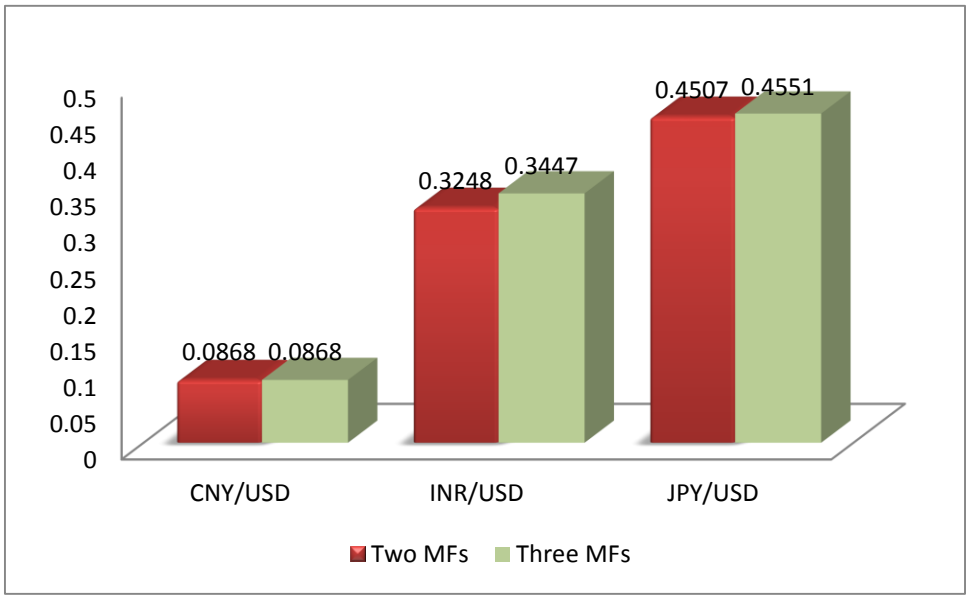
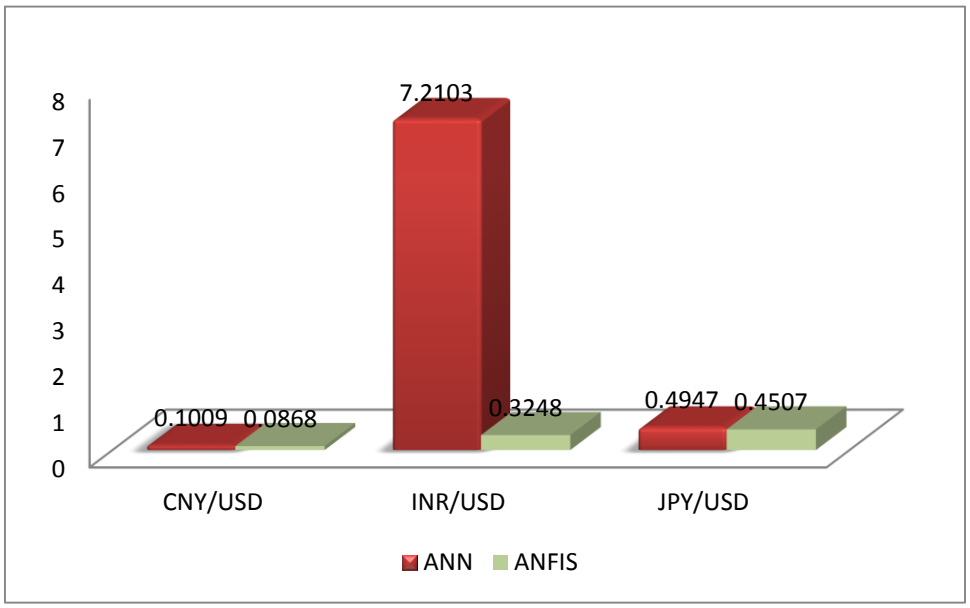


Figure 8
COMPARATIVE MAPE (TESTING) OF ANN AND BEST ANFIS



CONCLUSION AND IMPLICATION

The study concludes that the prediction of financial data requires models which can accommodate nonlinear patterns. The authors selected Foreign Exchange rate data to demonstrate the predictive power of the ANN-based models. This study investigated the predictive power of ANN techniques for three Asian currencies. The models were developed using two ANN techniques: (1) Error Back Propagation Network (EBPN) and (2) ANFIS techniques. The EBPN technique was used to investigate various parameters such as momentum, learning rate, etc. Additionally, ANFIS was applied to investigate the type and number of MF. This study is different from previous studies where ANFIS techniques were used, but it did not analyze the number of membership functions to build the ANFIS model. This study found that the ANN model with a suitable value of learning parameters and the ANFIS model with two bell-shaped membership functions were appropriate to develop a FX rates prediction model as well as for a comparison of the results. The study reveals that all the ANFIS based models outperformed the ANN based models with the lowest MAPEs at 0.0868, 0.3248, 0.4507 respectively, for CNY/USD, INR/USD, and JPY/USD. This research will certainly motivate other researchers to design and develop ANFIS and other hybrid models using multiple inputs such as technical indicators as well as time delay Foreign Exchange rate data. This study further suggests that researchers should focus on the creative ways of selecting membership functions with appropriate values to improve the performance of ANN-based models.

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VALUE RELEVANCE OF HISTORICAL INFORMATION AND FORECAST INFORMATION IN CHINA: EMPIRICAL EVIDENCE BASED ON THE OHLSON AND FELTHAM–OHLSON MODELS

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ABSTRACT

With more than two decades of rapid economic growth, China has grown to become one of the most important economies in the world in the 21st century. The Chinese stock market has been emerging for over 20 years. However, there is still no widely recognized evaluation model in the domestic market. This paper aims to examine the value relevance of historical accounting information and forecast accounting information in the Chinese market using the Ohlson model and the Feltham–Ohlson model and to provide empirical evidence. By adjusting the variable v, which denotes information other than abnormal earnings, the paper applies regression analysis on information from companies listed in the Shanghai Stock Exchange and the Shenzhen Stock Exchange from 2011 to 2014. According to the empirical test results, we can conclude that, contrary to many previous research studies, historical information by itself is more closely related to the current firm value rather than when it is combined with forecast information; whereas forecast information might have helped to improve the accuracy of models. Additionally, a separation in financial assets and operating assets in financial statements may not lead to an improvement in the value relevance of accounting information.

INTRODUCTION

The research of firm value and value relevance has been gaining popularity in financial and accounting area for a long time. Value relevance is defined as the ability of information disclosed by financial statements to capture and summarize firm value (Sibel Karğın, 2013, p. 71). Research studies on value relevance aim to find out whether there is statistical significance between accounting information and firm value.

Firm value refers to "the price of the company." It is a representation of the company in terms of the "monetary amount." However, with the development of modern business model diversification and financial securities market, and if we look at the corporate value from various perspectives, the meaning could be different. To derive significant relevance between accounting information and corporate value, and to determine how to evaluate enterprise value, one thing to mention here is the corporate value that has attracted attention in the investment industry, and in case of listed companies, it is stock capitalization.

Until the middle of the 1980s, using return on equity (ROE), earnings per share (EPS), and price book-value ratio (PBR) to calculate the enterprise value was the mainstream in the world of investment industry. In the 1990s, models of corporate valuation, prepared by calculating the cash flow and cost of capital, emerged, replacing the traditional investment style. Economic value added (EVA) and free cash flow (FCF) are typical examples. These models were disseminated through consulting firms and became popular in large companies in the United States. Although these firm valuation models partially used the accounting data, they

denied the current accounting data based on the accrual accounting theory with a feature that focuses on cash flow.

On the other hand, accounting information based on enterprise valuation models emerged in the middle of the 1990s to counter the corporate valuation models that are cash flow-based, which attracted considerable attention in the academic world. It is called the Ohlson model or residual income model (RIM). According to the RIM, firm value is equal to the sum of the book value of equity and the present value of future abnormal earnings. This model is successful in expressing the stock price and prediction while assuming that the ideal situation holds for capital market, including the irrelevance of the dividend. Therefore, the enterprise value evaluation model, which is based on the Ohlson model (including the Feltham–Ohlson (FO) model that is applied in this paper), has now become a core model of value relevance research.

In addition, with development in modern accounting, accounting information can be divided by time. There is historical accounting information that refers to published accounting data of the past and forecast accounting information that is artificially predicted by either enterprise managers or analysts about companies' future operations. In China, managers' forecast information is not required to be published for listed companies. Thus, the forecast information we discuss here is simply analysts' forecasts. The value relevance of historical accounting information and forecast accounting information could be different, as it has been discussed in previous research studies for developed capital markets.

With a great speed of economic growth, China has emerged as one of the most important economies in the world in the 21st century. The Chinese stock market has been emerging for over 20 years, though it is still a young capital market that is under development compared with the stock market in developed countries. There is still no widely recognized evaluation model in the domestic market yet. The Ohlson and FO models are popular and widely cited in developed countries. This paper aims at examining the stock price interpretability using the Ohlson and FO models by applying these models to data from the Chinese stock market. By adjusting the models into two groups, one group uses only historical information and the other group uses both historical information and forecast information. The goal is to provide empirical evidence to the value relevance of forecast information and historical information of accounting in China.

The significance of this paper can be concluded in three points. First, there were many studies in China about the application of the Ohlson and FO models in the middle of the 2000s. However, previous research studies of the Chinese market based on these models have not been able to provide profound conclusions because of short periods of data and other limitations (Wutongxin, 2011). As some time has now passed, we expect new findings by using data from recent years. Second, this paper examines the Ohlson and FO models at the same time. Thus, we are able to create a comparison between the two models to form a perspective of validity. The analysis result may also have enlightenment on the current financial statement standards because the FO model separates the asset variable into financial asset and operating asset. Lastly, the Ohlson and FO models are adjusted to fit both historical information and forecast information. In previous studies in developed countries, it was considered that compared to historical information, the market and investors are more likely to react to forecast information (Conroy, Harris & Park, 1990; Ota, 2012). By contrast, the analysis result of the empirical test in this paper implies that historical information solely may have higher value relevance than the combination of historical information and forecast information.

In this paper, the first chapter is an introduction part that consists of research background, purpose, and thesis structure. The second chapter reviews the previous research and explains the

models used in the empirical test in the next chapter. The third chapter describes the research design, variables definitions, and sample selection. Subsequently, it comes to the analysis result of explanatory power of contemporaneous stock price from two aspects: the gap between estimated stock price and real stock price, and model regression goodness of fit. The last chapter concludes the empirical test and the problems, which could have had negative influence on the test result.

REVIEW OF EXISTING MODELS

The DDM Model

The Dividend Discount Model (DDM) is a procedure for valuing the price of a stock by using predicted dividends and discounting them back to the present value. John Burr Williams (1900-1989), the founder of fundamental analysis, stated a famous opinion in his book *The Theory of Investment Value,* which was published in 1938. He stated that a stock is worth only what you can get out of it…A cow for her milk, a hen for her eggs, and a stock, by heck, for her dividends (Williams, 1938). Williams developed DDM on this principle. Dividend discount model laid a theoretical foundation for the quantitative analysis of fictitious capital, assets, and firm value. It also provided a strong theoretical basis for the basic analysis of stock investment. Remarkably, both the Ohlson and FO models are based on DDM. However, the crucial accounting information used in this model is only forecast information about dividend in the future. There is no historical accounting information used in this model.

DDM focuses on the intrinsic value of stock. The basic function is as follows:

$$V = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t}$$

V: Intrinsic value of stocks

D_t : Expected dividend per share in year t

k: Expected return per share

According to the function, the intrinsic value of stock is the sum of discounted expected return in future. There are also several simplified versions of DDM based on different dividend pay methods as follows.

1. Zero growth model: Dividend growth is 0. Future phases of dividends are paid by a fixed amount. The function is:

$$\mathrm{V} = \frac{D_0}{k}$$

V: Firm value

D_0: Current term stock dividend

k: Investment return rate or capital cost

2. Constant growth model: Dividend is paid by a fixed growth rate g. The function is:

$$V = \frac{D_1}{(k - g)}$$

D_1: Dividend of next term

3. Two-stage, three-stage growth model: The two-stage growth model is set on the assumption that the growth rate within time period m is g_m, and g_n when it is out of time period m.

$$V_0 = V_m + V_n$$

The three-stage growth model has one more time period than the two-stage model. Corresponding to the three time periods, there is one more growth rate g_c.

$$V_0 = V_m + V_n + V_c$$

DDM is usually applied in companies that have a normal dividend payment. Nevertheless, the application of DDM is not extensive in China because the dividend payment amount is comparatively small or unstable for many listed companies. In this case, it is hard to apply a model like DDM, which is solely based on dividend payment (Wutongxin, 2011). However, the DDM model has contributed to the research of the intrinsic value of stock. Stock price is expressed as a result of market supply and demand. It does not always necessarily reflect the intrinsic value of a company. Theoretically, the gap between the market value and the intrinsic value of a company should be corrected by the market over a long period of time. This way, DDM can provide useful information to help with investment decisions by estimating the intrinsic value of stock.

The RIM Model

Edwards and Bell put forward the RIM, also known as the Edward Bell Ohlson model, in 1961. The model did not attract the focus of academia until 1995, when Ohlson (1995) systematically explained and adopted the approach to set up the relationship between equity of corporates and accounting variables in his work *Earnings, Book Values, and Dividends in Equity Valuation*. Since then, the RIM model has become one of the hottest topics in the field of financial and accounting in the United States.

Residual income refers to the difference between the corporate's net income and the least requirement from stockholders. The RIM model suggests that if the company generates profits equaling stockholders' least requirement, then the normal return is realized. If it generates more profits than the stockholders' requirement, then there is a positive residual income.

The core formulation of the RIM can be described as:

$$P_t = \sum_{i=1}^{\infty} R_f^{-t} E_t[X_{t+i}^a] + b_t$$

where

P_t: The market value of the company in period *t*

R_f: Discount factors that equal to risk-free rates plus one

b_t: The clean surplus

The biggest difference between the RIM model and the traditional DDM and discounted cash flow (DCF) models is that residual income valuation focuses on the value creation process of corporations, while the RIM looks at the stockholders' interest. The management can be said to be creating value only when the net profit after tax is larger than the cost of investment. Residual income takes the cost of equity as one of the factors to measure the performance of corporations, which is quite different from the traditional financial analysis. By considering the capital cost, corporations can avoid invisible loss and harmonize the conflicts among different departments to maximize the interests of whole.

Residual income is also useful in supporting corporations' decision-making process. Usually, the management is faced with too many choices instead of none, and there are many factors to balance. Through residual income, all the factors can be transferred to one question: whether the project can increase the residual income. All companies have their own life circulation. According to the microeconomics theory, when an industry experiences long-run competition equilibrium, the participants of the industry can only expect the same amount of profits as the capital costs without exclusive technology or copyright. Before the market reaches an equilibrium, a few companies may earn some economic profit. However, as new competitors join and the incentive of increasing production in the industry grows, the companies' economic rents cannot be sustainable. Therefore, the abnormal return of a company is hard to maintain. How to maintain the level of residual income while creating a new value point has become the primary question of corporate strategy management. Needless to say, the resource of residual income is a proprietary technology and may face industrial barriers. Since not every corporation can enjoy the protection of industrial barriers, innovations become the key to sustain in the fierce competition. From this, we can see that the concept of residual income is helpful in supporting corporate decision making.

Ohlson (1995) Model

The Ohlson model is developed based on three assumptions.

$$V_t = \sum_{\tau=1}^{\infty} R_f^{-\tau} E_t\,[d_{t+\tau}] \qquad (PVED)$$

V_t: The market value of equity in period *t*
R_f: Discount factors that equal to risk-free rates plus one
d_t: Dividend in period *t*

The second assumption is the residual relationship

$$bv_t = bv_{t-1} + x_t - d_t$$

bv_t: The book value of equity in period *t*
x_t: The net income in period *t*

The abnormal return is defined as the net income minus the book value of equity in the beginning of the period, which is then multiplied by the risk-free risk (Edwards & Bell, 1961; Peasnell, 1982). We can now derive the following formula:

$$V_t = \sum_{\tau=1}^{\infty} R_f^{-\tau} E_t\left[x_{t+\tau}^{\alpha}\right] + bv_t$$

From the model, we can figure that the corporate value equals the sum of book value and the expectation of abnormal returns in future. Compared to the former research, Ohlson innovatively proposed a linear information dynamic equation. He assumed that the abnormal return satisfies the following dynamic equation:

$$x_{t+1}^{\alpha} = \omega x_t^{a} + v_t + \varepsilon_{1t+1}$$
$$V_{t+1} = \mu V_t + \varepsilon_{2t+1} \quad (LIM1)$$

V_t refers to other information that has influence on the abnormal return. ω and μ, which reflect the durability of abnormal return and other information, are known constants that lie between 0 and 1. In the extreme case, where ω and μ both equal to 0, the current abnormal and other information have nothing to do with the next period.

By combining these two equations, we can derive the Ohlson model (1995):

$$V_t = bv_t + a_1 x_t^{a} + a_2 v_t$$

where

$$a_1 = \frac{\omega}{R_f - \omega}$$

$$a_2 = \frac{R_f}{(R_f - \omega)(R_f - \mu)}$$

From the above process, we notice that what makes the Ohlson model attractive is that it launched a verifiable equation to test the influence of corporate accounting information and other information on the corporate valuation; however, it has a few flaws. In LIM1, the formula assumes that the auto regression follows a stochastic process, which suggests that the mean of disturbance and other information is equal to zero, and the unconditional goodwill of the company will be zero. In this case, it will be meaningless for managers to choose the project, and the model itself will be useless.

Feltham–Ohlson (1995) Model

As the original Ohlson model has some flaws, Feltham and Ohlson (1995) modified the Ohlson model by dividing the net assets into financial and operating assets,

$$bv_t = fa_t + oa_t$$

At the same time, net profit was divided into two parts:

$$x_t = i_t + ox_t$$

where

i_t: Net interest income from financial assets in period *t*

ox_t: Operating profit in period *t*

Besides, Feltham and Ohlson proposed several assumptions about financial and operating assets. First, it is assumed that the financial market is perfect, and the interest level is stable in the corporate's duration, which means that the book value of the financial assets is equal to the market value, and the net interest income in period *t* is equal to the risk-free return required by financial assets in the beginning of the period. This is called the net interest relation:

$$i_t = (R_f - 1)fa_{t-1}$$

The financial assets relation:

$$fa_t = fa_{t-1} + i_t + c_t - d_t$$

The operation assets relation:

$$oa_t = oa_{t-1} + ox_t - c_t$$

Compared to operating assets, cash flow is regarded as the most objective reflection and measurement. Different from the definition of many other scholars, the model set up by Feltham and Ohlson is defined as operating cash flow minus capital cost and net interest income.

$$ox^a_{t+1} = \omega_{11} ox^a_t + \omega_{12} oa_t + \mu_{1t} + \varepsilon_{1t+1}$$
$$oa_{t+1} = \omega_{22} oa_t + \mu_{2t} + \varepsilon_{2t+1}$$
$$v_{1t+1} = v_{1t}\mu_1 + \varepsilon_{3t+1}$$
$$v_{2t+1} = v_{2t}\mu_2 + \varepsilon_{4t+1} \quad \text{(LIM2)}$$

This is the same with LIM1, ω_{11}, which lies in the range of 0 to 1. The meanings are the same as the ones in LIM1: ω_{22} lies between 1 and R_f. ω_{12} reflects the influence of accounting

on abnormal operating return. When $\omega_{12} = 0$, i.e., the principle of fair value accounting, the accounting value of operating assets equals to the economic value. When $\omega_{12} > 0$, it is the prudent principle.

The Feltham and Ohlson model is derived as follows:

$$V_t = bv_t + \alpha_1 ox_t^a + a_2 oa_t + \beta_1 v_{1t} + \beta_2 v_{2t}$$

where

$$\alpha_1 = \frac{\omega_{11}}{R_f - \omega_{11}}$$

$$\alpha_2 = \frac{\omega_{12} R_f}{(R_f - \omega_{11})(R_f - \omega_{22})}$$

$$\beta_1 = \frac{R_f}{(R_f - \omega_{11})(R_f - \mu_1)}$$

$$\beta_2 = \frac{\omega_{12} R_f}{(R_f - \omega_{22})(R_f - \omega_{11})(R_f - \mu_2)}$$

RESEARCH DESIGN

Models

In this paper, referring to the idea in Ota 2014, we adjusted the linear information dynamics of the Ohlson and FO models and set two groups of models: one using only the historical information and the other using both historical information and forecast information. Linear information dynamics is a model with high discretion, wherein by specifying the variable v_t, we can estimate the future residual income either by using residual income data from the past or by adding in forecast accounting information as well. The variable v_t denotes information other than abnormal earnings that is yet to be captured in the current financial statements but affects future abnormal earnings. We ignored the variable v_t in group one (which means v=0). This way, the estimated firm value is only related to assets, earnings, and dividend information from the past. We call this group of models as historical information models. In the second group, we consider forecast information of expect earnings and assets as variable v_t. Therefore, we name the second group as mixed information models. The basic formulation is as follows:

Group 1: Historical Information Models

$$\boldsymbol{V_{Ohlson(v=0),t} = \alpha_0 b_t + \alpha_1 x_t + \alpha_2 d_t} \quad \textbf{(1)}$$

$$\boldsymbol{V_{FO(v=0),t} = \beta_0 oa_t + \beta_1 fa_t + \beta_2 ox_t + \beta_3 c_t} \quad \textbf{(2)}$$

Group 2: Mixed Information Models

$$\boldsymbol{V_{Ohlson,t} = \gamma_0 b_t + \gamma_1 x_t + \gamma_2 d_t + \gamma_3 E_t[x_{t+1}]} \quad \textbf{(3)}$$

$$\boldsymbol{V_{FO,t} = \theta_0 oa_t + \theta_1 fa_t + \theta_2 E_t[\Delta ox_{t+1}] + \theta_3 E_t[ox_{t+1}] + \theta_4 E_t[\Delta oa_{t+1}]} \quad \textbf{(4)}$$

The variables used in the models above will be discussed in chapter 3.2.

In this empirical test, we collected data from the Guo-Tai-An database from years 1994 to 2014. By applying the four regression models to data from 2011 to 2014, we examined the explanatory power of contemporaneous stock price from two aspects.

Variable Definition

Variables	Meaning	Definition
t	Time period	Year t
$\boldsymbol{V_t}$	Firm value	Market capitalization by the end of March in year t+1
$\boldsymbol{P_t}$	Theoretical firm value	Firm value that estimated based on valuation models
$\boldsymbol{b_t}$	Net asset	Book value of equity
$\boldsymbol{x_t}$	Net income	Book value of net income
$\mathbf{d_t}$	dividend	Annual dividend
$\boldsymbol{c_t}$	Free cash flow	The cash flow that a firm takes from operating asset to financial asset. Defined in OHLSON AND FETHAM 1995
$\boldsymbol{oa_t}$	Net operating asset	Total operating asset – total operating liabilities
$\boldsymbol{fa_t}$	Net financial asset	Total financial asset – total financial liabilities
$\boldsymbol{ox_t}$	Operating earnings	Operating profit + financial cost – gains or loss from changes in fair value
$\boldsymbol{E_t[x_{t+1}]}$	Expected dividend 1 year ahead	Mean value of analyst forecast information
$\boldsymbol{E_t[ox_{t+1}]}$	Expected operating earnings 1 year ahead	Mean value of analyst forecast information
r	Capital cost rate	Calculated by Fama-French 3 factors model
$\boldsymbol{E_t[\Delta ox_{t+1}]}$	Change of expected operating earnings	-(1+r)+r
$\boldsymbol{E_t[\Delta oa_{t+1}]}$	Change of expected operating asset	Calculated by oa growth rate from historical data

Sample Selection

The sample selection requirements are as follows:

1. A shares and B shares firms – those that are listed on the Shanghai Stock Exchange and Shenzhen Stock Exchange
2. The accounting period ends in December
3. The accounting period is of 12 months
4. Firms in the financial industry are excluded (e.g., banks, securities firms, insurance firms)
5. The year range considered is 2011–2014

The data source is the Guo-Tai-An database. We collected 10,320 firm-year data in total.

RESULTS

This paper examines the explanatory power of contemporaneous firm value from two aspects.

Error of Estimation in Firm Value

First, we used data from 2002–2010 to calculate the four sets of coefficients in models (1)–(4). Next, we applied the coefficients to variables from 2011 to 2014 to obtain the theoretical firm value P_t. The calculation based on model 1 is shown as follows:

$$\boldsymbol{V_{Ohlson(v=0),2002-2010} = \alpha_0 b_{2002-2010} + \alpha_1 x_{2002-2010} + \alpha_2 d_{2002-2010}}$$

From the regression, we get $\boldsymbol{\alpha_0, \alpha_1, \alpha_2}$, and by inserting them into the following equations, we obtain P_t:

$$\boldsymbol{P_{Ohlson(v=0),2011} = \alpha_0 b_{2011} + \alpha_1 x_{2011} + \alpha_2 d_{2011}}$$
$$\boldsymbol{P_{Ohlson(v=0),2012} = \alpha_0 b_{2012} + \alpha_1 x_{2012} + \alpha_2 d_{2012}}$$
$$\boldsymbol{P_{Ohlson(v=0),2013} = \alpha_0 b_{2013} + \alpha_1 x_{2013} + \alpha_2 d_{2013}}$$
$$\boldsymbol{P_{Ohlson(v=0),2014} = \alpha_0 b_{2014} + \alpha_1 x_{2014} + \alpha_2 d_{2014}}$$

To examine the explanatory power of contemporaneous firm value, we calculated the error of estimation in the firm value. In other words, we compared the estimated firm value and real firm value to conclude the validity of valuation models.

Here, we define:

$$\text{Error of estimation} = (V_t - P_t)/V_t$$
$$\text{Accuracy of estimation} = |V_t - P_t|/V_t$$

Therefore, if the error of estimation is positive, it means that the firm value is underestimated; if the error of estimation is negative, the firm value is overestimated.

About the accuracy of estimation, the closer the values are to zero, the more accurate the estimation is.

Error of estimation	Median	Mean
Ohlson model (v=0) $\boldsymbol{V_{Ohlson(v=0),t}}$	-0.499994005	-0.397343097
FO model (v=0) $\boldsymbol{V_{FO(v=0),t}}$	-0.429669675	-0.511652155
Ohlson model $\boldsymbol{V_{Ohlson,t}}$	-0.97204159	-2.602644933
FO model $\boldsymbol{V_{FO,t}}$	-0.231973955	-3.228412841
Accuracy of estimation	**Median**	**Mean**
Ohlson model (v=0) $\boldsymbol{V_{Ohlson(v=0),t}}$	1.1168889	1.754928508
FO model (v=0) $\boldsymbol{V_{FO(v=0),t}}$	1.4054188	2.386763876
Ohlson model $\boldsymbol{V_{Ohlson,t}}$	1.9829038	5.541408404
FO model $\boldsymbol{V_{FO,t}}$	2.13315075	8.794630604

From the results, we can state that all four models have a tendency of overestimating the firm value. Comparatively, models in group 1, which use only historical accounting information, are more valid than the models in group 2. Generally, the behavior of the Ohlson model was found to be better than the FO model. Therefore, contrary to many of the previous research studies, our results imply that historical information is more closely related to the current firm value rather than forecast information; the separation in financial assets and operating assets in financial statements may not lead to improvement in the value relevance of accounting information.

Regression Goodness of Fit

The paper also applied regression analysis to examine the relevance between firm value and accounting data. While processing the data, the outliers of all variables were dropped at a 0.05 interval. The following chart is the result of descriptive statistics of all four models.

Variable	Obs	Mean	Std.Dev.	Min	Max
vt	7284	5.309e+06	5.247e+06	1.058e+06	2.120e+07
xt	7510	2.290e+08	3.630e+08	-7.310e+07	1.420e+09
bt	10199	2.780e+09	3.470e+09	2.560e+08	1.410e+10
dt	10261	5.910e+07	9.850e+07	0	3.820e+08
oat	10199	4.270e+09	6.490e+09	2.370e+08	2.590e+10
fat	10199	-1.470e+09	3.410e+09	-1.300e+10	1.060e+09
oxt	7510	2.660e+08	4.380e+08	-1.090e+08	1.670e+09
ct	7095	-3.310e+08	7.550e+08	-2.730e+09	6.110e+08
$\boldsymbol{E_t[x_{t+1}]}$	8600	4.410e+08	5.790e+08	3.040e+07	2.320e+09
$\boldsymbol{E_t[\Delta ox_{t+1}]}$	5530	8.130e+08	1.050e+09	6.910e+07	4.140e+09
$\boldsymbol{E_t[ox_{t+1}]}$	6261	1.080e+09	1.420e+09	9.670e+07	5.700e+09
$\boldsymbol{E_t[\Delta oa_{t+1}]}$	9665	7.250e+08	1.270e+09	-2.070e+08	4.980e+09

From the chart listed above, it is evident that there is a limitation of forecast information of dividend data.

Next are the regression analysis results.

Group 1: Historical Information Models

$$\boldsymbol{V_{Ohlson(v=0),t} = \alpha_0 b_t + \alpha_1 x_t + \alpha_2 d_t} \quad \textbf{(1)}$$

	Reg 1
VARIABLES	vt
bt	0.000924***
	(1.85e-05)
xt	0.00426***
	(0.000227)
dt	0.00963***
	(0.000724)
Observations	7,279
Adjusted R-squared	0.794

Standard errors in parentheses

*** $p<0.01$

$$V_{FO(v=0),t} = \beta_0 oa_t + \beta_1 fa_t + \beta_2 ox_t + \beta_3 c_t \quad \textbf{(2)}$$

	Reg 2
VARIABLES	vt
Oat	0.000992***
	(2.05e-05)
fat	0.00139***
	(3.17e-05)
oxt	0.00557***
	(0.000159)
ct	-0.00104***
	(7.08e-05)
Observations	6,869
Adjusted R-squared	0.772

Standard errors in parentheses
*** p<0.01

Group 2: Mixed Information Models:

$$V_{Ohlson,t} = \gamma_0 b_t + \gamma_1 x_t + \gamma_2 d_t + \gamma_3 E_t[x_{t+1}] \quad \textbf{(3)}$$

	Reg 3
VARIABLES	vt
bt	0.000732***
	(2.22e-05)
xt	0.00342***
	(0.000264)
dt	0.00600***
	(0.000753)
ExNetIncome	0.00284***
	(0.000158)
Observations	6,159
Adjusted R-squared	0.835

Standard errors in parentheses
*** p<0.01

$$V_{FO,t} = \theta_0 oa_t + \theta_1 fa_t + \theta_2 E_t[\Delta ox_{t+1}] + \theta_3 E_t[ox_{t+1}] + \theta_4 E_t[\Delta oa_{t+1}] \quad \textbf{(4)}$$

	Reg 4
VARIABLES	vt
oat	0.000831***
	(2.25e-05)
fat	0.00122***
	(3.36e-05)
oxChange	3.81e-05
	(0.000132)
Exox	0.00195***
	(0.000110)
oaChange	0.000808***
	(5.28e-05)

Observations	5,447
Adjusted R-squared	0.819

Standard errors in parentheses
*** $p<0.01$

In the results shown above, the adjusted R-squared for all four models are at an ideal value around 0.8. The first two models are a little bit lower than 0.8, and the last two models are a little bit higher. It is not obvious but the adjusted R-squared for models in group 1 is lower than group 2, which means that the mixed information models have better behavior than the historical information models. Therefore, we can imply that the forecast information might have contributed to an increase in the goodness of fit for both Ohlson and Fetham–Ohlson models. Additionally, in both group 1 and group 2, the Ohlson model has a slightly higher presence than the Fetham–Ohlson model. Therefore, we can assume that a separation in financial assets and operating assets in financial statements may not lead to an improvement in the value relevance of accounting information.

CONCLUSION

According to the test results, there are two main conclusions. First, from the result of error of estimation, we can conclude that contrary to many previous research studies, historical information is more closely related to the current firm value rather than forecast information, whereas the result of regression analysis shows that forecast information might have helped improve the accuracy of models. Second, a separation in financial assets and operating assets in financial statements may not lead to improvement in the value relevance of accounting information. These findings contribute to the significance of this paper by providing empirical evidence of a different view toward previous research works. At the same time, these findings also indicate that there are calls to further research about value relevance of forecast information and how to increase the quality of forecast information.

To think about the conflict in our first conclusion, there are a couple of things to keep in mind. First, since the variable v of linear information dynamics is not easy to be assessed, the forecast information used in models of group 2 may not exactly represent all the other factors that affect future abnormal earnings. Furthermore, due to the limitations of analyst forecast data, some variables are captured from similar forecast items or just simply estimated from previous data. Additionally, the difference of goodness of fit between group 1 and group 2 is not too obvious. All these factors may lead to an error in the analysis and should be considered in future studies.

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ESTIMATING THE VOLATILITY REDUCING HEDGE RATIOS USING OLS: EVIDENCE FROM THE SPOT AND SILVER FUTURES MARKET

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ABSTRACT

This study estimates the volatility reducing hedge ratio to reduce risk exposure to spot market price volatilities in the silver market by using futures contracts. We use a sample that consists of spot and futures prices from 2008 to 2012. A bi-variate regression is performed to estimate the hedge ratios that may reduce volatility. Our results indicate that it is possible to find some hedge ratios that reduce risk exposures faced by financial market participants.

INTRODUCTION

Given the volatile nature of the market, market participants constantly try to manage the volatility to reduce their risk exposure. It is well documented that unhedged commodity price exposure may have an adverse impact on the firm's profitability (Carter, Rogers, and Simkins, 2004).

As a result, effectively hedging the volatility of commodity prices continues to draw considerable interest from academics, practitioners and economist. One such commodity that is of particular interest to some market participants is silver. Silver is a precious metal and the prevailing spot and futures prices of silver not only reflect the current supply and demand conditions but also reflect investors' future expectations of macroeconomics events such as inflation and other business and economic conditions. What sets silver apart from other precious metals such as gold is that silver has many uses and the demand for silver can change rapidly due to various reasons. Derived demand theory suggests that the changes in demand for particular products have implications for commodity prices which are often used as intermediate inputs into the final product (Harper, Jin, Sokunle and Wadhwa, 2013). For instance, silver can be transformed from its natural state and used in the technology and medical industries for such purposes as solar energy, water purification, and X-Ray devices. Moreover, silver is also used in the electronics, and automobile industries to produce components for computers and antifreeze materials. In addition; silver can also be used as an investment vehicle by investors who seek to diversify their investment portfolio. Silver's multiple industrial and investment uses have the potential of making its price more volatile than other commodities.

In response to the need to manage volatility, researchers have sought to develop models that estimate spot and futures hedge ratios that reduce risk. There is considerable debate in the literature as to the appropriate models to be used. Some researchers advocate the use of advanced econometric models, while others support the OLS model (Lien, 2005**;** Lien, Tse, and Tsui (2002).

The significance for studying silver prices in the spot and futures market is that financial managers often seek to minimize inventory holding costs and reduce the price volatility for storable products. For example, consider a firm that seeks to purchase silver for the use in its finished good production processes. The firm's financial managers might be concerned that an exogenous shock or external events that impact the business cycle might have an adverse effect on silver prices in the future. This adverse effect could have a significant impact on the profitability of the firm and a potential negative effect on shareholder wealth. In order to offset the risk, the difference between spot and future prices, the firm's financial management might engage in the futures market to reduce their risk exposure.

Hedging is comprised of both long and short positions. Long hedges are characterized by the purchase of a futures contract in anticipation of a future price increase, while short hedges are characterized by the selling of a futures contract in anticipation of a future price decline. The outcome of hedging is that the financial managers seek to minimize the variance associated with the price movement of silver.

This study contributes to the debate of estimating the risk reducing hedge ratios in the futures market by evaluating the basis movements in spot and futures prices for silver in markets that are believed to be efficient. In order to evaluate the relationship in price movements for silver purchased on the spot and in the futures market, we conducted a bivariate regression. But as a preliminary measure, we first evaluate both price series for stationary. We do this because it is widely known that if spot and future prices follow a random walk then the estimators with or without drift are correctly specified (Chen, Lee and Shrestha, 2003). We also do this to support other research findings that in liquid markets, the use of advanced econometric models such as GARCH models may not provide any more meaningful insight (Alexander and Barbosa, 2007).

The main findings of our study indicate the following. First, we find that both spot and future price series contain unit roots at level. By not accounting for the presence of unit roots in our price series, could cause the estimated hedge ratio to be misspecified. Second, we find that the hedge ratios are robust and significant during our testing period. This study adds to the continuing debate in the literature pertaining to estimating hedge ratios in liquid markets.

The rest of this paper is organized as follows. In section I, a brief review of the literature is provided. Section II, we discuss the data used in this paper. Section III discusses the methodology, which is followed by a discussion of data set in section IV. Section V discusses our empirical findings. We conclude in Section VI.

LITERATURE REVIEW

The use of hedging by corporations to reduce volatility is well documented in the literature. Jin and Jorion (2006) examine the hedging behavior of 119 oils and gas producers from 1998 to 2001 and the impact of hedging on the market value of the firm. They find that the use of hedging does reduce stock price sensitivity to oil and gas prices. Carter, Rogers and Simpkins (2006) analyze whether hedging effects the firm's value of airlines by investigating jet fuel hedging behavior from 1992 to 2003. They conclude that hedging jet fuel behavior is positively related to airline firm value. Mackay and Moeller (2007) model and estimate the value of corporate risk management by demonstrating how hedging can add value. They sampled 34 oil refiners and they find that hedging concave revenues and not costs represents 2% of firm value under the base approach and 3% under the hedged approach. These studies analyzed the effect of hedging on firm value with respect to price volatility.

In order to validate the use of our OLS model, we examined the literature. According to the literature, several empirical models have been developed in order to estimate the optimal hedge ratio. Many of these complex econometric models such as GARCH models may suffer from too much noise. For instance, Lien, Tse, and Tsui (2002) compared the performances of the OLS hedge ratio with the VGARCH hedge ratio by examining ten daily spot and future prices for currency futures, commodity futures and stock index futures from January 1988 to June 1998. They found during their sampling period the OLS model performed better than the VGARCH model. In another study Alexander and Barbosa (2005) evaluated the minimum variance hedge using the OLS (ordinary least squares), exponentially weighted moving averages and ECM-GARCH models. Drawing upon data collected from May 2000 to December 2004 for ETF portfolios, they found that the OLS hedged portfolios based on S&P 500 futures contract exhibited the least kurtosis. They cite that complex econometric models display too much noise. In a not so developed forward and futures market, Adrangi, Chatrath, Christie-David, and Malik (2014) examined the hedge ratios of silicon because of its applications in the electronic, ferrous foundry and chemical industries. They found that because the forward and futures market for silicone is not well developed, the estimated Generalized Least Squares performed better than its counterpart OLS. Lee and Chien (2010) examined the relationship between stock market liquidity and hedging performance during bear and bull markets. Using daily data from the TWSE (Taiwan Weighted Stock Index) from January 2006 to December 2008, they found the OLS model outperformed the GARCH model during both bear and bull markets. In a more recent study, Yim and Quin (2013) estimated the hedge ratio of CSI300 Index futures using OLS and VECM for a constant hedge and GARCH (1, 1) for a dynamic hedge. They found no significant difference in the hedging performance among the three models.

METHODOLOGY

Suppose the firm's financial management is concerned that changes in the spot and future market prices for silver as denoted as s_t and f_t at time t posses uncertainty and the firm's management is concerned about the adverse impact of basis changes on profits. Now suppose the firm's management seeks to purchase (sale) a futures contract in order to hedge this uncertainty. To minimize the risk, we take the first derivative of h or simply choose the h that minimizes the squared differentials between spot and future prices for silver as outlined below:

$$\boldsymbol{Min}_h \; E[(\Delta S - h * \Delta F)^2] \tag{1}$$

Where h is the minimizing squared differential between the spot and future prices for silver which forms the optimal hedge ratio and is derived as follows:

$$h = \frac{\sigma_s}{\sigma_f} . \rho_{S,F} \tag{2}$$

Where σ_S is the standard deviation of the spot price changes in silver, σ_F is the standard deviation of the future price changes for silver, and $\rho_{S,F}$ is the correlation between spot price changes and the future price changes in silver. The hedge ratio can also be calculated using OLS (Ordinary Least Squares) which forms the methodology of this paper. We base our argument on the findings of Alexander and Barbosa (2007), Lee and Chien (2010), and Yim and Quin (2013). They find no evidence that the estimation of the minimum variance hedge ratios using advanced

econometric models in liquid and efficient markets perform better than a simple linear regression model.

It is important to establish that the mean and autocovariance of spot and futures silver prices do not possess unit roots. If this key assumption is violated, the OLS model maybe incorrectly specified. In the OLS (Ordinary Least Squares) model we make certain assumptions about of the data. The first assumption that we make is that a linear relationship exist between the dependent variable (silver spot prices) and the independent variable (future silver prices). The second assumption that we make about silver spot and silver future prices is that the expected value of the disturbance term is zero. The third assumption that we make about silver spot and silver future prices is that the disturbances between silver spot and future prices display a uniform variance and are uncorrelated. The fourth assumption that we make in this paper is that the OLS model is based on the joint distribution that the spot and future price of silver is constant and also reflects a constant mean and variance. The OLS model for silver spot and future prices is derived as follows:

$$\Delta S_t = \alpha + \beta \mathbf{\Delta} F_t + \varepsilon_t \quad (3)$$

Where $\mathbf{\Delta} S_t$ denotes the daily log change on spot silver price at time t, $\mathbf{\Delta} F_t$ denotes the daily change in the future price of silver at time t, and ε_t is the error term at time t. β is the estimated hedge ratio for a firm that seeks to minimize the variance of their position by selling one futures contract to hedge one unit of spot position.

DATA

Data for this study was retrieved from Bloomberg database and spans from January 2008 to January 2012. We use daily data in order to capture the temporal movements of spot and future silver prices. The daily returns for silver spot and future prices are computed using the following estimation after discovering both spot and future silver price series contain a unit root.

$$R_t = Log_{pt} / Log_{pt-1} \quad (4)$$

Where, R_t is the return at time t of spot silver prices, Log_{pt} is the logarithmic price at time t and Log_{pt-1} is the logarithmic at time $t-1$. The reason for transforming time series data is to ensure that the data is stationary. Working with non-stationary data can cause model misspecifications and erroneous results (Kennedy, 2003).

EMPIRICAL RESULTS

Table 1 illustrates the summary of 1,065 daily statistics. The mean for spot and future prices are 21.47 and 21.50 respectively. Additionally, both spot and future prices exhibit kurtosis associated with a normal distribution. Both price series have positive skewness. The Jarque-Bera test statistic is significant so that we can conclude that the sample data is normally distributed. The standard deviation from both the spot and silver prices are relatively close at 9.143 and 9.167 respectively, along with the median at 17.85 and 17.88.

Table 1 SUMMARY OF STATISTICS		
	Spot	**Futures**
Mean	21.46864	21.49565
Median	17.85000	17.87500
Maximum	48.58400	48.44380
Minimum	8.790000	8.958800
Std. Dev.	9.143277	9.166877
Skewness	0.874884	0.881528
Kurtosis	2.595124	2.612590
Jarque-Bera	143.1366	144.5938
Probability	0.000000	0.000000
Sum	22864.10	22892.87
Sum Sq. Dev.	88949.89	89409.67
Observations	1065	1065

Figure 1 illustrates the daily movements of both spot and future silver prices during sample time frame. Interestingly, both price series appear to be highly correlated.

Figure 1
SPOT AND SILVER FUTURE PRICES

Table 2 indicates that spot silver prices are not stationary at levels. Using financial data to perform further tests that is not stationary is not advised. The Augmented Dickey-Fuller test statistics of -1.461091 lies to the right of all 3 critical values at the1 %, 5%, and 10% levels of significance; this indicates that spot silver prices contain a unit root and are not stationary.

Table 2

Null Hypothesis: SPOT has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=21)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.461091	0.5532
Test critical values:	1% level	-3.436284	
	5% level	-2.864048	
	10% level	-2.568157	

*MacKinnon (1996) one-sided p-values.

Table 3 addresses the concern that the spot time series is non-stationary. When time series are non-stationary, model misspecification and erroneous results may be produced. To ensure the model is specified correctly, taking the first difference of spot silver prices should correct this problem. After taking the first difference of spot prices, the Augmented Dickey-Fuller test statistics lies to the left of the critical values at the 1%, 5%, and 10% levels of confidence. This is indicates that the time series is now stationary.

Table 3

Null Hypothesis: D(SPOT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=21)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-29.86169	0.0000
Test critical values:	1% level	-3.436284	
	5% level	-2.864048	
	10% level	-2.568157	

*MacKinnon (1996) one-sided p-values.

Table 4 indicates that future silver prices are not stationary at levels. Using financial data to perform further tests that is not stationary is not advised. The Augmented Dickey-Fuller test statistics of -1.492215 lies to the right of all 3 critical values at the1 %, 5%, and 10% levels of significance; this indicates that future silver prices contain a unit root and are not stationary.

Table 4

Null Hypothesis: FUTURES has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=21)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.492215	0.5374
Test critical values:	1% level	-3.436284	
	5% level	-2.864048	
	10% level	-2.568157	

*MacKinnon (1996) one-sided p-values.

Table 5 again addresses the concern the future silver prices are non-stationary at levels. After taking the first difference of spot prices, the Augmented Dickey-Fuller test statistics lies to the left of the critical values at the 1%, 5%, and 10% levels of confidence. This is indicates that the time series is now stationary.

Table 5

Null Hypothesis: D(FUTURES) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=21)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-29.81840	0.0000
Test critical values:	1% level	-3.436284	
	5% level	-2.864048	
	10% level	-2.568157	

*MacKinnon (1996) one-sided p-values.

Table 7 displays the results of the regression model by displaying the coefficients for spot and future prices for silver. The standardized regression coefficient labeled beta is slope of the regression line that was obtained by regressing spot silver prices onto future silver prices. Our model indicates that the futures coefficient is .865 and is significant. If a financial manager is concerned with basis risk, they should hedge this risk based on our estimates by selling .865 futures contract in order to hedge one spot position.

Table 7
REGRESSION RESULTS

Dependent Variable: DLOG(SPOT)
Method: Least Squares
Date: 03/18/15 Time: 21:22
Sample (adjusted): 2 1065
Included observations: 1064 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(FUTURES)	0.864959	0.014347	60.28889	0.0000
C	-9.23E-05	0.000378	-0.243977	0.8073

R-squared	0.773886	Mean dependent var	-0.000731
Adjusted R-squared	0.773673	S.D. dependent var	0.025933
S.E. of regression	0.012337	Akaike info criterion	-5.950483
Sum squared resid	0.161649	Schwarz criterion	-5.941141
Log likelihood	3167.657	Hannan-Quinn criter.	-5.946943
F-statistic	3634.751	Durbin-Watson stat	2.943348
Prob(F-statistic)	0.000000		

Table 7 displays the results as to how well the model fits. The R-square or square of the correlation coefficient is .774 which indicates that 77.4% of the variability in future silver prices can be explained by the independent variable, spot silver prices. Since we are using a bi-variate linear regression model, the correlation coefficient between the observed and predicted values is the same as the absolute value of the correlation coefficient. In our case this value is the R value and it is .880.

CONCLUSION

This paper estimated the hedging ratios in the silver spot and futures market by using OLS (ordinary least squares). To confirm that the results were significant, we analyzed futures coefficient using bi-variate regression. The implications from our findings are that the hedge ratios during our testing period are robust and significant and that financial managers my reduce basis risk by the use of our model. Future research should compare the in-sample performance with the out of sample performance during our testing period. Additionally, further research could benefit from the use of a Chow test to examine if the time series suffers from structural breaks. If the time series suffers from structural breaks, then the OLS model maybe misspecified. Finally, this study can be adapted as an in class exercise to expose students to the different methods and models used for estimating hedge ratios. This study also adds to the continuing debate in the literature of estimating hedge ratios with less advanced econometric models in liquid markets.

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THE REGULATOR'S VIEW OF AUDIT QUALITY: A FOCUS ON IAASB'S PROPOSED FRAMEWORK FROM THE PERSPECTIVE OF INSTITUTIONAL THEORY

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ABSTRACT

Institutional Theory literature, e.g., Barley & Tolbert (1997), captures institutional development as the movement from "Realm of Action" to "Institutional Realm" using "Script" as the interval connection. This paper attempts to analyze the audit quality frameworks that a major world regulator, IAASB, has proposed using institutional theory perspectives. This paper also summarizes the characteristics of the audit quality frameworks that IAASB has proposed to satisfy the interests of various interested parties such as investors, regulators, and academics.

INTRODUCTION

It is well known that the audit is an important tool to support the reliability of financial information of business activity. Audit quality is a meaningful element that contributes to the level of reliability of the financial information. More reliable financial information helps investors make investment decisions in a capitalistic economy, and is necessary to make the economy smooth and active. So, audit quality can be thought of as an important supporter of the economy, which is a central agenda for policymakers. Thus, for regulators, crafting good policy decisions to support audit quality is of great concern.

In the academic world, there is large body of literature that discusses and analyzes audit quality following DeAngelo (1981). For practitioners, the importance of audit quality regained prominence after the 2008 global financial crisis and subsequent accounting scandals such as the Olympus Corporation scandal in 2011. Various national regulators such as the Financial Reporting Council (FRC), Public Company Accounting Oversight Board (PCAOB), as well as international regulators such as the International Auditing and Assurance Standards Board (IAASB), have made efforts to control audit quality. However, it was not until 2006 that a discussion of the meaning and valuation of audit quality occurred when the FRC published their first *Promoting Audit Quality* discussion paper. The FRC concluded their discussion of audit quality frameworks following the publication of *The audit quality framework* in 2008. Subsequently, the PCAOB's Audit Quality Indicator Project commenced in 2012 but is yet to reach a consensus. This paper analyzes the view of IAASB, an international regulator, on audit quality. Understanding the regulator's view of audit quality is important to academics, practitioners, and investors, and, thus, this paper attempts to provide insight into IAASB audit quality.

It is well known that the institutional theory can be applied to analyze phenomena in the social, policy, or economic realms. Since the scope of the institutional theory is vast, and its contents and streams are various (Scott, 1988; 1995; 2014), choosing a specific literature of institutional theory to make a specific analysis must occur. To understand the scope of literature on institutional theory, it is possible to divide it into two streams: "old institutional economics" (OIE), and "new institutional sociology" (NIS) (Ribeiro & Scapens, 2006; see

"INSTITUTIONAL THEORY PERSPECTIVE" section for details). This paper attempts to analyze regulators' view of audit quality using Barley & Tolbert (1997) model from the OIE stream and Tolbert & Zucker (1996) framework from the NIS stream.

This paper attempts to contribute in two ways. First, it attempts to analyze the audit quality framework proposed by a major world regulator, IAASB, using an institutional theory perspective. To the author's best knowledge, few existing studies use the institutional theory to analyze the process of accounting/auditing policy/consensus development. Second, this paper also summarizes the characteristics of the audit quality frameworks that IAASB has offered and that previous literature has not accomplished, in order to appeal to the interests of various stakeholders such as investors, regulators, and academics.

INSTITUTIONAL THEORY PERSPECTIVE: BARLEY & TOLBERT (1997) AND TOLBERT & ZUCKER (1996)

Institutional theory has been used in numerous disciplines, e.g., organizational studies, political studies of institutions, international business, and social movement studies (Scott 2014). For parsimonious usage, it is useful to divide the institutional theory literature into two steams: "old institutional economics" (OIE), and "new institutional sociology" (NIS). According to the argument of Ribeiro & Scapens (2006), the commonality between OIE and NIS is that they capture the institution of change not as an output but as a process. On the other hand, Ribeiro & Scapens (2006) argue that the differentiation between OIE and NIS is that OIE focuses on the change of a specific organization using a microscopic perspective, while NIS focuses on the field of the organization from macro perspective. Furthermore, the OIE and NIS approaches are categorized as comparative analysis perspectives, with a growing stream of literature that uses both perspectives in this manner (Modell, 2006). In this " INSTITUTIONAL THEORY PERSPECTIVE" section, this paper summarizes the Barley & Tolbert (1997) model from the OIE stream and Tolbert & Zucker (1996) framework from the NIS stream. This paper then analyzes the IAASB Audit Quality Process using these models in "CONLUSIONS" section.

Barley & Tolbert (1997) Model

Barley & Tolbert's (1997) Model was influenced not only by institutional theorists, like Berger & Luckmann (1967), but also by structuration theorists, e.g., Giddens (1979). Barley & Tolbert (1997, 96) define the institution as "shared rules and typifications that identify categories of social actors and their appropriate activities or relationships" (see also Burns & Flam, 1987.). They use the Gidden (1979) structural model's "scripts" as the element that connects with "institution" and "activities" or "action" to make the Sequential Model of Institutionalization (see Figure 1.). Scripts are important in this model and are defined as "observable, recurrent activities and patterns of interaction characteristic of a particular setting" (Barley & Tolbert, 1997, 98). Here, unlike previous literature, Barley and Tolbert treat scripts as behavioral activities and patterns rather than cognitive ones (Schank & Ableson, 1977) to improve their model.

Figure 1
BARLEY & TOLBERT (1997) MODEL: "A SEQUENTIAL MODEL OF INSTITUTIONALIZATION"

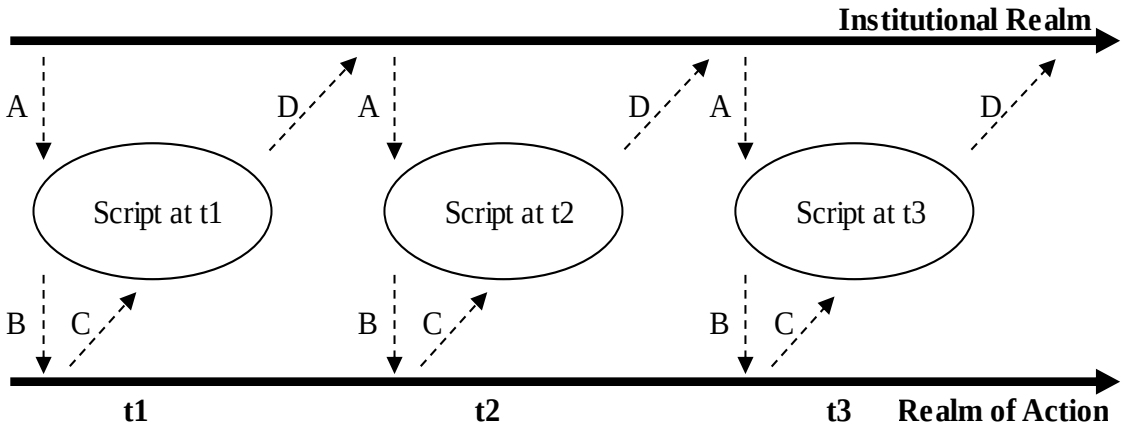


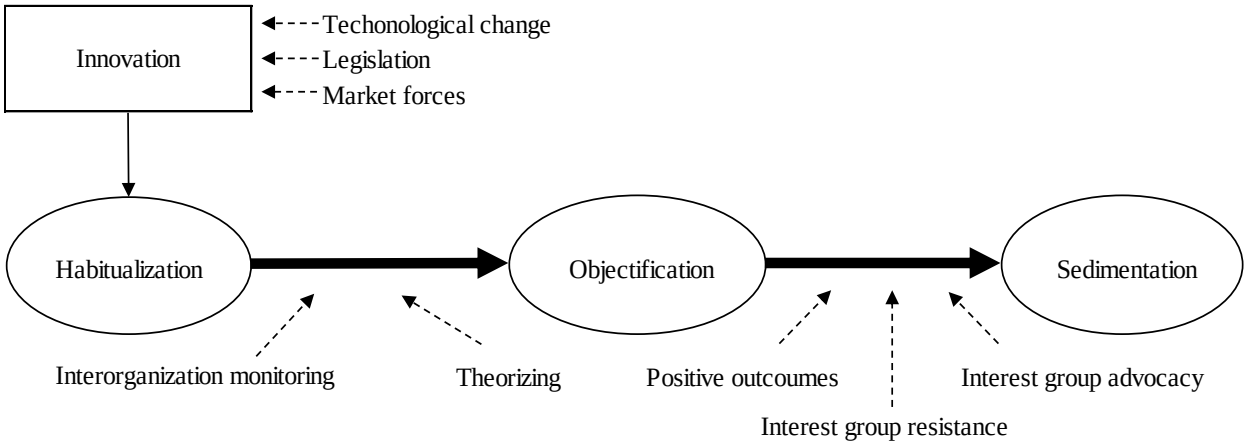
Figure 1 presents the Barley & Tolbert (1997) Model: a framework to show the institutional process in which action and institution interact with each other using the scripts as the intermediary. Notably, this model considers of the element of time going (see the bold arrow from left to right in Figure 1.).

In Figure 1, the arrows A and B show institutional constraints on action, while the arrows C and D show actions that revise or externalize the institution. In other words, arrow A means "encode," and represents the moment when institutional principles are encoded in the scripts; arrow B means "enact," and represents the moment of encoding when the scripts grow to action; arrow C means "replicate or revise," and represents the moment when action is revised or replicated the scripts; arrow D means "externalize and objectify," and represents the moment when revised or replicated scripts realize objectification and externalization to the institution.

Tolbert & Zucker (1996) Process Model

Common wisdom suggests that NIS commences with Meyer & Rowan (1977) (e.g., Sato & Yamada, 2004). Following Meyer & Rowan's (1977) idea to capture an institution as a process, Tolbert & Zucker (1996) modified previous literature and presented a theoretical framework for the institutional process. Furthermore, Tolbert & Zucker (1996) identify "Habitualization," "Objectification," and "Sedimentation" from previous literature (e.g., Berger & Luckmann, 1967; Zucker, 1977), as the process steps for institutionalization (see Figure 2.)

Figure 2
TOLBERT & ZUCKER (1996) PROCESS MODEL: "COMPONENT PROCESS OF INSTITUTIONALIZATION"



According to Tolbert & Zucker (1996, 181), the process of Habitualization in an organizational context "involves the generation of new structural arrangements in response to a specific organizational problem or set of problems, and the formalization of such arrangements in the policies and procedures of a given organization, or a set of organizations that confront the same or similar problems." Habitualization can be classified at the "pre-institutionalization stage." In this process, the generation or the formalization of new arrangements are independent activities among organizational decision-makers. Normally, there is no consensus from innovation (see Figure 2.) and the imitation may occur only in a few organizations that confront similar problems.

The process of Objectification is a movement to a more permanent and widespread status and involves the diffusion of structure and Objectification can be classified at the "semi-institutional stage" (Tolbert and Zucker, 1996, 182). In this process, as a social consensus among organizational decision-makers is reached regarding the value of the new emerging organizational structures from the Habitualization process, the imitation increases. As Figure 2 shows, Objectification concludes when "interorganization monitoring" results reach consensus and the "theorizing" process is complete. The decision-makers of organizations monitor the adoption of the "old" structure, which was made in Habitualization process, and consider the benefit and cost of that adoption. If there are more cases of adoption, then the decision-makers consider that adoption as favorable. On the other hand, "theorizing" is also necessary for the Objectification process. Theorizing offers evidence that the new structure is successful not only for the organization that has already adopted the structure, but also for the organization that is considering adoption. Additionally, in the process of Objectification, the existence of a so-called "champion" is important in many cases. According to DiMaggio (1988), the "champion" is a set of entities with a significant interesting in hastening the process of adopting a new structure.

Finally, Tolbert & Zucker (1996, 184) discuss the process of Sedimentation that can be classified as "full-institutionalization." At this level, most organizational decision-makers are not apt to value the theorized structure any more than during the process of Objectification. In the Sedimentation process, the theorized structure in the Objectification process becomes completely diffused fixed for a long period. As Figure 2 shows, the Sedimentation process completes when

there are positive outcomes (even weak ones), relatively low opposition from the resistance group, and a relatively high and continued promotion from the advocacy group.

OUTLINE OF IAASB'S AUDIT QUALITY FRAMEWORKS

The IAASB is the independent standard-setting body of the International Federation of Accountants (IFAC) that sets International Standards on Auditing (ISAs). IAASB started the Audit Quality Project in December 2009 after the Clarity Project finished, which was an important project for IAASB to promote International Standards (IAASB, 2010; Hamilton, 2011; see also Table 1). After 4 years of discussion and work, IAASB reached a consensus through the IAASB's Audit Quality Framework (2014), (see also Table 1 in "CONLUSIONS" section.). In this "INSTITUTIONAL THEORY PERSPECTIVE" section, this paper briefly sketches the outline of IAASB's Audit Quality Frameworks of 2011 and 2013, describes the newest framework of 2014, to offer a foundation for analysis in "CONLUSIONS" section.

A Brief Sketch of IAASB's Audit Quality Framework (2011 & 2013)

Figure 3 represents the IAASB's Audit Quality Framework of 2011. IAASB showed that audit quality could be captured from Inputs, Outputs, and Context Factors. Those three factors influence each other and affect audit quality.

Figure 3
IAASB'S AUDIT QUALITY FRAMEWORK OF 2011

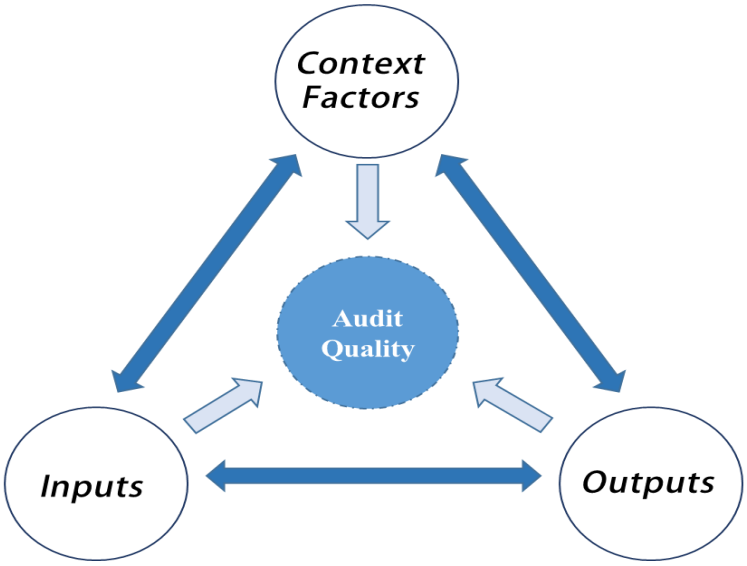
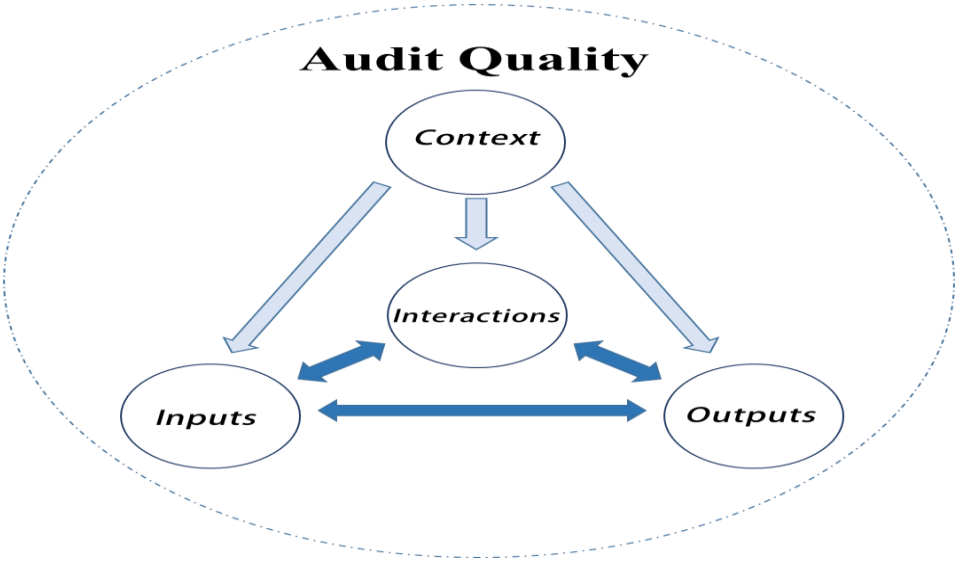


Figure 4 shows the IAASB's Audit Quality Framework of 2013. This framework included an addition of a new factor: Interactions. The 2013 framework can be characterized by the emphasis on the interaction effect among Inputs, Outputs, and Context factors (see Table 1). Furthermore, regarding the Input and Output factors, the 2013 framework attempts to capture audit quality on three levels: engagement, firm, and national levels. For example, one of the Input factors, audit time, can be measured at each of the three levels individually.

Figure 4
IAASB'S AUDIT QUALITY FRAMEWORK OF 2013



The IAASB's Audit Quality Framework (2014)

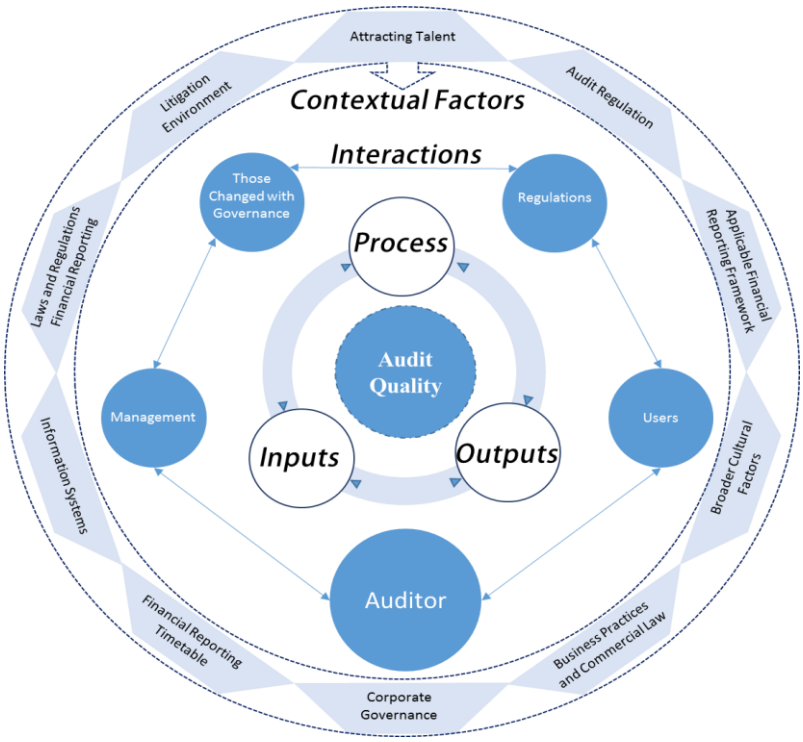
In February 2014, IAASB issued a publication: *A Framework for Audit Quality: Key Elements that create an Environment for Audit Quality* (IAASB's Audit Quality Framework, 2014). In this framework, IAASB identifies the purposes as: (1) "raising awareness of the key elements of audit quality," (2) "encouraging key stakeholders to explore ways to improve audit quality," and (3) "facilitating greater dialogue between key stakeholders on the topic" (IAASB, 2014a, 1). Furthermore, IAASB expects that the users of this framework are (1) national audit firms, global networks, and professional accountancy organizations, (2) those charged with governance, (3) public sector organizations, (4) regulators, (5) oversight bodies, (6) national standard setters, and (7) academics (IAASB, 2014b, 2). IAASB avoids providing any definition for audit quality itself in this framework, instead showing support for the understanding of audit quality as: "likely to have been achieved by an engagement team that: exhibited appropriate values, ethics and attitudes; was sufficiently knowledgeable, skilled, and experienced and had sufficient time allocated to perform the audit work; applied a rigorous audit process and quality control procedures that complied with law, regulation and applicable standards; provided useful and timely reports; and interacted appropriately with relevant stakeholders" (IAASB, 2014, Paragraph 2).

Figure 5 presents the IAASB's Audit Quality Framework of 2014. The 2014 framework identifies five factors that contribute to the audit quality of financial statement: Inputs, Outputs,

Process, Interactions, and Contextual Factors. For the factors of Inputs, Outputs, and Process, an analysis can be done at three levels: engagement, firm, and national levels. Regarding the Interactions factor in Figure 5, the primary player is the auditor who has responsibility for producing a quality audit, while the other players from "Financial Reporting Supply Chain," (e.g. Management) are also important for achieving a quality audit (IAASB 2014b, 3).

Specific details of the Inputs, Outputs, Process, Interactions, and Contextual factors are also described in IAASB 2014. The Input factors include "the values, ethics and attitudes of auditors" and "the knowledge, skills, and experience of auditors and the time allocated for them to perform" (IAASB 2014a, Paragraph 9). The Process factors are important because rigorous audit process factors help the audit firm to achieve quality audits (IAASB 2014b, 4). The Output factors refer not only to outputs such as audit reports of client companies but also to "reports and information that are formally prepared and presented by one party to another" (IAASB 2014a, Paragraph 14). The Contextual Factors include (1) Business practices and commercial law, (2) Laws and regulations relating to financial reporting, (3) The applicable financial reporting framework, (4) Information systems, (5) Corporate governance, (6) Financial reporting timetable, (7) Broader cultural factors, (8) Audit regulation, (9) Litigation environment, (10) Attracting talent, and (11) Financial reporting timetable (IAASB 2014b, 4; see also Figure 5). Some Contextual Factors (e.g., laws and regulations, and corporate governance), influence audit quality either directly or indirectly. Furthermore, it is suggested that auditors respond to these contextual factors appropriately in order to achieve sufficient audit evidence (IAASB 2014a, Paragraph 17). The Interaction factors include the official and unofficial communication among the stakeholders in "Financial Reporting Supply Chain" and have particular impact on audit quality (IAASB 2014a, Paragraph 16).

Figure 5
IAASB'S AUDIT QUALITY FRAMEWORK OF 2014



DISCUSSION OF IAASB'S VIEW AND THE PROCESS OF CAPTURING AUDIT QUALITY THROUGH AN INSTITUTIONAL PERSPECTIVE

Table 1 shows the IAASB's activity during the Audit Quality Project and the publications resulting from it: the IAASB's audit quality frameworks. By reviewing Table 1, it is clear that the process leading to the newest publication of the IAASB Audit Quality Framework in 2014 spanned 4 years.

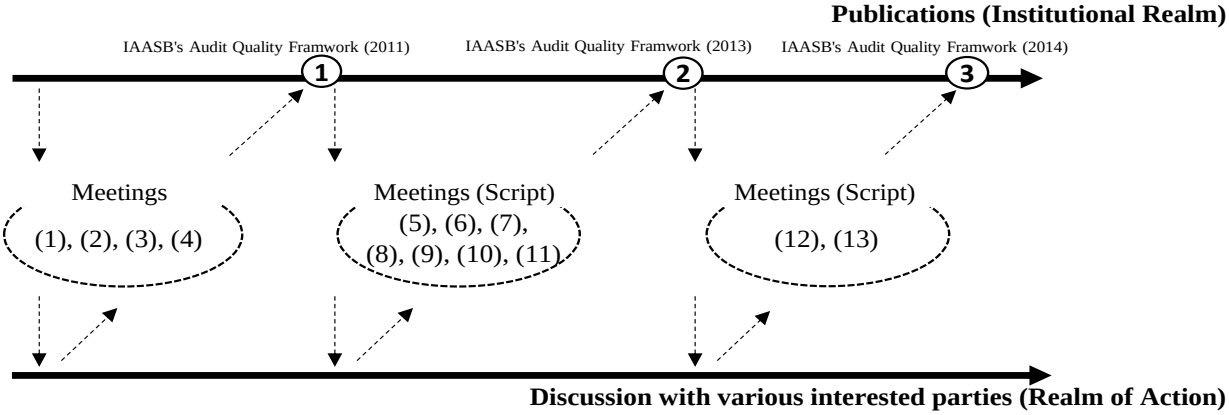
Table 1
IAASB'S AUDIT QUALITY PROJECT AND IT'S PUBLICATIONS

The meeting's date and location	IAASB's Audit Quality Project activity	Publications	The characteristics of the publications
(1) Dec. 7-11, 2009, San Francisco, USA	Discussion of (1) the perspectives or approaches to audit quality that are consistent with IAASB's policy, (2) the users' perception of audit quality, (3) the scope of the IAASB audit quality project.	① *Audit quality: An IAASB Perspective* (January 2011)	・Audit quality's definition is difficult and multifaceted. The audit quality is different for different interested parties. ・Audit quality can be captured from Inputs, Outputs, and Context Factors. ・Those three factors influence each other and affect audit quality.
(2) Jun. 14-18, 2010, Mainz, Germany	Consideration of the ways to contribute to the international discussion of audit quality.		
(3) Sep. 14-15, 2010, London, UK	The first meeting for IAASB Consultative Advisory Group (CAG) on discussion of audit quality.		
(4) Dec. 6-10, 2010, Orlando, Florida, USA	Proposing the development of a consulting paper on international audit quality. Agreement on the publication of a draft "thought piece" on audit quality.		
(5) Mar. 8-9, 2011, New York, USA	The second meeting of CAG for a discussion on audit quality.		
(6) Mar. 14-18, 2011, Paris, France	Consideration of (1) the objectives and scope of the development of an international audit quality framework, (2) the schedule to develop the consultation draft of that framework.		
(7) Jun. 20-23, 2011, New York, USA	Discussion of a preliminary consultation draft of an audit quality framework. For example, discussion of (1) the comprehensiveness or credibility of the proposed framework, (2) the structure of the framework to include various elements, (3) the relation of Small- and medium-sized practices (SMPs) and the public sector, (4) the timetable.	② Consultation Paper: *A Framework for Audit Quality* (January 2013)	・The contents and the volume have been expanded. ・The purpose of the framework is specified. ・Besides the Input, Output, and Context, Interaction factor is added. ・Regarding Inputs and Outputs factors, this 2013 framework tries to capture audit quality though those factors from three levels: engagement, firm, and national levels.
(8) Dec. 5-9, 2011, Los Angeles, USA	Discussion of the main comments from stakeholders on the preliminary draft of audit quality framework. For example, discussion of (1) alternative framework structure, (2) the impact of the requirements of the applicable financial reporting framework on audit quality.		
(9) Sep. 11, 2012, New York, USA	The third meeting for CAG of discussion on audit quality.		
(10) Sep. 17-21, 2012, New York, USA	Consideration of the consultation draft's first version. For example, Discussion of (1) the draft's structure, (2) the areas where action needs to be taken to reinforce audit quality, (3) the details of Contextual Factors for audit quality, (4) the status of the framework.		
(11) Dec. 10-13, 2012, New York, USA	Approval on the issuance of the consultation paper.		
(12) Sep. 16-20, 2013, New York, USA	Discussion of the contents from comment letters for the consultation paper. Especially, discussion of the status, volume of the framework, the definition of audit quality, and so on.	③ *Framework Audit Quality: Key Elements that Describe an Environment for Audit Quality* (February 2014)	・The volume of framework's expression is smaller than the 2013 framework. ・Separate Process factor from Inputs and Outputs factors. Renamed Contextual Factors. ・Make the Interaction factor's function for audit quality more clear in the chart of audit quality.
(13) Dec. 9-13, 2013, New York, USA	Approval on the revised framework of audit quality. Confirmation on the IAASB's policy of supporting this framework and audit quality itself.		

From the start of the project until the IAASB Audit Quality Framework in 2011, only 1 year (and 3 meetings) transpired. After 2011, it takes 2 years (and 7 meetings) to publish the IAASB Audit Quality Framework of 2013. During these 2 years, it takes 2 months to clarify the objection and scope of the project and decide the schedule, only 6 months to make the preliminary draft, and significant time for discussion. For the year between the IAASB Audit Quality Framework in 2013 and the IAASB Audit Quality Framework in 2014, the majority of the time is spent on modification resulting from comments from various stakeholders.

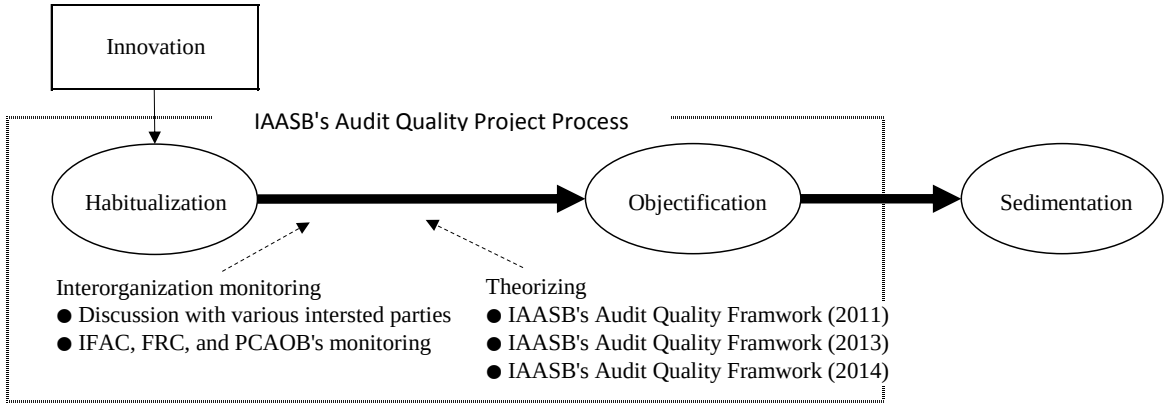
The characteristics of the three frameworks are also summarized in the Table 1. First, as regards the publication length of the frameworks, that of 2013 is the longest, and of 2011, the most concise. Second, the objective of the Audit Quality Project is showed clearly from the 2013 iteration. Third, the 2011 framework proposes 4 factors that influence audit quality: Inputs, Outputs, and Context Factors, while the 2013 framework adds the Interactions factor, and the 2014 framework includes the Process factor (see Figures 3, 4, 5). Fourth, following the 2013 framework, analysis can be done from the engagement, firm, and national levels when it is needed.

Figure 6
IAASB AUDIT QUALITY PROJECT PROCESS USING BARLEY & TOLBERT (1997) MODEL



Note: see also Table 1 regarding to the meetings details.

Figure 7
IAASB AUDIT QUALITY PROJECT PROCESS USING TOLBERT & ZUCKER (1996) PROCESS MODEL



Conversely, using the institutional theory perspective and Barley & Tolbert (1997) model from the OIE stream and Tolbert & Zucker (1996) framework from the NIS stream as described in "INSTITUTIONAL THEORY PERSPECTIVE" section of this paper, the IAASB's view of audit quality can be analyzed differently, as shown in Figures 6 and 7. Figure 6 shows the IAASB Audit Project Process's analysis results using Barley & Tolbert (1997) model. In this way, analysis shows that IAASB experienced the bulk of its meetings as "script": "observable, recurrent activities and patterns of interaction characteristic of a particular setting," and that it achieved three institutions: the IAASB's audit quality frameworks (2011; 2013; 2014), in chronological order. On the other hand, during the intervals between those meetings, there are discussions with various interested parties and the IAASB that can be analyzed as "action" in the Barley & Tolbert (1997) model (Figure 6). Those discussions can be presented, in some cases, as the comment letters from various parties to IAASB according to the IAASB's audit quality frameworks.

Using the Tolbert & Zucker (1996) process perspective to analyze the IAASB Audit Quality Project, it can be argued that the IAASB Audit Quality Project is in the process of Habitualization to Objectification. As described in "INSTITUTIONAL THEORY PERSPECTIVE" section, there are Interorganization monitoring and Theorizing steps between Habitualization to Objectification, and it can be argued that IAASB's discussions with various interested parties and perceived monitoring from IFAC, FRC, and PCAOB represent the Interorganization monitoring step in the Tolbert & Zucker (1996) Process. Likewise, IAASB's audit quality frameworks (2011; 2013; 2014) can be identified as the Theorizing step (Figure 7). Furthermore, IAASB can be analyzed as a "champion" that is attempting to hasten the adoption of a new structure in Tolbert & Zucker (1996) process perspective, toward the institutionalization of a definition and measurement of audit quality (see "INSTITUTIONAL THEORY PERSPECTIVE" section.).

CONCLUSIONS

Based on the importance of a regulator's actions regarding audit quality and an analysis from the perspective of institutional theory, this paper attempts to contribute to the literature by reviewing the IAASB's Audit Quality Project. First, the Barley & Tolbert (1997) model from the OIE stream and the Tolbert & Zucker (1996) model from NIS stream of institutional theory were selected as the appropriate tools for analysis and 0 their usage was described. Second, this paper provides an outline of IAASB's Audit Quality Frameworks, with some details of 2014 framework. Third, this paper analyzes the development process of IAASB's Audit Quality Project using the selected Barley & Tolbert (1997) and Tolbert & Zucker (1996) models.

The results of this analysis show that until IAASB's Audit Quality Framework in 2014, there is much discussion regarding the IAASB framework development process, most notably around the five factors that influence audit quality: Inputs, Outputs, Process, Interactions, and Contextual Factors. The institutional theory perspective from the Barley & Tolbert (1997) and Tolbert & Zucker (1996) models are shown to be effective for analyzing the process of generating accounting/auditing policy consensus. In this case of the development of an audit quality regulation process from the regulator's view, it is found that IAASB acts as a "champion" that attempts to encourage the development of regulation of audit quality. The IAASB holds numerous meetings ("script"), engages in discussions with various interested parties ("action"), and achieves three audit quality frameworks in 2011; 2013; 2014 ("institution"). Furthermore, the achievements of IAASB's Audit Quality Project do not reach the diffusion level

("Sedimentation") yet, and IAASB is still in the process of theorizing the jobs of audit quality ("Objectification").

AUTHOR'S NOTE

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WHAT IS YOUR EPS? ISSUES IN COMPUTING AND INTERPRETING EARNINGS PER SHARE

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ABSTRACT

This paper examines several problematic issues in the presentation of information related to earnings per share (EPS) that are common to college textbooks and popular investment websites. U.S. generally accepted accounting principles (GAAP) require disclosure of EPS for all publicly listed firms. In fact, EPS is the only financial ratio required by GAAP and it is the only financial ratio with a formula specified by GAAP. Despite these facts, many college textbooks and investment websites present incorrect formulas for the computation of EPS. Furthermore, many textbooks and investment websites either explicitly or implicitly encourage students and investors to interpret EPS incorrectly. This paper discusses these issues and contrasts proper EPS computation and interpretation with the most common errors in computation and interpretation.

INTRODUCTION

In a recent study, we used business textbooks to evaluate the state of financial ratio education in business schools (Mankin and Jewell, 2014). The study included current textbooks from accounting, finance, management, marketing, and financial statement analysis. The textbooks generally had copyright dates from 2007-2011 and included books from all major publishers. Table 1 gives information about the sample of textbooks in the preceding paper.

Table 1
SAMPLE OF BUSINESS TEXBOOKS
(Mankin and Jewell, 2014)

ACCOUNTING	FINANCE	MGT/MKT	FSA	TOTAL
31	27	13	6	77

The study made several interesting discoveries. Two of the most interesting points are as follows. First, many financial ratios with the same formula have different names. We call this phenomenon "naming confusion." This naming confusion can hinder understanding of the ratios and cause miscommunication. An example of this naming confusion is when the ratio Days Sales Outstanding (DSO) can also be called Days Sales in Receivables, Average Collection Period (ACP), or Days Sales Uncollected. An experienced analyst may know these terms all refer to the same formula, but this is difficult for students and novice analysts.

Second, financial ratios may have the same name but several different formulas. We call this phenomenon "formula confusion." Textbook authors agree unanimously on very few ratio formulas. The Current Ratio, Gross Profit Margin, and Dividend Yield are the most notable of these ratios. (See Table A1 in the Appendix). Most ratios, even the most commonly used ones, have several alternate formula versions. Common ratios with substantial disagreement in the formulas are Return on Assets (ROA), Quick Ratio and Inventory Turnover. For example, we found eleven different formulas for Return on Assets in current business textbooks (Mankin and Jewell, 2014). We also demonstrated, in a separate study, that there are at least fourteen different formulas for ROA (Jewell and Mankin, 2011).

This paper focuses on basic, not diluted, Earnings Per Share (EPS) since it is widely used and should enjoy complete consensus on its formula since it is required by U.S. GAAP. However, we find that it does not enjoy formula consensus in business textbooks. This paper expands on our previous work by exploring how EPS is defined on popular finance and investing websites. It will also explore how different "versions" of the EPS formula can lead to erroneous computations and some major problems in interpreting EPS numbers.

LITERATURE REVIEW

In the United States, financial reporting in the 1800's focused only on the balance sheet accounts and the changes to the balance sheet accounts. Company revenues and expenses increased and decreased these accounts and net income was shown only as a component of the equity or capital account. The modern income statement first appeared in the 1830's in the annual reports of railroad companies. Railroads were the high tech companies of that era and adopted the income statement first, while non-railroad companies were slow to adopt the new income statement. United States Steel Corporation produced its first income statement in 1901 and Westinghouse Corporation began in 1911. Some large U.S. corporations did not prepare income statements until 1930 (Vangermeersch, 1996).

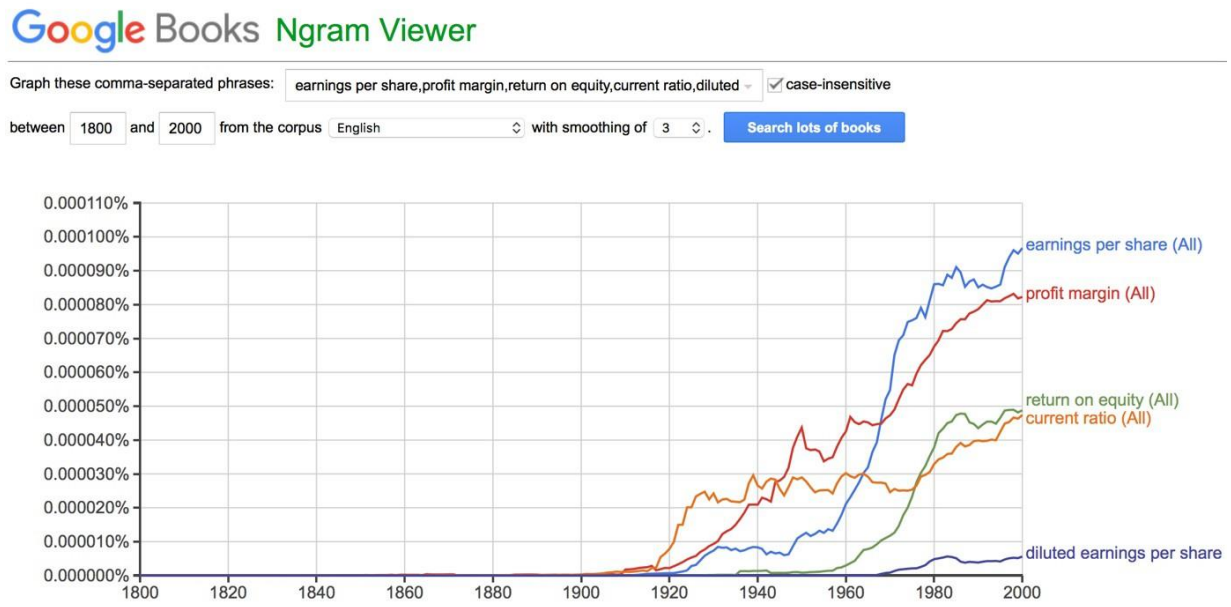
The idea of earnings per share followed the development of the income statement and the rise of the modern corporation. Financial analysts first popularized the use of EPS. According to Google Book Ngram Viewer, the first use of the term "earnings per share" in that database was in 1850 by the Eastern Railroad in New Hampshire (Twelfth Annual Report). Another early mention of earnings per share was for the Vanderbilt railroads in 1887 as reported in *The Railway News* (The Vanderbilt Roads, p. 105). Vangermeersch reports that the first mention of EPS in the *Wall Street Journal* was in an article about Bethlehem Steel in 1915. An accounting textbook included earnings per share as early as 1919, but only as an advanced topic (Rittenhouse, p. 307). Famed investor Benjamin Graham included an EPS calculation in a 1922 stock analysis article (Graham, 1922).

The Google Ngram Viewer is based on the Google Books corpus of over 4.5 million books in the English language that have been digitized by Google. The corpus includes over 468 billion English words. Words and phrases in the corpus are called n-grams. Any single word is a 1-gram, a two-word phrase is a 2-gram, and so on (Lin et al., 2012). The Google Ngram Viewer shows the frequency of the n-grams based on publication dates.

Figure 1 shows the rise of the use of the Earnings Per Share term versus other popular financial ratios in the Google Books corpus. We searched the most common twenty ratios in textbooks from our previous study and found the most common in the Google database. (The list is shown on the Table A2 in the Appendix). The top four financial ratios in the Google corpus are EPS, Profit Margin, Return on Equity, and Current Ratio. Both Current Ratio and Profit Margin were used more frequently than Earnings Per Share during the 1920-1960 period. EPS became the

most popular financial ratio beginning with its explosive growth in the 1960's. We also added Diluted Earnings Per Share to show the relative use of diluted versus basic EPS.

Figure 1
FREQUENCY OF THE TERM EARNINGS PER SHARE VERSUS OTHER FINANCIAL RATIO TERMS
(https://books.google.com/ngrams)



Academic authors also followed the financial analysts by joining the EPS trend beginning in the 1920's. Sloan (1928) included Earnings Per Share numbers in his analysis of U.S. business prospects. Sloan, an editor of the Standard Statistics Company (a predecessor of the Standard & Poor's Company), showed that his company computed earnings per share amounts as early as 1914 (1928, p. 188). Haney, writing on the eve of the 1929 stock market crash, lamented the prevalence of the idea that "stocks are better than bonds" and included EPS in his argument (1929, p. 159). Roberts recommended the use of the Price-Earnings Ratio as an index of stock prices. His analysis of 170 companies used market prices divided by earnings per share as the price-earnings ratio (Roberts, 1929). The first master's thesis including the term earnings per share that appears in the ProQuest Dissertation database is a 1929 MBA thesis (Jones). The first doctoral dissertation that used earnings per share in its analysis was by Phillip Taylor in 1934 (Taylor, 1934).

Paralleling the rise of EPS in financial analysis and academic papers, some companies began including earnings per share calculations in their annual reports in the early 20th century. American Telephone & Telegraph included a table in its 1919 annual report that showed EPS for every year from 1901-1919 (p. 46). This was a new calculation for the 1919 report that was not included in previous years. Apparently, the firm's EPS calculation was net income divided by ending number of shares of common stock, though the formula was not specified. Companies and financial writers continued to expand their use of EPS for the next several decades.

Prior to the 1950s, regulation of the earnings per share number did not exist; and there was great debate on the value of EPS throughout the 1950s and 60s. Some professionals argued that financial statements should include earnings per share and dividends per share (Stanley, 1951). Robertson, a partner at the New York office of Haskins & Sells (a predecessor firm of Deloitte), stated the position of the accounting and regulatory community that "earnings per share figures are not a fair summary of operating results (1951, p. 569)." His argument was that using a single number such as EPS was an over simplification of complex financial results (Robertson, 1951).

One author (Belda, 1955) showed three different ways to calculate earnings per share and recommended a uniform approach by investors. He noted that analysts frequently used different methods that could lead to misunderstanding. The article was published in the *Journal of Accountancy*, an official publication of the organization now known as the American Institute of Certified Public Accountants (AICPA). The article was preceded by an editorial comment that showed the AICPA's perspective on EPS:

We do not join in Mr. Belda's enthusiasm for the earnings per share figures as a measure of a company's performance, since it is usually necessary to know the elements going into the make-up of the net income figure if the per share figure is to be meaningful. However, we agree that it is one of a number of useful financial statistics, and that a great deal of importance is attached to it by financial reporters, securities dealers, and investors (Belda, 1955 p. 62).

The accounting regulators were the last to join the earnings per share trend. The U.S. Securities and Exchange Commission (SEC) was created by the Securities Exchange Act of 1934. The SEC has the legal authority to set accounting and financial reporting practices for all publicly traded corporations in the U.S. capital markets. Since 1938, the SEC has allowed private standard setters in the accounting and financial profession to set financial reporting standards (Wahlen, Jones, & Pagach, 2016). Table 2 shows the history of the private bodies charged with setting accounting standards.

Table 2
UNITED STATES FINANCIAL REPORTING STANDARD-SETTING BODIES
(Wahlen, Jones, & Pagach, 2016)

ABBREVIATION	ORGANIZATION	STANDARDS	YEARS
CAP	Committee on Accounting Procedure	Accounting Research Bulletins (ARB)	1938-1959
APB	Accounting Principles Board	APB Opinions	1959-1973
FASB	Financial Accounting Standards Board	Statements of Financial Accounting Standards (SFAS)	1973-2009
		FASB Accounting Standards Codification	2009-Present

The timeline of EPS and the standard setting process is shown in Table 3. First, the earnings per share trend was ignored until the 1950's. Then, the standard setting bodies began to give guidance on EPS. The first authoritative discussion of EPS occurred in 1953. Finally, the standard-setters began to require EPS in 1969. The 1969 pronouncement required a specific formula for EPS for the first time. The 1997 standard required a dual presentation of 1) Basic EPS and 2) Diluted EPS. The current EPS standard is included in the FASB Accounting Standard Codification as ASC 260 *Earnings Per Share.*

THE IMPORTANCE OF EARNINGS PER SHARE

There is ample evidence that EPS is an important ratio. The fact that it is the only ratio with required disclosure and a mandated formula (see ASC 260-10-45-10 Computation of Basic Earnings Per Share (FASB, 2009)) from the Accounting Standards Codification is fairly compelling on its own, yet there is far more evidence than that. First, analysts and investors used EPS for many years before it was first required and some companies voluntarily provided it in their annual reports. Second, Gibson (1987) found EPS to be the third most important ratio for financial analysts, trailing only Return on Equity (ROE) and the Price/Earnings (P/E) ratio in importance. Obviously, the P/E ratio cannot be computed without EPS; therefore, EPS affects two of the three most important ratios for analysts.

Table 3
HISTORY OF EARNINGS PER SHARE IN U.S. FINANCIAL REPORTING STANDARDS

YEAR	STANDARD	RESULT
1953	ARB No. 43 Restatement and Revision of Accounting Research Bulletins	"earnings per share is often given undue prominence and its significance exaggerated" (p. 18)
1958	ARB No. 49 Earnings Per Share	"It is, in many cases, undesirable to give major prominence to a single figure of earnings per share" (para. 1) Any computation of EPS should include net income as the numerator Should be applicable to common stock No guidance on how to calculate the number of shares of common stock
1966	APB Opinion No. 9 Reporting the Results of Operations	Strongly encouraged disclosure of EPS using income before extraordinary items and using net income Provided limited guidance on how to compute EPS
1969	APB Opinion 15 Earnings Per Share	First official accounting standard to require presentation of EPS in the income statement Required Primary EPS and Fully Diluted EPS, if more than 3% dilution Controversial and complex, by 1971 the FASB had published 102 additional accounting interpretations
1997	FASB Statement No. 128 Earnings Per Share	Intended to simplify the rules to make them comparable to international EPS standards Required Basic EPS and Diluted EPS
2009	FASB Accounting Standards Codification ASC 260 Earnings Per Share	Combined all previous standards into a single authoritative source

In addition, EPS is the second most important ratio to general users of financial information. This can be shown simply by measuring the "web presence" of various ratios on the Internet. Table 4 shows that P/E and EPS are the top two ratios in terms of web presence by a large margin. Web presence was measured by a simple Google search of each ratio name.

Table 4
TOP 20 RATIOS BY WEB SEARCH BY GOOGLE.COM
As of 2/14/2015

RANK	RATIO NAME	GOOGLE HITS
1	P/E Ratio	23,400,000
2	Earnings per Share (EPS)	10,100,000
3	Return on Equity (ROE)	6,490,000
4	Dividend Yield	5,380,000
5	Return on Assets (ROA)	4,450,000
6	Current Ratio	3,700,000
7	Net Profit Margin (Return on Sales)	1,720,000
8	Gross Profit Margin	1,110,000
9	Dividend Payout	581,000
10	Quick Ratio	521,000
11	Debt Ratio	507,000
12	Inventory Turnover	500,000
13	Debt to Equity Ratio	482,000
14	Market to Book	364,000
15	Receivables Turnover	335,000
16	Days Sales Outstanding	289,000
17	Fixed Asset Turnover	223,000
18	Total Asset Turnover	163,000
19	Times Interest Earned	135,000
20	Days Sales in Inventory	32,100

EARNINGS PER SHARE DEFINED

The prescribed formula for basic EPS is found in ASC 260-10-45-10:

Basic EPS shall be computed by dividing income available to common stockholders (the numerator) by the weighted-average number of common shares outstanding (the denominator) during the period (FASB, 2009).

Income available to common stockholders is net income minus preferred stock dividends. The basic EPS formula can be shown as:

$$\textit{Basic EPS} = \frac{\textit{Income Available to Common Stockholders}}{\textit{Weighted} - \textit{Average Number of Common Shares Outstanding}}$$

Or, alternatively the formula can be shown as:

$$Basic\ EPS = \frac{Net\ Income - Preferred\ Stock\ Dividends}{Weighted - Average\ Number\ of\ Common\ Shares\ Outstanding}$$

Admittedly, the EPS formula is slightly more complex than the formulas for some other common ratios. However, the fact that the formula is mandated would seem to imply that it is important to use and teach the correct version. But the evidence suggests that many are not very concerned with using the correct version. Remember, this is only the Basic EPS calculation, not the more complicated Diluted EPS, which is a topic for intermediate accounting classes and beyond.

PROBLEMS WITH EARNINGS PER SHARE EDUCATION

Despite the obvious importance of Basic EPS, we found (Mankin and Jewell, 2014) four serious problems with the presentation of the ratio in college textbooks:

1. Less than 55% of textbooks containing ratios discuss EPS at all.
2. EPS is the 14th most discussed ratio in college textbooks – not the second or third most discussed as the evidence above would seem to support.
3. Despite the fact that EPS has a mandated formula, less than 65% of textbooks included the correct formula.
4. EPS ranked 11th in terms of "formula consensus" out of all ratios.

Similar problems are found when exploring how EPS is presented on educational websites. A simple Google search using terms like "EPS defined" and "EPS explained" identified the top twenty finance education websites that discuss EPS. Of these twenty websites, only three used the precise mandated formula for EPS. Another three of the sites were assessed to use versions that were "basically correct" – even if they contained a technical error. The other fourteen sites were found to have serious problems with their EPS definitions. A summary of the findings is shown in Table 5 below.

When combining the results from college textbooks and educational websites, four competing versions of EPS can be identified:

1. The correct version as stated above.
2. A version that ignores Preferred Dividends in the numerator.
3. A version that fails to weight common shares in the denominator.
4. A version that both ignores Preferred Dividends and fails to weight common shares.

Table 6 shows the frequency of each version for textbooks and websites. Notice that the textbooks and the websites went for the simplest, or least accurate, version of EPS with roughly equal frequency. Textbook authors were much more likely to use the correct formula, while websites frequently used one of the two "intermediate" versions that were not found in any college textbooks.

Table 5
ISSUES WITH EPS ON TWENTY EDUCATIONAL WEBSITES AS OF 2/15/2015

SITE	ASSESSMENT	PROBLEM
Investopedia.com	Basically Correct	Omits "common" in denominator
Wikihow.com	Incorrect	Ignores weighting of shares in the denominator
MyAccountingCourse.com	Perfect	None
Dummies.com	Incorrect	Ignores Preferred Dividends and weighting of shares
Stocks.About.Com	Incorrect	Ignores Preferred Dividends and weighting of shares
FinanceFormulas.Net	Incorrect	Ignores Preferred Dividends
AccountingExplained.com	Perfect	None
Wikipedia.com	Basically Correct	Use of "Profit" in numerator is ambiguous
Zacks.com	Perfect	None
InvestingAnswers.com	Incorrect	Ignores weighting of shares – but notes that weighting is "typically used"
Financial-Dictionary.com	Incorrect	Ignores Preferred Dividends and weighting of shares
BeginnersInvest.com	Incorrect	Ignores Preferred Dividends
BizFinance.com	Incorrect	Ignores weighting of shares
ReadyRatios.com	Incorrect	Ignores weighting of shares and omits the word "common" in denominator
finance-glossary.com	Incorrect	Ignores Preferred Dividends and weighting of shares
istockanalyst.com	Basically Correct	Omits the word "common" in denominator
education.stocktrak.com	Incorrect	Ignores weighting of shares
nasdaq.com	Incorrect	Ignores Preferred Dividends and weighting of shares
InvestorWords.com	Incorrect	Ignores Preferred Dividends and weighting of shares
Finance.Yahoo.com	Incorrect	Ignores Preferred Dividends and weighting of shares

Table 6
FREQUENCY OF EPS VERSIONS IN TEXTBOOKS AND EDUCATIONAL WEBSITES

VERSION	TEXTBOOKS	WEBSITES
EPS 1 (correct and most complex)	64.29%	30.00%
EPS 2	0.00%	10.00%
EPS 3	0.00%	25.00%
EPS 4 (simplest)	35.71%	35.00%
TOTAL	100.00%	100.00%

PROBLEMS WITH "COMPETING" EPS FORMULAS

The table above shows there is significant "formula confusion" with EPS, despite the mandated formula for the ratio. Novice users of financial statements attempting to educate themselves on EPS through research on the web have a 70% chance of finding an incorrect formula, while college students have about a 36% chance of being taught an incorrect formula in a formal classroom setting.

The differences in the four versions of the formula may seem trivial at first glance, but they can result in significant mathematical errors when computing EPS. This will be demonstrated with a simple example.

Table 7
EPS COMPUTATIONS

	Company A	Company B	Company C	Company D
Net Income	$10,000	$10,000	$10,000	$10,000
Preferred Dividends	-	$1,000	-	$1,000
Beginning Shares	5,000	5,000	5,000	5,000
Share Activity	-	-	issues 1,000 shares	repurchases 1,000 shares
Ending Shares	5,000	5,000	6,000	4,000
Income Available to Common Stockholders	$10,000	$9,000	$10,000	$9,000
Weighted Common Shares Outstanding	5,000	5,000	5,500	4,500
EPS 1 (correct)	$2.00	$ 1.80	$1.82	$2.00
EPS 2 (ignores preferred dividends)	$ 2.00	$ 2.00	$1.82	$2.22
EPS 3 (does not weight shares)	$ 2.00	$ 1.80	$1.67	$2.25
EPS 4 (ignores preferred dividends and weighted shares)	$ 2.00	$ 2.00	$1.67	$2.50

Table 7 shows data and EPS computations for four very similar firms. Each firm has $10,000 of Net Income and begins the year with 5,000 common shares outstanding. However, two of the firms have preferred stock, on which they pay $1,000 of preferred dividends, while the other two do not. In addition, one of the firms issues new shares during the year, while another has a share repurchase. For the sake of simplicity, we will assume these share transactions occur exactly halfway through each firm's fiscal year.

Since Company A has neither preferred stock nor any change in shares outstanding, all four EPS formulas yield the same results for it. But the results are quite different for the other three firms. Note that version 2 of the EPS formula always yields an answer that is less than or equal to the correct answer provided by version 1. However, version 3 and 4 of the formula give results that may be either larger or smaller than the correct answer depending on the nature of the change in shares outstanding.

Finally, note that the differences in magnitude between the answers provided by the four versions are not trivial, even though the differences between the four firms are not huge. The errors in the answers provided by versions two through four range from fifteen to fifty cents per share.

Changes in EPS of a single penny can have dramatic effects on the stock prices of publicly traded firms. The classic example of this was given by then SEC Chairman Arthur Levitt when he said, "I recently read of one major U.S. company, that failed to meet its so-called "numbers" by one penny, and lost more than six percent of its stock value in one day (Levitt, 1998)." Therefore, it is baffling that the level of potential imprecision in EPS implied by the example above would be tolerated by textbook authors or educational websites.

PROBLEMS WITH EDUCATION ON EPS INTERPRETATION

Unfortunately, formula confusion is not the only educational problem plaguing EPS. There is also widespread misinformation about what the ratio actually means and how it may be used.

When EPS is discussed in textbooks, the discussion is usually framed imperfectly. Information on EPS is typically presented in the same chapter and in the same manner as many other financial ratios. However, EPS cannot be used in the same manner as most other ratios, which are designed to be useful in cross-sectional comparisons. EPS cannot be directly compared between firms, yet this is almost never mentioned.

Most textbooks and educational websites completely ignore the fact that shares outstanding is a choice variable for public companies. Since firms can directly control their number of shares, they can indirectly control their EPS. The same logic explains why stock prices cannot be directly compared. Most people seem to understand the point for stock prices, yet fail to grasp it for EPS.

Consider two firms that are identical in every way except for shares outstanding. Neither has any preferred stock and neither has issued or repurchased shares in the recent past. Both have Net Income of $10,000, but the first firm has 1,000 shares outstanding while the second has ten thousand shares outstanding. The first firm's EPS will be ten times that of the second, even though there are literally no other differences between the firms.

The only way to draw meaningful comparisons between earnings of different firms is to take the shares outstanding out of the picture in some way. This can easily be accomplished by comparing earnings growth rates or earnings yields or many other transformations of earnings.

It is incredibly easy to find examples that prove this misunderstanding. For the sake of brevity, we will only provide one. Stocks.About.Com correctly points out that comparing stock prices is meaningless and that comparing total earnings of firms is also meaningless. However, it then instructs readers that the solution to both of these problems is to compare the EPS of firms. This is obviously incorrect.

CONCLUSION

There are two major issues with both formal and informal education about Earnings per Share. First, there are four "competing" versions of the EPS formula in wide use, even though one specific formula has been mandated by ASC 260 and is therefore clearly "correct."

Second, there is the widespread belief that EPS can be used for cross-sectional comparisons of firms' earnings. Due to the fact that EPS depends on Shares Outstanding, which is a choice variable for the firm, this is incorrect. In order to compare earnings, the inherent bias of the firm's choice of shares must be removed from the equation. This can be accomplished through the use of earnings growth rates or various transformations of earnings such as the earnings yield.

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APPENDIX

Table A1
TOP 20 RATIOS BY DEGREE OF CONSENSUS
(Mankin & Jewell, 2014)

RANK	RATIO NAME	RATIO FORMULA	PERCENT	TOTAL VERSIONS
1	Current Ratio	rrent Assets / Current Liabilities	100.00%	1
	Gross Profit Margin	Gross Profit / Sales	100.00%	1
	Dividend Yield	ends Per Share / Market Price	100.00%	1
	Market to Book	Market Price / Book Value	100.00%	1
5	Debt Ratio	Debt / Assets	96.00%	3
6	PE Ratio	Market Price / EPS	95.08%	4
7	Net Profit Margin (Return on Sales)	NI / Sales	90.91%	3
8	Debt to Equity	Debt / Equity	87.76%	3
9	Times Interest Earned	EBIT / Interest Expense	82.35%	4
10	Fixed Asset Turnover	Sales / Fixed Assets	73.33%	2
11	Earnings Per Share (EPS)	NI – Preferred Dividends) / WAvg Common Shares	64.29%	2
12	Total Asset Turnover	Sales / Assets	59.32%	4
13	Return on Equity (ROE)	NI / Equity	57.63%	5
14	Dividend Payout	Dividends Per Share / EPS	56.25%	3
15	Quick Ratio	Cash + AR + Mkt Sec) / Current Liabilities	49.28%	4
16	Receivables Turnover	Sales / Average AR	46.00%	6
17	Days Sales in Inventory (DSI)	365 / Inventory Turnover	45.95%	5
18	Days Sales Outstanding (DSO)	365 / Receivables Turnover	45.90%	5
19	Inventory Turnover	COGS / Average Inventory	44.44%	4
20	Return on Assets (ROA)	NI / Assets	40.00%	11
			Minimum	1
			Maximum	11
			Mean	3.60
			Median	3.50
			Mode	4.00

AR = Accounts Receivable COGS = Cost of Goods Sold
EBIT = Earnings Before Interest and Taxes EPS = Earnings Per Share
Mkt Sec = Marketable Securities NI = Net Income
WAvg = Weighted Average

Table A2
TOP 20 RATIOS BY FREQUENCY OF APPEARANCE IN COLLEGE TEXTBOOKS
(Mankin & Jewell, 2014)

RANK	RATIO NAME	FREQUENCY	PERCENT OF BOOKS
1	Current Ratio	74	96.10%
2	Inventory Turnover	72	93.51%
3	Return on Assets (ROA)	70	90.91%
4	Quick Ratio	69	89.61%
5	Times Interest Earned	68	88.31%
6	Net Profit Margin (Return on Sales)	66	85.71%
7	Days Sales Outstanding (DSO)	62	80.52%
8	PE Ratio	61	79.22%
9	Total Asset Turnover	60	77.92%
	Return on Equity (ROE)	60	77.92%
11	Receivables Turnover	51	66.23%
	Debt Ratio	51	66.23%
13	Debt to Equity	49	63.64%
14	EPS	42	54.55%
15	Days Sales in Inventory (DSI)	37	48.05%
	Gross Profit Margin	37	48.05%
17	Dividend Payout	32	41.56%
18	Dividend Yield	31	40.26%
	Fixed Asset Turnover	31	40.26%
20	Market to Book	28	36.36%
	Total Ratios	1,051	

Table A3
TOP 20 HIGHEST RATED FINANCIAL RATIOS BY ANALYSTS
(Gibson, 1987)

Rank	Ratio Name	Significance (0-9)
1	Return on Equity After Tax	8.21
2	Price / Earnings Ratio	7.65
3	Earnings Per Share	7.58
4	Net Profit Margin After Tax	7.52
5	Return on Equity Before Tax	7.41
6	Net Profit Margin Before Tax	7.32
7	Fixed Charge Coverage	7.22
8	Quick Ratio	7.10
9	Return on Assets After Tax	7.06
	Times Interest Earned	7.06
11	Debt to Equity Ratio	7.00
12	Return on Total Invested Capital After Tax	6.88
13	Stock Price / Book Value	6.75
14	Degree of Financial Leverage	6.61
15	Long-Term Debt / Total Invested Capital	6.52
16	Debt / Assets	6.50
17	Total Debt / Total Assets	6.42
18	Return on Total Invested Capital Before Tax	6.40
19	Degree of Operating Leverage	6.36
20	Current Ratio	6.34

INFLUENCE OF THE AUDIT MARKET SHIFT FROM BIG 4 TO BIG 3 ON AUDIT FIRMS' INDUSTRY SPECIALIZATION AND AUDIT QUALITY: EVIDENCE FROM JAPAN

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Frendy, Nagoya University

ABSTRACT

This study aims to empirically examine the influence of the increased audit market concentration in the Japanese Big N audit market from Big 4 to Big 3 in 2007 following the dissolution of PricewaterhouseCoopers ChuoAoyama on audit quality and audit firm industry specialization. Consistent with previous studies, this study employs absolute discretionary accruals as a proxy for audit quality along with six proxy variables for audit industry specialization.

Using a sample of publicly listed Japanese firms with a total of 11,813 observations for fiscal years 2001 to 2006 (Big 4 period) and 2008 to 2012 (Big 3 period), this study finds that Japanese auditors perform higher quality audits during the Big 3 period after 2007. Specifically, our study finds a positive association between higher audit concentration during the Big 3 period and audit quality.

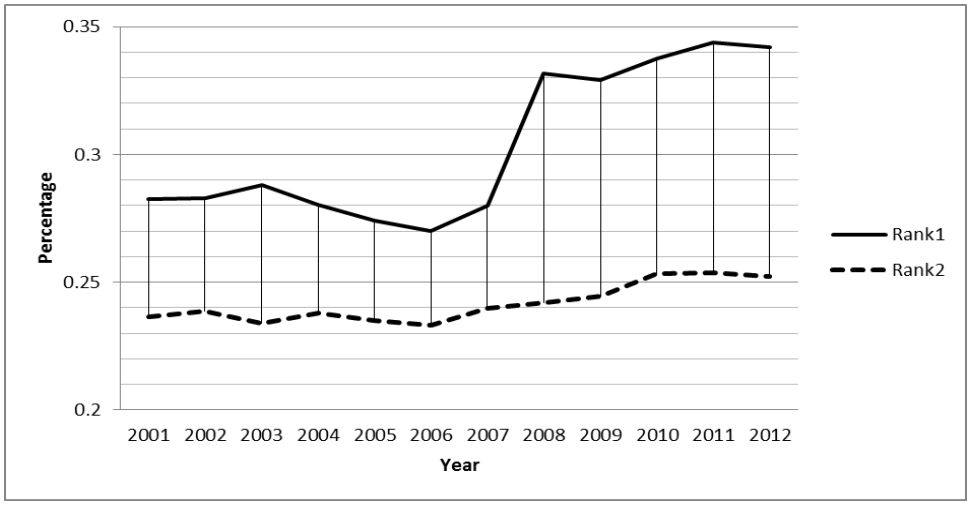
This study also shows that a highly concentrated audit market has a positive effect on industry specialization and audit quality, in which audit quality of industry-specialized auditors increases at a higher rate than that of non-industry-specialized auditors during the Big 3 period compared to the Big 4 period.

INTRODUCTION

The first general standard of Generally Accepted Auditing Standard (GAAS) clearly defines the importance of maintaining an adequate level of audit expertise (AICPA 2001). To maintain audit quality, auditors are especially concerned with retaining audit expertise in a competitive audit market. One way auditors can accumulate such expertise is by increasing their competitive advantage in providing industry specialized audits.

Figure 1 shows the time series graphs of the average audit market shares for the first and second largest Japanese Big N audit firms (in terms of industry specialization) from fiscal year 2001 to 2012. The Rank1 line represents the average market share of the largest audit firm while the Rank2 line denotes the average market share of the second largest audit firm. A dramatic change in the market share can be observed after the demise of PwC ChuoAoyama in 2007 that might affect the quality of audit services provided by Big N firms to Japanese listed companies.

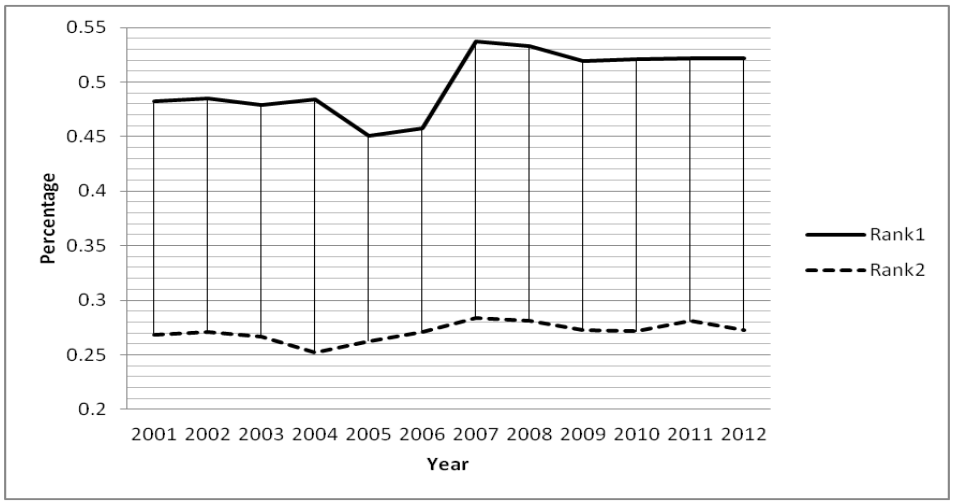
Figure 1A
INDUSTRY AVERAGE MARKET SHARES FOR THE FIRST AND SECOND LARGEST JAPANESE AUDITORS (NUMBER OF CLIENTS)



Note: Rank1 = industry average market share (number of clients) of the largest audit firm
Rank2 = industry average market share (number of clients) of the second largest audit firm

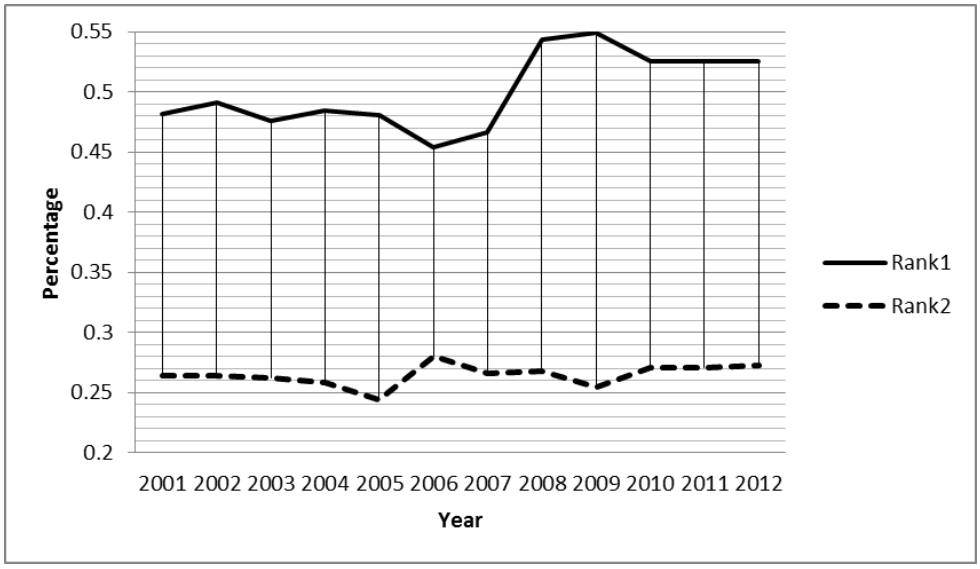
From Figure 1A, we can observe that market share difference between Rank1 and Rank2 firms has increased since 2007. From 2001-2007, there was a relatively small market share gap between Rank1 and Rank2 firms. From 2008 onwards however, the market share gap between Rank1 firms and Rank2 firms has been steadily increasing. We include additional measures of audit market share using clients' total sales (Figure 1B) and assets (Figure 1C) to complement the client number index in Figure 1A. Figures 1B and 1C show similar trends, despite using different measures of audit market share.

Figure 1B
INDUSTRY AVERAGE MARKET SHARES FOR THE FIRST AND SECOND LARGEST JAPANESE AUDITORS (CLIENTS SALES)



Note: Rank1 = industry average market share (clients sales) of the largest audit firm
Rank2 = industry average market share (clients sales) of the second largest audit firm

Figure 1C
INDUSTRY AVERAGE MARKET SHARES FOR THE FIRST AND SECOND LARGEST JAPANESE AUDITORS (CLIENTS' ASSETS)



Note: Rank1 = industry average market share (clients assets) of the largest audit firm
Rank2 = industry average market share (clients assets) of the second largest audit firm

The substantial market share gap between the first and second largest Big N auditors before and after 2007 from the prior three figures (Figure 1A, 1B and 1C) indicates a significant change in the state of Japanese audit market competition following the transition from Big 4 to Big 3 in 2007. Unlike audit market in other developed economies that is still dominated by Big 4, this study exploits the distinct characteristic of the Japanese audit market as the only large developed economy where Big 3 auditors control the majority of the national audit market share. This study aims to analyze the influence of a major Big N firm's market exit on auditors' industry specialization and audit quality.

Accounting researchers have shown high interest in the topic of auditors' industry specialization in recent years. To this end, we conduct a full text search to search the number of peer-reviewed articles containing the keywords "auditor" and "industry specialization" that has been published for the last 6 years (2009-2014) using the ProQuest Central academic database, which includes the ABI/INFORM database. The search reveals that the number of published articles discussing auditors' industry specialization has steadily increased over the last 5 years, with 24 articles published in 2009, 35 articles published in 2010, 44 articles published in 2011 and 2012, 39 articles published in 2013, and 52 articles published in 2014. From those numbers, the top six accounting journals (AJPT, Accounting Horizons, TAR, CAR, JAR, and JAE) published 39 papers from 2009 to 2011 and 24 papers from 2012 to 2014. This study contributes to the auditing literature in two important points. First, our study provides important contribution to the lack of empirical literature examining Japanese audit firm industry specialization. Fujiwara (2012) examines the extent of Japanese auditors' industry specialization from 2003 to 2011 using the within-industry market share approach. This study extends Fujiwara's (2012) study by providing empirical evidence that a significant change in the audit market following the exit of a Big N affects auditors' industry specialization, which in turn influences audit quality. Second, our study utilizes the distinctive setting of Japanese audit market transition from Big 4 to Big 3

in 2007 to examine its influence on auditors' industry expertise and audit quality. The results of our study can be generalized to predict the potential effect of an audit market transition from Big 4 to Big 3 on auditor's industry specialization and audit quality in other developed countries with similar institutional characteristics as Japan, such as Germany.

This study finds that market competition among the largest Japanese audit firms intensified after the demise of PwC ChuoAoyama in 2007 and there is evidence that the audit quality of Japanese Big N auditors is higher during the Big 3 period (2008-2012) compared to the prior Big 4 period (2001-2006). In addition, this study also finds that not all Big N auditors show equal increase in audit quality. Industry-specialized (IS) Big N auditors show a higher increase in audit quality compared to their non-industry specialized (non-IS) peers in the Big 3 period (2008-2012).

The remainder of this paper is structured as follows: Section 2 reviews previous literature on audit quality and industry specialization and develops the hypotheses. Section 3 describes the research design explaining the details of six proxy variables for audit firms' industry specialization, audit quality, regression model, and sample selection. Section 4 shows descriptive statistics, regressions, and audit fee premium analysis results. Section 5 provides the robustness tests results, before the conclusion in Section 6.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The literature review and hypotheses are developed in three sections. The first part provides an overview of the competitiveness of the Japanese audit market, followed by a discussion of the audit market competition for IS auditors. The final part examines the existing empirical evidence for the relationship between auditors' industry specialization and audit quality.

Japanese Audit Market Competition

Before 2007, the Big 4 audit firms controlled approximately 80% of the Japanese audit market share based on client numbers (Skinner and Srinivasan 2012). However in 2007, PwC ChuoAoyama was dissolved due to its involvement in the Kanebo accounting fraud, significantly shifting the Japanese audit market share composition from Big 4 to Big 3 audit firms between 2007 and 2008 (Hu and Kato 2014). The largest Big 3 Japanese audit firms that survived post-2007 are Deloitte Tohmatsu, Ernst & Young ShinNihon, and KPMG Azsa. Big 4 post-2007 includes PwC Aarata, although its current market share is significantly smaller compared to the Big 3 firms.

A number of factors have increased the competition among the Big 3 in the Japanese audit market after PwC ChuoAoyama's dissolution in 2007. First, Japanese companies were pressuring their auditors to decrease their audit fees, decreasing the fees paid by the 300 major listed companies in fiscal year 2009 by 2% compared to the previous period (Nihon Keizai Shinbun 2010a). Second, higher costs decreased audit firms' income. From a survey of auditors from 49 companies conducted in fiscal year 2008, audit firms' income decreased by 29% compared to the previous year (Nihon Keizai Shinbun 2010b). Audit firms attributed this lower income to higher audit personnel-related expenses. Third, former clients of PwC ChuoAoyama that had to switch auditors did not necessarily switch to one of the remaining Big 3 auditors (Morita 2011). A number switched to smaller non-Big 3 firms, diminishing Big N firms' market share as a whole.

Relationship Between Audit Market Competition and Audit Quality

Unlike other professional service industries, capital market regulations create the market for audit services which is then subject the supply and demand forces of the market (Huber 2015). When a client has not yet chosen its auditor, the bargaining power of all auditors is equal and the audit market is in a state of perfect competition (Weinstein 1987). Porter (1985) postulates that in a state of perfect competition, a company can choose to pursue either a differentiation or cost strategy, so audit firms in such a market can increase their market share using either of these strategies. However, audit firms can choose to engage in both strategies simultaneously, where audit firms assume a certain competitive strategy for each industry (Cahan et al. 2011). Audit firms with a significant market share within an industry significantly increases the probability that the firm has developed an audit approach specifically adapted to that industry in order to maintain a competitive advantage over other audit firms (Beelde 1997). A competitive audit market is also necessary to maintain high audit quality. Using empirical data from 42 countries, the unequal market concentration of the Big 4 auditors shows a negative effect on earnings quality (Francis et al. 2013). Accounting regulators and standard setters are especially concerned over the lack of choice for large company audits (Kend et al. 2014).

From the perspective of a differentiation strategy, Big 4 auditors earned audit fee premiums, indicating audit service differentiation among the large audit firms in a competitive audit market (Hamilton et al. 2008). If an audit firm pursues a differentiation strategy, the firm can accumulate in-depth technical audit knowledge on a particular industry group (Habib 2011), usually capturing substantial market share within an industry by having a small proportion of large clients (Cahan et al. 2011). Audit firms benefit from industry specialization because auditors have an incentive to align their audit expertise with specific client characteristics (Dunn and Mayhew 2004), which are often shared among clients within an industry. IS auditors can more effectively tailor their audit program for a certain industry group. Dunn and Mayhew (2004) demonstrated that clients from distinct industry groups exhibit different reporting behavior when audited by IS auditors, finding that clients of IS auditors have higher disclosure quality when they engage in unregulated industries (manufacturing, trading, extraction, and services) compared those working within regulated industries (utilities, transportation, communication, and finance).

Alternatively, audit firm can pursue a low cost strategy, aiming to expand market share across industry groups to minimize audit costs through economies of scale. Auditors pursuing a low cost strategy generally gain market share by providing low-cost audit services to a large number of small clients within an industry. Audit firms that increase the economies of scale of their audit services can improve their audit firm industry specialization as measured by market share (Danos and Eichenseher 1982). Prior studies into audit fees in the Japanese market concluded that as auditors develop higher market share in a particular industry, they develop industry-specific audit expertise, ultimately reducing audit costs (Fukukawa 2011). Auditors can increase their market share without earning additional fee premiums, further suggesting that they are pursuing a low cost strategy (Mayhew and Wilkins 2003).

IS audit firms have several advantages: increased demand for audit and non-audit services, improved audit efficiency through higher economies of scale, a higher barrier to entry and expansion for competing audit firms, stronger risk aversion for fear of reputation loss, and improving client audit quality (Habib 2011). Clients assume that they can obtain a high-quality audit if they are audited by IS audit firms with a high degree of audit knowledge relevant for their industry.

The dissolution of PwC ChuoAoyama in 2007 significantly disrupted the composition of the Japanese audit market, as their former clients had to hire another auditor. Existing Japanese audit firms are pressured to retain existing clients while obtaining as many new clients as possible, thus contributing to the more competitive Japanese audit market. Furthermore, Japanese auditors faced more stringent audit regulations following the 2006 amendment of Financial Instruments and Exchange Law and stricter JICPA self-regulations. We argue that a more competitive audit market and stricter audit regulatory environment following the audit market transition from Big 4 to Big 3 positively contribute to a higher audit quality. Thus, we hypothesize that the remaining Big N auditors have higher audit quality during the Big 3 period (post 2007) compared to the prior Big 4 period (pre 2007).

H1: The average audit quality among Big N auditors post-2007 is higher compared to the pre-2007 period.

Relationship between Auditors' Industry Specialization and Audit Quality

Big N audit firms must obtain a high level of industry specific audit expertise in a competitive market. Existing empirical evidence shows that audit firms' market share is not evenly distributed among the large auditors (Francis 2004). Most existing empirical research suggests that IS auditors are expected to perform higher quality audits compared to non-IS auditors (Balsam et al. 2003; Chin and Chi 2009; Dunn and Mayhew 2004; Krishnan 2003; Kwon et al. 2007; Lim and Tan 2008; Reichelt and Wang 2010; Romanus et al. 2008). IS auditors have more incentives to maintain their reputation as industry specialists from the increased potential to retain larger audit fee premiums (Craswell et al. 1995). In addition, IS auditors with a large market share across diverse industry groups have stronger incentives to conduct high quality audits compared to non-IS auditors due to the risk of earning a bad reputation, as disreputable auditors lose clients or must reduce their audit fees.

A number of papers examined the relationship between audit firms' industry expertise and audit quality. Balsam et al. (2003) and Krishnan (2003) demonstrated that IS audit firms reduced their clients' discretionary accruals more effectively compared to non-IS auditors. Gul et al. (2009) examined the influence of auditors' industry specialization on the relationship between audit duration and audit quality, concluding that clients of IS auditors have a weaker association between shorter auditor tenure and lower earnings quality. This finding suggests that IS auditors are more likely to detect and correct financial irregularities despite not having sufficient client-specific knowledge commonly acquired from a longer audit tenure. Clients of specialist auditors are also less likely to meet or beat analyst forecast, implying higher earnings quality (Payne 2008).

Lim and Tan (2008) investigated whether auditor industry specialization affects the relationship between non-audit-related fees and audit quality by employing three proxies for audit quality: higher propensity to issue a going concern opinion, higher earnings response coefficients, and a higher rate of missing analysts' forecast. They found that IS auditors' audit quality is more positively related to the level of non-audit services compared to non-specialist auditors, suggesting that industry specialist auditors retained a higher degree of audit independence compared to non-specialists. Reynolds and Francis (2001) argue that auditors are more likely to employ stricter audit procedures and issue more conservative audit reports while auditing large clients to minimize litigation risk.

Following the dissolution of Arthur Andersen in 2001 that reduced the Big 5 auditors to only four firms, the proportion of US clients appointing IS auditors increased from 38 percent in 2001 to 48 percent the following year (Scott and Gist 2013). The increase of demand for IS auditors indicate more intense competition among industry specialized auditors. This study finds similar results for IS auditors in Japan. The average market share of Japanese IS auditors during the Big 4 period (2001 to 2006) is 33.61% and this figure increases significantly to 42.89% during the Big 3 period (see Table 3). Consistent with Scott and Gist's (2013) finding, Japanese clients show higher demand for auditors with industry expertise in the Big 3 post-2007 period compared to before 2007. In order to maintain the industry market share leadership in the intense competition environment, industry specialized Big 3 have more incentives to attract new clients by improving their audit quality. Prior studies conclusively show that IS auditors provide higher quality audits compared to non-IS auditors. Thus, we argue that IS auditors have more incentives to increase their audit quality compared to non- specialized auditors in the more competitive Big 3 period (after 2007) compared to prior Big 4 (before 2007) and we propose the following hypothesis:

H2: The difference in audit quality between IS (industry-specialized) and non-IS (non-industry-specialized) auditors is larger during the Big 3 period (post-2007) compared to the Big 4 period (pre-2007).

RESEARCH DESIGN AND SAMPLE

Determination of Audit Firms' Industry Specialization

It is difficult to directly observe auditors' industry specialization. Previous studies employed proxies, as it is difficult to determine whether auditors with strong industry specialization are affected by their audits of a few large clients (Gramling and Stone 2001; Krishnan 2003). However, there is no conclusive consensus on the most appropriate variable to use.

Neal and Riley (2004) identified two main approaches to measure auditor industry specialization: the market share approach (within-industry differentiation across competing audit firms) and the portfolio share approach (within-audit firm differentiation across industries). This study adopts the market share approach since audit fee data for publicly listed Japanese firms is only available from fiscal year 2005 and uses this for the sample observed for period 2001-2012. In addition, the robustness tests in Section 5 (see Table 10) employ audit fees as an alternative proxy for industry specialization.

The study uses six proxies of audit firms' industry specialization for empirical analysis: auditors' market share is measured by sales, total assets, and number of clients (represented with either continuous or dummy variable). Most previous studies employ auditors' market share within each industry group as a proxy for auditors' industry specialization, though there are many to choose from, such as the most widely used method, clients' sales (Dunn and Mayhew 2004; Krishnan 2003; Kwon et al. 2007; Lim and Tan 2008; Romanus et al. 2008), as defined in the following equation:

$$SHARE_{ik} = \frac{\sum_{j=1}^{J_{ik}} SALES_{ijk}}{\sum_{i=1}^{I_k} \sum_{j=1}^{J_{ik}} SALES_{ijk}}$$

where: *i* is the auditor name, *j* is the client name, and *k* is the industry group.
The numerator represents the total sales of all of an audit firm's clients in an industry, while the denominator is the sum of the sales of all sample clients in the industry.

In a study examining the Japanese audit market, Fujiwara (2012) employs auditors' market share (by clients' total assets) in each industry group to measure auditor specialization. By replacing total sales with total assets, we use the second proxy variable SHARE2 to measure an auditor's market share using the clients' total assets:

$$SHARE2_{ik} = \frac{\sum_{j=1}^{J_{ik}} ASSET_{ijk}}{\sum_{i=1}^{I_k}\sum_{j=1}^{J_{ik}} ASSET_{ijk}}$$

where: *i* is the auditor name, *j* is the client name, and *k* is the industry group.

For the third proxy variable, we use the LEADER dummy variable that takes a value of 1 for clients of audit firms with the largest market share as defined by the SHARE variable (total sales) and 0 otherwise (Balsam et al. 2003). The LEADER2 dummy variable is the fourth proxy, similarly calculated as the LEADER variable, except using the SHARE2 variable (total assets) as the measure of audit market share.

However, Chin and Chi (2009) argue that the clients' sales variable does not accurately portray the accumulated industry specific audit knowledge if the auditors audit many small clients. Balsam et al. (2003) and Chin and Chi (2009) argue that auditors' industry market share is better represented by the number of clients. Based on these studies, the fifth auditor industry specialization proxy variable, SHARECL, is defined as:

$$SHARECL_{ik} = \frac{\sum_{j=1}^{J_{ik}} CLIENTS_{ijk}}{\sum_{i=1}^{I_k}\sum_{j=1}^{J_{ik}} CLIENTS_{ijk}}$$

where: *i* is the auditor name, *j* is the client name, and i is the industry group.

For the sixth proxy variable, the MOSTCL dummy variable measures the auditors' rank in terms of market share as defined by the SHARECL (number of clients) variable within the industry group. It takes the value of 1 for the audit firm with the largest number of clients and 0 for all others within the industry.

Measurement of Audit Quality

Consistent with previous studies, this study uses discretionary accruals as a proxy for audit quality. Audit quality can be measured through changes in the extent of accounting earnings management. Discretionary accruals are defined as estimated accounting accruals deliberately generated by management (Jones 1991). A higher-quality audit is expected to minimize the amount of discretionary accruals. We employ the CFO modified Jones model to calculate discretionary accruals as a proxy for audit quality (Kasznik 1999; Lawrence et al. 2011) because it is better suited for the Japanese market compared to other Jones models (Suda and Shuto 2004), where the variables are divided by average total assets$_t$:

$$\frac{TACC_{i,t}}{aveASSET_{i,t}} = \alpha + \beta_1\left(\frac{1}{aveASSET_{i,t}}\right) + \beta_2\left(\frac{\Delta SALES_{i,t}}{aveASSET_{i,t}} - \frac{\Delta REC_{i,t}}{aveASSET_{i,t}}\right) + \beta_3\frac{PPE_{i,t}}{aveASSET_{i,t}} + \beta_4\frac{\Delta CFO_{i,t}}{aveASSET_{i,t}} + \varepsilon_{i,t} \quad (1)$$

where, *aveASSET* is the average total assets$_t$.

Table 1 summarizes the variables defined for Equation 1. Discretionary accruals are calculated by deducting non-discretionary accruals from total accounting accruals. A positive sign of the discretionary accruals variable implies that management intentionally increases accounting earnings management. On the other hand, a negative sign suggests that management decreases the extent of accounting earnings management. In this paper, we use the absolute value of *ADA* (absolute discretionary accruals) as a proxy variable for audit quality because the research questions and hypotheses are not concerned with specific directions in earnings quality affected by earnings management (Balsam et al. 2003; Hribar and Nichols 2007). Absolute discretionary accruals better capture the variance in earnings quality since firms can engage in either positive or negative earnings management.

Table 1
VARIABLES DEFINITION

Equation 1	
TACC	Total accounting accruals = After tax ordinary income – Cash flow from operating activities
$\Delta SALES$	Increase in sales = Current sales – Previous period sales
ΔREC	Increase in trade receivables = Current year-end account receivables - Previous year-end account receivables
PPE	Fixed assets depreciation
ΔCFO	Increase in cash flows from operating activities = Current cash flows from operating activities – Previous period cash flows from operating activities
aveASSET	Average total assets
Equation 2	
ADA	Absolute value of discretionary accruals
DEMISED	Dummy variable that takes a value of 1 if the observation period of the sample belongs to the period after PwC ChuoAoyama's dissolution (from fiscal year 2008 to 2012) and takes 0 if the sample belongs to the periods of before PwC ChuoAoyama's demise (from fiscal year 2001 to 2006)
SP	6 proxy variables of industry specialization discussed in Section 3.1 (*LEADER*, *LEADER2*, *SHARE*, *SHARE2*, *MOSTCL*, and *SHARECL*)
CFO	Cash flows from operating activities
ln ASSET	Natural logarithm of total assets
LEV	Debt leverage ratio = Total liabilities
abs (TACC)	Absolute value of total accounting accruals
Index (i,t)	Company *i*, Year *t*
Robustness Tests	
AUDCHANGE	Dummy variable that takes a value of 1 if the number of consecutive years during which an audit client employs the same auditor is less than 3 years and 0 otherwise

Regression Analysis

The study uses OLS regression to test both hypotheses using the regression model depicted in Equation 2. The three main dummy variables are: the *DEMISED* dummy which takes a value of 1 if the observation period of the sample belongs to the period of after PwC ChuoAoyama's dissolution (from fiscal year 2008 to 2012) and takes 0 if the sample belongs to the periods of before PwC ChuoAoyama's demise (from fiscal year 2001 to 2006); the audit

firms' industry specialization (*SP*) variable represents the six proxy variables of industry specialization discussed in the preceding sections, and the cross term of *SP* and *DEMISED*[1].

$$ADA_{i,t} = \beta_0 + \delta_0 DEMISED_{i,t} + \beta_1 SP_{i,t} + \delta_1 DEMISED_{i,t} \times SP_{i,t} + \beta_2 \ln ASSET_{i,t} + \beta_3 CFO_{i,t} + \beta_4 LEV_{i,t} + \beta_5 abs(TACC)_{i,t} + \varepsilon_{i,t} \quad (2)$$

The dependent variable for the regression model is *ADA* as a proxy for audit quality, which is inversely related to audit quality. *SP* is the main variable of interest of our study, representing the six proxy variables of auditor industry specialization. In addition, the effect of outliers is controlled through a 98% winsorization on all regression variables except the SP variable. The year and industry dummy variables are included in the regression estimations.

If δ_0 takes negative value, the absolute value of discretionary accruals diminishes after fiscal year 2007, meaning that hypothesis 1 is supported. According to previous research β_1 should have a negative value (Balsam et al. 2003; Krishnan 2003), meaning that IS auditors conduct higher quality audits. Hypothesis 2 would be confirmed through the value of δ_1. The coefficient of cross term *DEMISED*×*SP*, δ_1 takes a negative value when the incremental improvement in the *ADA* of IS auditors is larger than that of non-IS auditors.

We employ the following control variables in the regression model: *lnASSET, CFO, LEV,* and *abs(TACC)* (Balsam et al. 2003). Previous studies have shown that these variables can affect discretionary accruals (Becker et al. 1998; Reynolds and Francis 2001). *CFO* is the cash flow from operating activities, while *lnASSET* measures company size. In addition, companies with high debt ratios are more likely to engage in earnings management, so *LEV* is incorporated as a control variable to measure a company's debt ratio. It is difficult for external shareholders to distinguish non-discretionary accruals from discretionary accruals, contributing to the inherent uncertainty of reported earnings. To control for accruals generating potential, we include the absolute value of accounting accruals as a control variable, *abs(TACC)* (Becker et al. 1998).

Sample Selection

The company financial and auditor data are obtained from the NEEDS Financial Quest and the eol database, respectively. The initial sample includes all publicly listed Japanese companies audited by large audit firms from fiscal year ending March 31, 2001 to March 31, 2012, excluding those that changed accounting periods or engaged in M&A during the period. The sample period begins in 2001 because Japan underwent major accounting and capital market deregulation (otherwise known as the "Big Bang" accounting reform) in fiscal year 1999 and 2000 (Asami 2006). In addition, we exclude post 2012 data in our paper to control for the regulatory effect on audit quality. In 2013, JICPA issued "Standard to Address the Risks of Fraud in an Audit" that aim to improve audit firm's quality control to address risks of fraud in 2013 (Iyoda et al. 2015). The revised standard is a major audit regulation change that significantly improves audit quality in Japan.

From the initial sample size of 19,435 firm years, we obtained a final sample of 11,813 firm years. Industry samples were selected based on the following criteria. First, almost all IS audit firms are large audit firms. Second, the size of audit firms represents a confounding factor in the analysis that might influence the dependent variable. Auditors' industry specialization affects Big 4 and non-Big 4 firms differently, where the brand reputation of Big 4 firms is a necessary requirement wherein industry specialization improves audit quality (DeFond et al. 2000). Furthermore, globally connected audit firms can more efficiently expand their global

industry specialization compared to non-Big 4 firms (Carson 2009). To control for these two factors, clients audited by small and medium sized audit firms are excluded from the sample.

The study uses consolidated financial statements with annual fiscal years ending in March, and excludes the firms with one of the following characteristics: financial companies (financial services, insurance, banking, and securities companies), companies adopting US GAAP or IFRS standards, companies audited by more than one audit firm (joint audits), and those missing data required for analysis. Data from fiscal year 2007 are excluded to control for the market contagion effect caused by the demise of PwC ChuoAoyama. The following summarizes the sample firms' selection process:

Japanese listed firms for fiscal year 2001-2012 (firm years)		19,435
Less:	Firms audited by non-Big 4 (Big 3) auditors	(3,653)
	Financial companies	(1,438)
	Fiscal year 2007 sample	(1,142)
	Clients with joint auditors	(981)
	Unavailable data	(408)
Final sample (firm years)		11,813

Table 2 illustrates the composition of the final sample classified by industry. The five largest industry groups in consist of electric appliances (10.34%), wholesale trade (10.04%), chemicals (9.36%), machinery (8.52%), and construction (7.83%).

Table 2
SAMPLE CLASSIFIED BY INDUSTRY

Industry	Firm Years	Percentage (%)
Electric Appliances	1,220	10.33%
Wholesale Trade	1,186	10.04%
Chemicals	1,108	9.38%
Machinery	1,008	8.53%
Construction	926	7.84%
Information & Communication	702	5.94%
Services	654	5.54%
Transportation Equipments	640	5.42%
Retail Trade	549	4.65%
Foods	522	4.42%
Land Transportation	474	4.01%
Metal Products	330	2.79%
Other Products	323	2.73%
Glass & Ceramics Products	325	2.75%
Iron & Steel	305	2.58%
Textiles & Apparels	298	2.52%
Pharmaceutical	265	2.24%
Warehousing & Harbor Transportation Services	261	2.21%
Nonferrous Metals	264	2.23%
Precision Instruments	244	2.07%
Real Estate	209	1.77%
Total	11,813	

Table 3 presents the average market share of Big N auditors for the 2001-2012 period, and shows that E&Y ShinNihon had the largest average market share (32.9%), followed by Deloitte Tohmatsu (28.9%), KPMG Azsa (26.07%), and PwC ChuoAoyama (12.13%) in this period. However, this industry market share figure is understated for PwC ChuoAoyama and overstated for other Big N auditors because of the 2007 dissolution of PwC ChuoAoyama. After 2007, the remaining Big 3 industry market shares are E&Y ShinNihon at 37.74%, Deloitte Tohmatsu at 32.43%, and KPMG Azsa at 29.82%.

Table 3
BIG N INDUSTRY MARKET SHARES (NUMBER OF CLIENTS)

Industry	Big N Industry Market Shares (%) 2001 – 2012								Market Shares Proportion from Total Sample (%)	
	E&Y ShinNihon		Deloitte Tohmatsu		KPMG Azsa		PwC ChuoAoyama		Total	
	I	II	I	II	I	II	I	II	I	II
Electric Appliances	**35.25**		*30.41*		22.21		12.13		10.33	
	31.78	**39.39**	*26.36*	*35.25*	19.58	25.36	22.29	-	10.54	10.08
Wholesale Trade	*28.58*		**31.37**		27.49		12.56		10.04	
	24.92	*32.68*	**27.96**	**35.18**	23.32	32.14	23.80	-	9.94	10.15
Chemicals	**39.80**		21.84		*26.08*		12.27		9.38	
	33.55	**47.40**	19.57	24.60	*24.51*	*28.00*	22.37	-	9.66	9.06
Machinery	**37.40**		*26.39*		23.21		13.00		8.53	
	32.68	**43.24**	*23.88*	*29.49*	19.93	27.27	23.52	-	8.85	8.18
Construction	**35.96**		23.54		*29.81*		10.69		7.84	
	30.02	**42.73**	23.94	23.09	*25.96*	*34.18*	20.08	-	7.83	7.85
Information & Communication	*30.06*		**35.75**		19.66		14.53		5.94	
	22.78	*36.81*	**32.84**	**38.46**	14.20	24.73	*30.18*	-	5.37	6.60
Services	*27.83*		**37.00**		22.17		13.00		5.54	
	27.10	*28.49*	**28.39**	**44.77**	17.10	26.74	*27.42*	-	4.92	6.24
Transportation Equipments	**33.44**		*24.53*		23.28		18.75		5.42	
	26.99	**41.32**	21.02	28.82	17.90	*29.86*	**34.09**	-	5.59	5.22
Retail Trade	*28.78*		**38.07**		23.68		9.47		4.65	
	26.30	*31.54*	**34.95**	**41.54**	20.76	26.92	17.99	-	4.59	4.71
Foods	*31.03*		**37.74**		19.92		11.30		4.42	
	26.88	*35.80*	**35.13**	**40.74**	16.85	23.46	21.15	-	4.43	4.41
Land Transportation	**36.71**		17.30		*35.86*		10.13		4.01	
	32.43	**41.86**	16.22	18.60	**32.82**	*39.53*	18.53	-	4.11	3.90
Metal Products	22.73		**34.85**		*25.76*		16.67		2.79	
	18.41	*29.46*	26.37	**48.06**	**27.86**	22.48	*27.36*	-	3.19	2.34
Other Products	26.93		**32.82**		*28.17*		12.07		2.73	
	27.13	26.67	**28.72**	**38.52**	23.40	*34.81*	20.74	-	2.99	2.45
Glass & Ceramics Products	*28.00*		25.23		**29.54**		17.23		2.75	
	26.44	29.80	20.11	*31.13*	21.26	**39.07**	**32.18**	-	2.76	2.74
Iron & Steel	*24.59*		23.61		**28.52**		23.28		2.58	
	18.87	*30.82*	*21.38*	26.03	15.09	**43.15**	**44.65**	-	2.53	2.65
Textiles & Apparels	**35.91**		16.11		**35.91**		12.08		2.52	
	32.94	*39.84*	14.12	18.75	*31.76*	**41.41**	21.18	-	2.70	2.32
Pharmaceutical	*31.32*		**33.21**		23.40		12.08		2.24	
	31.40	*31.25*	24.79	**40.28**	17.36	28.47	*26.45*	-	1.92	2.61

Table 3
BIG N INDUSTRY MARKET SHARES (NUMBER OF CLIENTS)

Warehousing & Transportation Services	25.29		*26.82*		**35.63**		12.26		2.21			
	17.91	*33.07*	*26.12*	27.56	**32.09**	**39.37**	23.88	-	2.13	2.30		
Nonferrous Metals	**39.77**		19.32		16.67		*24.24*		2.23			
	27.89	**54.70**	12.24	*28.21*	16.33	17.09	**43.54**	-	2.33	2.12		
Precision Instruments	18.44		**42.21**		*32.38*		6.97		2.07			
	16.54	20.72	**41.35**	**43.24**	*29.32*	*36.04*	12.78	-	2.11	2.01		
Real Estate	**47.37**		16.27		*28.23*		8.13		1.77			
	36.84	**56.14**	15.79	16.67	*29.47*	*27.19*	17.89	-	1.51	2.07		
Total	**32.90**		*28.90*		26.07		12.13		100			
	28.14	**37.74**	*25.20*	*32.43*	22.07	29.82	24.58	-	100	100		
Average market share of IS auditors during the Big 4 period (Column I)											**33.61**	
Average market share of IS auditors during the Big 3 period (Column II)											**42.89**	

(*) This table describes the audit firms' market share for each industry based on the number of clients. For each industry group and Big N auditor, the value in the first row indicates the audit firms' market shares, and the value in the second row in the first (I) and second (II) column denotes the audit firms' market shares before PwC ChuoAoyama's dissolution (fiscal years 2001 to 2006) and after PwC ChuoAoyama's demise (fiscal years 2008 to 2012), respectively. For each industry group, the bold text identifies the audit firm with the largest market share (industry specialist) while the italics represents the audit firm with the second largest market share.

Note:
Column I = audit firms' market shares before PwC ChuoAoyama's demise (fiscal years 2001 to 2006)
Column II = audit firms' market shares after PwC ChuoAoyama's demise (fiscal years 2008 to 2012)

RESULTS

Descriptive Statistics and Correlation Coefficients

Table 4 shows the descriptive statistics for sample clients with IS and non-IS audit firms. An additional test of the difference of means between the two groups shows a statistically significant difference between them, indicating that there are differences in client characteristics between IS and non-IS auditors. More specifically, IS groups have smaller discretionary accruals (higher audit quality), larger total assets, larger operating cash flow, and a higher debt ratio. These trends are consistent Balsam et al.'s (2003) results from analyzing U.S. companies between 1991 and 1999.

Table 4
DESCRIPTIVE STATISTICS AND DIFFERENCES OF MEANS POOLED SAMPLE

variable	n	Mean	sd	p25	p50	p75
ADA	11,813	0.030	0.030	0.010	0.022	0.041
lnASSET	11,813	11.184	1.410	10.185	11.000	12.061
CFO	11,813	0.057	0.055	0.027	0.056	0.087
LEV	11,813	0.536	0.206	0.383	0.546	0.691
abs(TACC)	11,813	0.043	0.035	0.017	0.035	0.059

LEADER=1						
variable	**n**	**mean**	**sd**	**p25**	**p50**	**p75**
ADA	4,006	0.029	0.028	0.010	0.021	0.040
lnASSET	4,006	11.378	1.512	10.278	11.113	12.334
CFO	4,006	0.059	0.055	0.028	0.057	0.088
LEV	4,006	0.546	0.204	0.402	0.558	0.697
abs(TACC)	4,006	0.044	0.034	0.018	0.036	0.060

LEADER=0							
variable	**n**	**mean**	**sd**	**p25**	**p50**	**p75**	**t-stat**
ADA	7,807	0.031	0.031	0.010	0.022	0.041	-2.590 ***
lnASSET	7,807	11.084	1.344	10.134	10.936	11.901	10.378 ***
CFO	7,807	0.056	0.055	0.027	0.055	0.087	2.364 **
LEV	7,807	0.531	0.207	0.375	0.538	0.688	3.825 ***
abs(TACC)	7,807	0.043	0.035	0.017	0.035	0.058	0.827

*, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively.

Table 5 reports the Pearson and Spearman correlation coefficients, and shows that there is no strong correlation among the 6 market concentration proxy variables. Furthermore, the correlations among the independent variables are generally low, indicating that there is no multicollinearity problem. These results are consistent with Francis et al.'s (2013) findings.

Table 5
PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS (LOWER LEFT) AND SPEARMAN RANK CORRELATION COEFFICIENTS (UPPER RIGHT)

	ADA	LEADER	SHARE	LEADER2	SHARE2	MOSTCL	SHARECL	lnASSET	CFO	LEV	abs(TACC)
ADA	1	-0.013	-0.014	-0.021 **	-0.019 **	0.015 *	0.012	-0.144 ***	-0.020 **	0.022 **	0.378 ***
LEADER	-0.023 *	1	0.784 ***	0.841 ***	0.774 ***	0.420 ***	0.444 ***	0.084 ***	0.018 **	0.037 ***	0.016 *
SHARE	-0.014	0.819 ***	1	0.752 ***	0.981 ***	0.461 ***	0.555 ***	0.122 ***	0.025 ***	0.036 ***	0.033 ***
LEADER2	-0.027 ***	0.841 ***	0.779 ***	1	0.785 ***	0.365 ***	0.381 ***	0.095 ***	0.007	0.041 ***	0.013
SHARE2	-0.017 *	0.806 ***	0.980 ***	0.822 ***	1	0.436 ***	0.541 ***	0.126 ***	0.020 **	0.038 ***	0.032 ***
MOSTCL	0.006	0.420 ***	0.453 ***	0.365 ***	0.419 ***	1	0.690 ***	0.006	0.024 ***	-0.005	0.034 ***
SHARECL	0.015	0.407 ***	0.524 ***	0.344 ***	0.497 ***	0.682 ***	1	0.004	0.033 ***	-0.026 ***	0.059 ***
lnASSET	-0.164 ***	0.098 ***	0.130 ***	0.112 ***	0.134 ***	0.006	0.014	1	0.079 ***	0.160 ***	-0.044 ***
CFO	-0.044 ***	0.026 ***	0.034 ***	0.013	0.032 ***	0.025 **	0.035 ***	0.071 ***	1	-0.241 ***	0.424 ***
LEV	0.035 ***	0.035 ***	0.018 *	0.039 ***	0.017 *	-0.007	-0.030 ***	0.185 *	-0.222 ***	1	0.014
abs(TACC)	0.635 ***	0.008	0.030 ***	0.004	0.030 ***	0.030 ***	0.063 ***	-0.077 ***	0.315 ***	0.024 *	1

*, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively.

Discretionary Accruals Model

The regression model from Equation 2 is estimated to test hypotheses 1 and 2. Table 6 provides the results of the multivariate regression analysis with the absolute value of *ADA* as the dependent variable[2].

Table 6
MULTIVARIATE REGRESSION RESULTS FOR THE 2001-2012 SAMPLE

$$ADA_{i,t} = \beta_0 + \delta_0 DEMISED_{i,t} + \beta_1 SP_{i,t} + \delta_1 DEMISED_{i,t} \times SP_{i,t} + \beta_2 \ln ASSET_{i,t} + \beta_3 CFO_{i,t} + \beta_4 LEV_{i,t} + \beta_5 abs(TACC)_{i,t} + \varepsilon_{i,t}$$

Variable	Predicted Sign	*LEADER*			*LEADER2*			*SHARE*		
		Coef.	t-stat		Coef.	t-stat		Coef.	t-stat	
Intercept		0.027	13.53	***	0.027	13.50	***	0.027	13.43	***
DEMISED	-	-0.002	-2.56	**	-0.002	-2.49	**	-0.002	-2.74	***
SP	-	0.000	0.78		0.000	0.53		0.000	0.18	
SP×demised	-	-0.001	-1.68	*	-0.001	-1.98	**	-0.001	-1.69	*
lnASSET	-	-0.001	-9.50	***	-0.001	-9.41	***	-0.001	-9.42	***
CFO	-	-0.071	-19.82	***	-0.071	-19.83	***	-0.071	-19.82	***
LEV	-	0.003	-3.20	***	0.003	-3.22	***	0.003	-3.21	***
abs(TACC)	+	0.307	56.43	***	0.307	56.43	***	0.307	56.42	***
industry dummy		Yes			Yes			Yes		
year dummy		Yes			Yes			Yes		
Adj. R^2		0.483			0.483			0.483		
F-value		131.03		***	131.11		***	131.00		***
N		11,813			11,813			11,813		

Variable	Predicted Sign	*SHARE2*			*MOSTCL*			*SHARECL*		
		Coef.	t-stat		Coef.	t-stat		Coef.	t-stat	
Intercept		0.027	13.39	***	0.027	13.52	***	0.026	11.67	***
DEMISED	-	-0.002	-2.62	***	-0.002	-2.59	**	-0.002	-2.90	***
SP	-	0.000	0.22		0.001	1.05		0.006	1.56	
SP×demised	-	-0.001	-2.04	**	-0.001	-1.70	*	-0.001	-1.92	*
lnASSET	-	-0.001	-9.36	***	-0.001	-9.60	***	-0.001	-9.57	***
CFO	-	-0.071	-19.83	***	-0.071	-19.83	***	-0.071	-19.81	***
LEV	-	0.003	-3.23	***	0.003	-3.18	***	0.003	-3.18	***
abs(TACC)	+	0.307	56.42	***	0.307	56.42	***	0.307	56.39	***
industry dummy		Yes			Yes			Yes		
year dummy		Yes			Yes			Yes		
Adj. R^2		0.483			0.483			0.483		
F-value		131.10		***	131.01		***	131.06		***
N		11,813			11,813			11,813		

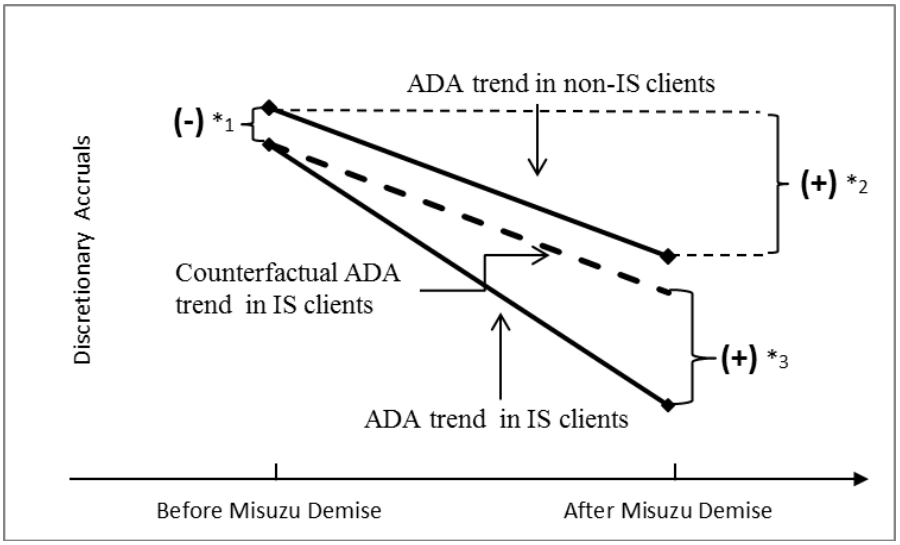
*, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively.

The multivariate regression results in Table 6 show that the estimated *DEMISED* variable coefficients (δ_0) show negative and statistically significant values for all six *SP* proxy variables during the entire period. These results support hypothesis 1 that the audit quality (measured by the absolute value of discretionary accruals) of Big N auditors post-2007 is higher than the pre-2007 period. In addition, δ_0 is also negative for all 6 models. This coefficient captures the difference in non-IS auditor's *ADA* (or counterfactual *ADA* differences of IS auditors) before and after 2007, which implies that the PwC ChuoAoyama's demise may have improved audit quality for non-IS auditors, though the increment is smaller than for IS-auditors by the same value as for δ_1.

Furthermore, the $DEMISED \times SP$ interaction variable coefficients (δ_1) are negative and statistically significant for all *SP* proxy variables. The coefficient δ_1 is significantly negative for all six proxy *SP* variables, meaning that the higher concentration of Big N auditors following the dissolution of PwC ChuoAoyama improved the audit quality for IS auditors, supporting hypothesis 2. These findings suggested that IS auditors show significantly higher marginal increases in audit quality compared to non-IS auditors. The coefficient signs of the *lnASSET*, *CFO*, *LEV,* and *abs(TACC)* control variables for all six *SP* variables are consistent with Balsam et al. (2003).

Figure 2 summarizes the empirical results in Tables 6. The coefficients of the *SP* variables in Table 6 show no significant difference in audit quality between IS and non-IS auditors (represented as the *1 gap, the vertical distance between the *ADA* trend of IS and non-IS clients before PwC ChuoAoyama dissolution). However, as the audit market grew more concentrated and industry specialization increased due to shift from Big 4 to Big 3, the results show two simultaneous effects on audit quality. First, audit quality for both IS and non-IS auditors improved (represented as *2, the vertical distance of the *ADA* trend for non-IS clients between the period before and after 2007 in Figure 2, and the δ_0 coefficients in Table 6). These results support hypothesis 1. Second, the marginal increase in audit quality for IS auditors is higher than for non-IS auditors (represented as *3, the vertical distance between the counterfactual *ADA* trend for IS and non-IS clients after 2007 in Figure 2, and the δ_1 coefficients in Table 6), supporting hypothesis 2[3].

Figure 2
AUDIT QUALITY CHANGE BEFORE AND AFTER PWC CHUOAOYAMA'S DISSOLUTION



Note: This figure summarizes the results obtained in this section. We checked four types of differences using DID and OLS (after PwC ChuoAoyama's demise) analysis.
(-) indicates no significant difference, and (+) indicates a significant difference.
1* Coefficient of *SP* (β_1) from the DID regression model (Equation 2 and Table 6)
2* Coefficient of *DEMISE* (δ_0) from the DID regression model (Equation 2 and Table 6)
3* Coefficient of *SP*×*DEMISE* (δ_1): treatment effect) from the DID regression model (Equation 2 and Table 6)

ROBUSTNESS TESTS

We conducted additional robustness tests to verify the results of previous statistical analysis. Previous research shows that longer tenures are related to lower discretionary accruals (Myers et al. 2003). Gul et al. (2009) show that auditors with longer tenures have higher audit quality, though not for IS clients. In addition, the result of improved audit quality of IS auditors can be attributed to the changes of its client portfolio, and not because IS auditors have conducted a high quality audit for their clients. In order to control for the possible effects of client characteristics and auditor change on the significant result of hypothesis 2, Equation 2 was re-estimated with an *AUDCHANGE* control dummy variable (refer to Table 1 for definition of the variable). Table 7 reports the results, and indicates that the implications from Tables 6 and 7 are qualitatively consistent.

Table 7
MULTIVARIATE REGRESSION RESULTS FOR THE 2001-2012 SAMPLE (EMPLOYING THE AUDCHANGE CONTROL VARIABLE)

Variable	Predicted Sign	*LEADER*			*LEADER2*			*SHARE*		
		Coef.	t-stat		Coef.	t-stat		Coef.	t-stat	
Intercept		0.027	13.43	***	0.027	13.40	***	0.027	13.29	***
Demised	-	-0.002	-2.48	**	-0.002	-2.41	**	-0.002	-2.55	**
SP	-	0.000	0.81		0.000	0.57		0.000	0.23	
SP×demised	-	-0.001	-1.72	*	-0.001	-2.02	**	-0.001	-1.97	**
lnASSET	-	-0.001	-9.39	***	-0.001	-9.30	***	-0.001	-9.25	***
CFO	-	-0.071	-19.85	***	-0.071	-19.86	***	-0.071	-19.86	***
LEV	-	-0.003	-3.15	***	-0.003	-3.17	***	-0.003	-3.17	***
abs(TACC)	+	0.307	56.38	***	0.307	56.38	***	0.307	56.37	***
AUDCHANGE	+	0.003	1.81	*	0.003	1.83	*	0.003	1.82	*
industry dummy			Yes			Yes			Yes	
year dummy			Yes			Yes			Yes	
Adj. R^2			0.493			0.493			0.493	
F-value			127.60	***		127.68	***		127.67	***
N			11,813			11,813			11,813	
Variable	**Predicted Sign**	***SHARE2***			***MOSTCL***			***SHARECL***		
		Coef.	**t-stat**		**Coef.**	**t-stat**		**Coef.**	**t-stat**	
Intercept		0.026	11.59	***	0.027	13.42	***	0.027	13.33	***
Demised	-	-0.002	-2.84	***	-0.002	-2.52	***	-0.002	-2.67	***
SP	-	0.006	1.56		0.001	1.08		0.000	0.19	
SP×demised	-	-0.001	-1.93	*	-0.001	-1.67	*	-0.001	-1.72	*
lnASSET	-	-0.001	-9.46	***	-0.001	-9.49	***	-0.001	-9.32	***
CFO	-	-0.071	-19.84	***	-0.071	-19.86	***	-0.071	-19.85	***
LEV	-	-0.003	-3.12	***	-0.003	-3.12	***	-0.003	-3.16	***
abs(TACC)	+	0.307	56.34	***	0.307	56.37	***	0.307	56.37	***
AUDCHANGE	+	0.003	1.78	*	0.003	1.80	*	0.003	1.80	*
industry dummy			Yes			Yes			Yes	
year dummy			Yes			Yes			Yes	
Adj. R^2			0.492			0.493			0.492	
F-value			127.65	***		127.58	***		127.57	***
N			11,813			11,813			11,813	

*, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively.

We use a Tobit regression model due to the non-negative non-frequency distribution of dependent variable ADA to complement the findings from the multivariate OLS regression model. Tobit model is very suitable for truncated dependent variable regression model[4]. Table 8 reports the results and show that the Tobit regression results are very similar to those in Table 7.

Table 8
TOBIT REGRESSION RESULTS FOR THE 2001-2012 SAMPLE (EMPLOYING THE AUDCHANGE VARIABLE)

Variable	Predicted Sign	*LEADER*			*LEADER2*			*SHARE*		
		Coef.	t-stat		Coef.	t-stat		Coef.	t-stat	
Intercept		0.034	20.04	***	0.034	19.90	***	0.034	19.90	***
demised	-	-0.002	-2.18	**	-0.002	-2.27	**	-0.002	-2.22	**
SP	-	0.000	0.82		0.000	0.58		0.000	0.22	
SP×demised	-	-0.001	-1.67	*	-0.001	-1.94	*	-0.001	-1.67	*
lnASSET	-	-0.001	-9.39	***	-0.001	-9.30	***	-0.001	-9.32	***
CFO	-	-0.072	-19.82	***	-0.072	-19.83	***	-0.071	-19.81	***
LEV	-	-0.003	-3.14	***	-0.003	-3.16	***	-0.003	-3.15	***
abs(TACC)	+	0.308	56.22	***	0.308	56.22	***	0.308	56.21	***
AUDCHANGE	+	0.003	1.81	*	0.003	1.83	*	0.003	1.80	*
industry dummy			Yes			Yes			Yes	
year dummy			Yes			Yes			Yes	
Pseudo R^2			0.071			0.071			0.071	
LR Chi^2			3954.08	***		3955.98	***		3953.46	***
n			11,813			11,813			11,813	

Variable	Predicted Sign	*SHARE2*			*MOSTCL*			*SHARECL*		
		Coef.	t-stat		Coef.	t-stat		Coef.	t-stat	
Intercept		0.034	19.73	***	0.034	20.00	***	0.033	17.27	***
demised	-	-0.002	-2.74	***	-0.002	-2.33	***	-0.002	-2.56	***
SP	-	0.000	0.23		0.001	1.08		0.006	1.53	
SP×demised	-	-0.001	-1.88	*	-0.001	-1.66	*	-0.001	-1.90	*
lnASSET	-	-0.001	-9.26	***	-0.001	-9.49	***	-0.001	-9.46	***
CFO	-	-0.072	-19.82	***	-0.072	-19.82	***	-0.071	-19.81	***
LEV	-	-0.003	-3.16	***	-0.003	-3.12	***	0.003	-3.12	***
abs(TACC)	+	0.308	56.22	***	0.308	56.22	***	0.308	56.19	***
AUDCHANGE	+	0.003	1.82	*	0.003	1.80	*	0.003	1.78	*
industry dummy			Yes			Yes			Yes	
year dummy			Yes			Yes			Yes	
Pseudo R^2			0.071			0.071			0.071	
LR Chi^2			3955.70	***		3953.82	***		3955.00	***
n			11,813			11,813			11,813	

*, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively.

According to Neal and Riley (2004), audit fees provide an alternative metric for industry specialization (the portfolio share approach) to total asset or sales (the market share approach). Table 9 reports the results from re-estimating Equation 2 using audit fees to measure industry specialization and controlling for changes in auditors. In Japan, as audit fee data are available only after March 2004, so the samples are limited to fiscal years 2005 to 2012. These results are also qualitatively consistent with the results reported in Table 6, so the conclusions related to the variables of interest do not change.

Table 9
AUDIT FEES AS THE SP PROXY VARIABLE FOR THE 2005-2012 SAMPLE (EMPLOYING THE AUDCHANGE VARIABLE)

Variable	Predicted Sign	*LEADER3*			*SHARE3*		
		Coef.	t-stat		Coef.	t-stat	
Intercept		0.027	11.08	***	0.026	10.39	***
demised	-	-0.004	-5.04	***	-0.005	-5.32	***
SP	-	0.001	1.02		0.001	1.02	
SP×demised	-	-0.001	-1.91	*	-0.002	-2.83	***
lnASSET	-	-0.001	-7.91	***	-0.001	-7.90	***
CFO	-	-0.072	-16.31	***	-0.072	-16.33	***
LEV	-	-0.004	-3.24	***	-0.004	-3.25	***
abs(TACC)	+	0.309	46.04	***	0.308	46.02	***
AUDCHANGE	+	0.004	2.29	**	0.004	2.31	**
industry dummy			Yes			Yes	
year dummy			Yes			Yes	
Adj. R^2			0.496			0.496	
F-value			99.73	***		99.94	***
n			7,770			7,770	

*, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively.

CONCLUSION

This paper examines the relationship between auditor's industry specialization and audit quality of the Japan's largest audit firms following the demise of one of the Big 4 auditors in 2007. We find empirical evidence that audit clients benefited from higher audit quality resulting from the shift from the Big 4 to Big 3 market post-2007. The results from the quantitative analysis show the following two conclusions. First, audit firms had higher audit quality during the Big 3 period (2008-2012) compared to the Big 4 period (2001-2006). Second, the difference in audit quality between IS and non-IS auditors is higher after the dissolution of PwC ChuoAoyama in 2007. Additionally, IS audit firm clients are associated with higher audit quality during the during Big 3 period (2008-2012), which is consistent with prior studies. As large audit firms must develop industry-specific expertise using a low-cost or differentiation strategy in a more competitive Japanese audit market post-2007, audit quality has improved in the Big 3 period.

The findings of this paper suggest that a more intense market concentration among auditors can motivate large auditors to leverage their industry expertise to compete and provide better quality audit for their clients. These results should assist public companies in appointing higher-quality auditors, regulators in monitoring competition in the Japanese audit market, and audit firms in improving their competitive advantage. In addition, accounting standards setters should take into consideration the potential effect of future regulations and standards on the competitiveness of audit market and its spillover effect on audit quality.

This study is limited by an assumption that audit firms implement either a low-cost or differentiation strategy in a competitive Japanese audit market. The study empirical evidence that audit quality has improved as a result of market competition. However, the study's scope did not investigate the different effects of the choice between a low-cost or differentiation strategy on audit quality. Cahan et al. (2011) suggest that audit firms that employ a differentiation strategy have higher audit quality than firms that pursue a low-cost strategy. In addition, this study did not investigate whether a differentiation or low-cost strategy affects the within-group audit quality of IS and non-IS auditors.

AUTHOR'S NOTE

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END NOTES

1. This equation is almost the same framework for DID (Difference in Difference) analysis, which is often used in economics. For example, Card and Krueger (1994) employed this method to investigate the effect of the minimum wage policy on employment by comparing the wages of fast food restaurants in New Jersey and Pennsylvania before and after the government's minimum wage policy. DID makes it possible to capture the effect of a treatment by comparing the changes in outcomes between the treated group and the controlled group over time. However, this study's hypotheses argue that the demise of Misuzu might have affected the audit quality of both IS and non-IS auditors, so it is not possible to state the "treatment effect" of the dissolution in the DID framework using a cross-term coefficient. Hence, this study uses the term OLS regression with a cross-term of the dummy variable instead of a DID analysis.
2. Since White's test indicated our result likely to have heteroscedasticity, all the regressions are conducted by Generalized Least Squares (GLS).
3. This results also suggest that the audit quality of IS auditors is superior compared to non-IS auditors only between 2008 and 2012 consistent with previous researches such as Balsam et al. (2003) and Krishnan (2003).
4. Please refer to Maddala (1983) for further detail of tobit regression.

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EARNINGS MANAGEMENT, EXECUTIVE COMPENSATION AND LAYOFFS

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ABSTRACT

This study examines the effects of managers' decisions on accounting numbers and the relation between earnings management and executive incentives around employee layoffs. We perform accrual analysis on a sample of firms that announce large layoffs by regressing discretionary accruals on indicator variables for years associated with large layoffs and indicator variables associated with executive incentives. We find that CEOs who announce employee layoffs are more likely to engage in earnings management in order to maximize their equity-based compensation.

INTRODUCTION

We study the accounting choices managers make to manage reported earnings during layoff announcements. Prior studies (Groshen and Potter, 2003; Farber and Hallock, 2008) suggest that layoff announcements after the 1990s were generally considered efficiency-improving, wealth-increasing events, whereas layoff announcements before that time were viewed as negative news events (Worrell, Davison, and Sharma, 1991; Chen, Mehrotra, Sivakumar, and Yu, 2001). In addition, prior research finds that CEOs of firms announcing layoffs receive significantly more stock-based compensation and more total pay in the subsequent year relative to CEOs of non-layoff companies. However, little is known about whether external pressures or contracts explicitly tied to accounting numbers affect the accounting choices by managers in layoff firms.

To our knowledge, only one study, Hall, Stammerjohan, and Cermignano (2005), addresses how managers make accounting choices around layoff announcements. Covering the years 1976 through 1995, Hall et al. descriptively examine the accrual behavior of layoff firms and document that companies appear to use accruals to decrease reported earnings in the layoff announcement year. They proffer that their findings are consistent with several theories of earnings management, including the "big bath" hypothesis and the bonus hypothesis. These hypotheses posit that earnings performance is poor, managers further reduce earnings to save income for increased earnings in future years (the "big bath hypothesis) or to increase the likelihood of management bonuses in future years (the bonus hypothesis). Hall et al. did not attribute their findings to either of these hypotheses as the singular motive for earnings manipulation.

Our study differs from Hall et al. in that, first, to determine whether their findings are robust over time and in later years when layoffs appear to be more dynamic, we examine layoffs in a ten-year period, 1997 – 2006. Second, we add explanatory variables to capture the impact of executive compensation and characteristics of the firm, CEO and governance. Third, we analyze whether accounting choices differ based on the stated reason for the layoff. Finally, we include control variables for the size of the layoff, state of the economy, fiscal quarter and industry.

Using a sample which includes more than 2,100 layoff firm-year observations, our empirical analysis shows that firms tend to have higher intensity of earnings management (measured by discretionary accruals) during the year of a layoff announcement, and that executive compensation structures economically impact the intensity. We argue these findings support both the "big bath" and bonus hypotheses.

Our paper contributes to the literature on layoffs, earnings management, and incentive-based compensation by providing analyses of how managers of layoff firms use accrual-based earnings management to respond to external pressure, and to serve self-interests in firms' stock prices. In addition to examining a more recent time period of layoffs than prior evidence, we incorporate characteristics of corporate governance and layoff reasons for sample and control firms within a multivariate setting. We thus provide new evidence on the impact of the external pressure and self-interested motives on the accounting choices made by managers of layoff firms.

The next section provides background and reviews the relevant literature. In the third section, we present the research design and describe the sample and data. The fourth section contains our results. Finally, we provide concluding remarks in section five.

LITERATURE REVIEW

Managerial Incentives and Earnings Management

Considerable evidence suggests that incentive compensation can motivate managers to make superior decisions (e.g., Baker, Jensen, and Murphy, 1988). However, managers can also exert their influence and power on the design of compensation arrangements (e.g., Berger, Ofek, and Yermack, 1997; Yermack, 1997; Bebchuk and Fried, 2003), or even manipulate accounting numbers to serve their own interests rather than those of the shareholders (e.g., Ke and Petroni, 1999; Cornett, Marcus, and Tehranian, 2008). For example, managers can benefit from anticipated stock price changes through earnings management.

Focusing on both total accruals and their sub-components, these studies document the use of accruals to decrease reported income in periods of large layoff announcements. Our study is not intended to test whether managers use accounting accruals to manage earnings upward or downward. Rather we examine the intensity of earnings management between layoff firms and control firms. Unlike the study of Hall et al. (2005), in which they use the total accruals and the components of total accruals to document firms' earnings management during layoff periods, we use discretionary accruals to examine earning management around layoff announcements.

Under the usual definition, accrual accounting is an accounting method that measures the performance and position of a company by recognizing economic events regardless of when cash transactions occur. Accrual accounting is required by US Generally Accepted Accounting Principles (GAAP). Accruals can be thought as the difference between reported income and cash from operation. Due to the nature of accrual accounting, there are a number of subjective decisions involved in the allocation of expenditures and revenue over time. Therefore, managerial decisions involved in the allocation of expenditure and revenue in any given period are subject to the great deal of discretion.

Earnings management is a strategy used to deliberately manipulate a company's earnings (Burgstahler and Dichev, 1997; Degeorge, Patel, and Zeckhauser, 1999). It occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either influence some stockholders about the underlying economic performance of a company or influence contractual outcomes that depend on reported accounting numbers (Schipper and Vincent, 2003; Healy and Wahlen, 1999). Though earnings management should not be confused with illegal activities to

misrepresent financial results, it can be viewed as an agency cost because earnings management obscures real performance and lessens the ability of shareholders to make informed decisions (Xie, Davidson, and DaDalt, 2003).

Whereas numerous empirical studies investigate the use of accounting choices to manage earnings, only Hall, et al. (2005) do so with respect to layoff events. The conventional view of layoffs is that managers view future costs as being more predictable than future revenues, and therefore, cutting employee costs is an easy way to boost profitability (Cascio, Young and Morris, 1997). Both Groshen and Potter (2003) and Farber and Hallock (2008) note that layoff announcements since the 1990s generally portray the events as efficiency improving and wealth increasing. Further, Billger and Hallock (2005) show that layoffs associated with negative stock price reactions are much more likely to lead to CEO turnover. Based on these prior findings, we argue that managers have an incentive to manage earnings during large layoffs due to the pressure of external expectations for improved performance subsequent to the layoff announcements. Because layoffs usually are the result of declining performance on earnings due to increased competition, slump in demand, sales drops, etc., we expect firms to take a "big bath" in the year of the layoff announcement so future years will show increased earnings.

Employee Layoff and Executive Incentives

A substantial body of layoff literature documents the incentive benefits of equity-based compensation. Murphy (1995) finds that stock-based compensation provides incentives for CEOs to take appropriate actions in downsizing, which produce the highest benefits for shareholders and society. Dial and Murphy (1995) examine General Dynamic's compensation system in the post-Cold War era of 1991 when defense contractors faced declining demand and excess capacity. They contend that compensation incentives helped motivate the former CEO to make value-enhancing layoffs. Hallock (1998) finds that the CEO pay premium from layoffs disappears after controlling for other detailed characteristics. Brookman, Chang, and Rennie (2007) study the changes in CEO compensation during the 1990s layoffs, and find that CEOs are rewarded for past layoff decisions and motivated to act in shareholders' interest in the future through incentive pay. In other words, changes in CEO compensation around layoffs are not one-time awards but, instead, continue to provide reward in the future.

The studies cited in the preceding paragraph (Dial and Murphy, 1995; Murphy, 1995; and Brookman, Chang, and Rennie, 2007) find that CEO salary and bonuses are lower during layoff years, because these forms of compensation are highly visible and attract criticism from employees and labor unions. The signals that managers' layoff decisions convey to the market is critically important to corporate boards, managers, and shareholders. CEOs may want to avoid sending negative signals to the market when reducing the company workforce and may choose not to sell equity (Hsieh and Davidson, 2008). Furthermore, previous literature documents managerial opportunism of layoff firms. For example, CEOs of firms announcing employee layoffs are more likely to receive stock options in advance of value-enhancing layoff announcements, and subsequent to value-destroying layoff announcements, to maximize their stock-based compensation value (Hsieh and Sharma, 2011). However, Hsieh, Wang, and Lin (2012) provide evidence that the provisions of the Sarbanes Oxley Act mitigate layoff firms' managerial opportunism associated with stock option grants. In support of the bonus hypothesis, we argue that CEOs of layoff firms have great incentive to manage earnings to serve their own interests.

As discussed above, managers of layoff companies are under scrutiny by both outsiders and insiders, e.g., creditors, shareholders, employees and unions. This agency problem affects the decision making by managers of layoff companies. We argue that awarding executives of layoff firms with more equity-based compensation will increase the likelihood of managing accounting numbers to maximize their own wealth. We hypothesize that the interaction of the agency problem with managers' self-interest will increase the intensity of earnings management during the layoff year.

DATA

Sample

The sample consists of companies that announced one or more layoffs between 1997 and 2006. We locate layoff announcements using the news wire in Lexis/Nexis, searching for the key words "layoff" , "job cut", "work force", or "downsizing" for the years 1997-2006. Our data ends in 2006 to control for potential noise associated with the mass layoff surge in the 2008-2009 recession period.

We find 1,009 layoff announcements made by 246 firms. To be included in the final sample, firms must have valid data in CRSP, Compustat, and ExecuComp for the two years surrounding layoff announcements. When data are missing from ExecuComp, we collect data from proxy statements if possible. Similarly to Hallock (1998) and other studies, we include only the first layoff announcement for firms with multiple layoff announcements in a given fiscal year. The final sample contains 547 layoff announcements made by 201 firms.

We compare our sample to a control sample. For the control sample, we match a non-layoff firm to each layoff firm based on industry, firm size, and prior performance, as recommended by Barber and Lyon (1996). We define industry by two-digit SIC code. When there is no two-digit SIC matching firm, we match on one-digit SIC code. We select the non-layoff firm closest in size to that of the layoff firm, where firm size is based on the book value of total assets. We require return on assets (ROA), measured the year before layoff, to be between 90% and 110% of sample firm ROA. If the firm closest in size does not have an ROA between 90% and 110% of the sample firm, we select the firm next closest in size. If there are no firms with an ROA in this range, we relax the restriction to be between 80% and 120% of the sample firm ROA.

Discretionary Accruals

Hribar and Collins (2002) and Hall, Stammerjohan and Cermignano (2005) argue that using the cash-flow approach to calculate total accruals is preferred for firms that are engaged in mergers or acquisitions or have significant discontinued operations. These firms are likely to have accruals for the entire firm in the prior year and accruals of a reduced, or different-sized, firm in the event year, producing biased results. To avoid the possible bias, we adopt the cash flow approach to calculate total accounting accruals.

Since earnings management is an unobservable process, proxies are needed to make inferences. In the earnings management literature, analysis of earnings management often focuses on management's use of discretionary accruals (Healy, 1985; DeAngelo, 1986; Jones, 1991; Dechow, Sloan and Sweeney, 1995). Dechow et al. (1995) evaluate the ability of alternative models, including the Healy model (1985), DeAngelo model (1986) and Jones model (1991), to detect earnings management. Their experiment results indicate that a modified version of the model developed by Jones (1991) provides the most powerful means of detecting earnings management.

The modified Jones model is used to estimate total accruals as a fraction of lagged assets from the following equation:

$$\frac{TA_{it}}{Asset_{it-1}} = \alpha_0 \frac{1}{Assets_{it-1}} + \alpha_1 \frac{\Delta Sales_{it}}{Assets_{it-1}} + \alpha_2 \frac{PPE_{it}}{Assets_{it-1}} \quad (1)$$

where TA denote total accruals, calculated as earnings before extraordinary items and discontinued operations (Compustat data item 123) minus operating cash flows from continuing operations (Compustat item 308-item124). $Assets_{it}$ denotes total assets for firm i in year t (Compustat data item 6), $\Delta Sales_{it}$ denotes change in sales for firm i in year t (Compustat data item 12), and PPE_{it} denotes property, plant, equipment for firm i in year t (Compustat data item 7). Then, discretionary accruals as a fraction of assets, $\%DA_{it}$, are defined as

$$\%DA_{it} = \frac{DA_{it}}{Assets_{it-1}} = \frac{TA_{it}}{Asset_{it-1}} - (\alpha_0 \frac{1}{Assets_{it-1}} + \hat{\alpha}_1 \frac{\Delta Sales_{it} - \Delta Receivables_{it}}{Assets_{it-1}} + \hat{\alpha}_2 \frac{PPE_{it}}{Assets_{it-1}}) \quad (2)$$

where hats denote estimated values from regression Equation (1). The inclusion of $\Delta Receivables_{it}$ is the "modification" of the Jones model. This variable attempts to capture the extent to which a change in sales is due to aggressive recognition of questionable sales.

Executive Incentives

Option compensation has been used as a proxy for incentives to manage earnings in several papers (Bergstresser and Philippon, 2006; Cheng and Warfield, 2005; Cohen, Dey, and Lys, 2005). This paper further examines how incentive compensation, such as equity-based pay, affects managers' decisions on accounting numbers around employee layoffs.

Following Mehran (1995), we include two executive incentive explanatory variables: Option Ratio (Option compensation as a fraction of total compensation), and Cash Ratio (Salary and Bonus as a fraction of total compensation). Data on option grants, salary, bonus, and other compensation are available from Standard and Poor's ExecuComp database. As an alternative measure of option or stock based compensation, we also use Bergstresser and Philippon's (2006) "incentive ratio". This ratio employs the total holding of stock and options rather than annual grants and is defined as the increase in the value of CEO stock and options due to a 1 % increase in the firm's stock price, expressed as a fraction of that increase plus total other compensation from salary and bonuses. We construct this measure using the Compustat Executive Compensation data on CEO stock holdings and option holdings.

Incentive Ratio = Increase in value of CEO stock options for a 1% increase in stock price ÷ (Increase in value of CEO stock and option + annual salary + annual bonus)

To examine the effect of interlock between the CEO and the compensation committee on the firm's decisions about earnings management, we include an explanatory variable, *Interlock*, if the CEO is listed in the compensation committee interlock section of the proxy statement. Interlock indicates that the named officer is involved in a relationship requiring disclosure in the "Compensation Committee Interlocks and Insider Participation" section of the proxy statement.

This generally involves one of the following situations: (1) The officer serves on the board committee that makes his compensation decisions; (2) The officer serves on the board (and possibly compensation committee) of another company that has an executive officer serving on the compensation committee of the indicated officer's company; or (3) The officer serves on the compensation committee of another company that has an executive officer serving on the board (and possibly compensation committee) of the indicated officer's company.

Corporate Governance, Characteristics of CEO and Firm

Previous literature examines the impact of corporate governance on earnings management. For example, Warfield, Wild, and Wild (1995) examine the absolute value of discretionary accruals and find that accruals management is inversely related to managerial ownership. Klein (2002) shows that board characteristics (such as audit committee independence) predict lower magnitudes of discretionary accruals. Bergstresser and Philippon (2006) find an inconsistent relation between accruals and an index of corporate governance quality. Cornett, Marcus and Tehranian (2008) find that governance structure, such as institutional ownership of shares, institutional investor representation on the board of directors, and the presence of independent outside directors on the board, all reduce the use of discretionary accruals. We include CEO stockholdings as our corporate governance variable.

We also include characteristics of the CEO, of the firm, and of layoffs as control variables. The CEO control variables are CEO age and CEO tenure. For the firm, our control variables are firm size, per Cannella and Shen (2001), measured as the natural log of the firm's total assets; return on assets (net income before extraordinary items and discontinued operations divided by total assets), which measures the profitability of a company in relation to assets are invested and indicates how efficiently assets are utilized; and stock return during the prior year. Layoff size (the percentage of the layoff reported in the *Wall Street Journal*, or the number of employees laid off divided by the number of total employees in the year before the layoff) is our layoff characteristic variable.

Summary Statistics

Table 1 presents summary statistics on CEO incentive (Panel A) and firm characteristics variables (Panel B). On average, CEOs across all firms in all years own 0.99% of the outstanding shares in each firm. The average age of CEOs is 57 years, and the average tenure is 6 years. CEOs are paid an average of $2.711 million in salary and bonuses annually and receive an additional $6.388 million worth of stock options.

Table 1

SUMMARY STATISTICS ON CEO INCENTIVES AND FIRM CHARACTERISTICS

Descriptive statistics of CEO Incentives and for Firm Characteristics that have an announced layoff between 1997 and 2006. The sample is drawn from Standard and Poor's ExecuComp database. The CEO Incentives variables (Panel A) are CEO bonus, CEO salary, CEO stock option grants (valued using the Black and Scholes (1973) option- pricing model adjusted for dividends), shares owned by the CEO, Percentage of Total Shares Owned (the fraction of outstanding common shares owned by the CEO), CEO age, and CEO tenure. Panel B presents descriptive statistics about firm characteristics. Firm size is the log of the book value of assets in millions of 1992 dollars. ROA is return on assets (net income before extraordinary items and discontinued operations divided by total assets). Stock return is the percentage holding-period stock return. Lagged one year denotes the prior year.

Variable	Mean	Median	Standard deviation	Min	Max
Panel A					
Bonus ($000) (lagged one year)	1,636.33	1,068.34	2,195.77	0.00	29,000.00
Salary ($000) (lagged one year)	1,075.12	1,000.00	482.69	0.00	5,806.65
Option grants ($million)(lagged one year)	6,388.86	3,227.74	12,181.75	0.00	130,354.30
Shares owned by CEO(lagged one year)	10416.37	319.57	86160.08	0.00	1318796.00
Percentage of Total Shares Owned(lagged one year)	0.0099	0.0008	0.04190	0.0030	34.5000
Incentive ratio	0.0004	0.0000	0.0379	0.0000	0.7408
CEO Age(lagged one year)	56.68	57.00	5.80	36.00	82.00
CEO Tenure(lagged one year)	6.23	5.00	5.77	1.00	34.00
Panel B					
Firm Size(lagged one year)	55,301.23	17,243.05	15,5471.2	4498.36	1484101
ROA(lagged one year)	3.6770	3.6665	7.8869	-66.0970	24.5810
Stock Return during the year(lagged one year)	62.31	5.92	1689.92	-94.721	797.43

Table 2

Correlation Coefficients of CEO Incentives and Firm Characteristics Variables This table presents the pairwise correlation coefficients. The sample is from Standard and Poor's ExecuComp database and includes firms that have an announced layoff between 1997 and 2006. The variables are CEO bonus, CEO salary, CEO stock option grants (valued using the Black and Scholes (1973) option-pricing model adjusted for dividends), shares owned by the CEO, Percentage of Total Shares Owned (the fraction of outstanding common shares owned by the CEO), CEO age, and CEO tenure. Firm size is the log of the book value of assets in millions of 1992 dollars. ROA is return on assets (net income before extraordinary items and discontinued operations divided by total assets). Stock return is the percentage holding-period stock return.

	Bonus	*Salary*	*Option grants*	*CEO Shares*	*% total shares owned*	*Incentive Ratio*	*AGE*	*tenure*	*Firm Size*	*ROA*	*Stock return*
Bonus	*1*										
Salary	*0.514*	*1*									
Option grants	*0.161*	*0.032*	*1*								
Shares owned by CEO	*0.039*	*-0.120*	*0.040*	*1*							
% total shares owned	*0.014*	*-0.277*	*0.089*	*0.440*	*1*						
Incentive Ratio	*0.001*	*-0.034*	*0.000*	*0.0126*	*-0.036*	*1*					
AGE	*0.160*	*0.189*	*0.021*	*0.003*	*-0.014*	*-0.012*	*1*				
tenure	*0.117*	*0.125*	*0.033*	*0.216*	*0.217*	*0.095*	*0.207*	*1*			
Firm Size	*0.573*	*0.316*	*0.117*	*-0.019*	*0.026*	*-0.018*	*0.053*	*0.006*	*1*		
ROA	*0.121*	*0.124*	*0.017*	*0.076*	*-0.247*	*-0.003*	*0.028*	*-0.013*	*-0.050*	*1*	
Stock return	*0.008*	*-0.004*	*-0.001*	*-0.006*	*-0.022*	*0.001*	*-0.004*	*-0.031*	*-0.006*	*0.024*	*1*

We provide pairwise correlation coefficients for the CEO Incentives and Firm Characteristics variables in Table 2. Not surprisingly, bonus and salary are positively correlated with each other and both are positively correlated with firm size. Consistent with previous studies, we find a positive correlation between Option grants and Firm size.

Table 3 presents summary statistics for mean and median of discretionary accruals of layoff firms (Panel A), mean and median of discretionary accruals of non-layoff firms (Panel B), and differences between layoff firms and non-layoff firms (Panel C). Panel A shows that the average absolute value of discretionary accruals as a percentage of total assets of layoff firms significantly increases from 7.61% to 14% between layoff years -1 and 0, significantly decreased from 14% to 5.96% between layoff years 0 and 1, and significantly increase to 7.73% in layoff year 2. The average absolute value of discretionary accruals for our sample in the layoff year is relatively large, 14% of assets using the modified Jones model as the basis for ‘‘normal’’ accruals.

Table 3
MEAN AND MEDIAN DISCRETIONARY ACCRUAL OF LAYOFF FIRMS AND NON-LAYOFF FIRMS

Abs(%DA) is the absolute value of discretionary accruals (defined as the difference between actual accruals and accruals predicted from the modified Jones model as a percent of total assets). The numerical indicators of layoff years denote: -1, the year before the layoff announcement; 0, the year of the layoff announcement; +1, the year after the layoff announcement; and +2, the second year of the layoff announcement. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

		Layoff Year				Mean Change between layoff year		
Panel A: Layoff firm								
		-1	0	+1	+2	-1, 0	0, 1	1, 2
%DA	Mean	-0.0671	-0.0838	-0.0245	-0.0208	-0.0167	0.0593***	0.0037
						(0.2809)	(0.0001)	(0.5799)
	Median	-0.0545	-0.0315	-0.0105	-0.0091			
Abs(%DA)	Mean	0.0761	0.1400	0.0596	0.0773	0.0069***	-0.0284***	0.0131***
						(0.0000)	(0.0000)	(0.0013)
	Median	0.0566	0.0635	0.0351	0.0482			
Panel B: Non-layoff firm								
		-1	0	+1	+2	-1, 0	0, 1	1, 2
%DA	Mean	-0.0477	-0.0411	-0.0292	-0.0482	0.0066	0.0119	-0.0189*
						(0.3125)	(0.3331)	(0.0721)
	Median	-0.0415	-0.0382	-0.0271	-0.0401			
Abs(%DA)	Mean	0.0783	0.0770	0.0696	0.0706	-0.0012	-0.0074	0.0009
						(0.3158)	(0.3307)	(0.1481)
	Median	0.0467	0.0443	0.0366	0.0463			
Panel C: Difference between layoff firm and non-layoff firm								
		-1	0	+1	+2	-1, 0	0, 1	1, 2
%DA	Mean	-0.0194**	-0.0419**	0.0047	0.0274***	-0.0225	0.0466*	0.0227
	difference	(0.0212)	(0.0286)	(0.5755)	(0.0008)	(0.2584)	(0.0756)	(0.1329)
Abs(%DA)	Mean	-0.0022	0.0619***	-0.010	0.0067	0.0641***	-0.0719*	0.0167
	difference	(0.7607)	(0.0006)	(0.1863)	(0.3218)	(0.0000)	(0.0725)	(0.2281)

Panel B shows that the average absolute value of discretionary accruals as a percentage of total assets of non-layoff firms decreases slightly between layoff years -1 and 0, and between layoff years 0 and 1, but the decreases are not statistically significant.

Panel C reports that the average absolute value of discretionary accruals as a percentage of total assets increases for layoff firms net of non-layoff firms between layoff years −1 and 0, but decreases between layoff years 0 and +1. In the layoff years, the average absolute value of discretionary accruals as a percentage of total assets is significantly higher in layoff firms than in non-layoff firms, consistent with the expectation that firms which announce employee layoffs are more likely to engage in earnings management for window dressing during the layoff year.

In summary, our univariate evidence is consistent with the "big bath" hypothesis, even after accounting for the trends of comparable non-layoff firms. However, earnings management might also be correlated with CEO stockholdings, CEO compensation, CEO age, CEO tenure, firm size, operating performance, and stock returns for layoff firms. We control for these variables in the multivariate tests.

METHODOLOGY

Earnings Management and Executive Compensation around Layoffs

To examine the effects of managers' decision on accounting numbers around layoffs, we use the full-sample pooled regression model:

$$\begin{aligned}\text{Absolute Discretionary Accruals over Lagged Assets}_{i,T} = {} & \alpha_{iT} + \beta_1 \text{Layoff}_{i,t-1} + \beta_2 \text{Layoff}_{i,t} + \beta_3 \text{Layoff}_{i,t+1} + \beta_4 \text{CEO Stockholding}_{i,T-1} + \beta_5 \text{OptionRatio}_{i,T-1} + \\ & \beta_6 \text{CashRatio}_{i,T-1} + \beta_7 \text{Interlock}_{i,T-1} + \beta_8 \ln(\text{CEOage}_{i,T-1}) + \beta_9 \ln(\text{CEO tenure}_{i,T-1}) \\ & + \beta_{10} \ln(\text{Firm Size}_{i,T-1}) + \beta_{11} \text{ROA}_{i,T-1} + \beta_{12} \text{Stock return}_{i,T-1} + \varepsilon_{iT} \qquad (3)\end{aligned}$$

where the *Layoff* variables are dummy variables to indicate the year relative to the layoff year; Layoff_{t-1} equals one if the year is the year before the layoff, and zero otherwise; Layoff_{t} equals one if the year is the layoff year, and zero otherwise. Similarly, Layoff_{t+1} equals one if the year is one year after the layoff, and zero otherwise. The other subscripts represent firm *i*, and subscript T represents layoff year t-1, t, t+1, or t+2. The other variables are defined above. The model is estimated by discretionary accruals using cash flow data. We also estimate Equation (3) with the addition of firm and fiscal year fixed effects to help control for potential omitted time- and firm- invariant variables (Hubbard and Palia, 1995; Himmelberg, Hubbard, and Palia, 1999; Kole and Lehn, 1999).

Earnings Management and Layoff Reason

Worrell, Davidson, and Sharma (1991) and Palman, Sun, and Tang (1997) find a positive stock price reaction to layoff announcements when the stated reason for the layoff is efficiency enhancement, and a negative stock price reaction when layoffs are announced in response to a declining product demand. Similarly, Farber and Hallock (2008) find evidence that market reactions to layoffs became less negative between 1970 and 1997, possibly because layoffs that improve efficiency are becoming more common than those that respond to decreases in product demand. Groshen and Potter (2003), Farber and Hallock (2008), and De Meuse, Bergmann, Vanderheiden, and Roraff (2004) contend that layoff announcements in the 1990s were generally considered efficiency-improving, wealth- increasing events. Hillier, Marshall, McDolgan and Werema (2007) show that layoffs occur following significant declines in operating profits and increases in leverage, as well as in response to threats to managerial control. Hsieh (2010) finds

that, on average, firms announcing restructuring layoffs perform worse than firms announcing non-restructuring layoffs in the year prior to employee layoffs.

In Model 4, we evaluate the relationship between the firms' announced layoff reason and earnings management during layoff years across layoff companies between 1997 and 2006. Following Hsieh (2010), we divided the sample into two groups based on the firms' stated layoff reason. The group 'Restructuring' consists of firms whose that stated reasons of cost cutting or reorganization; the group of 'Non-Restructuring' consists of firms that stated reasons of increased competition, slump in demand, sales drop, plant closing, or contract cancellation.

In addition to the explanatory variables in Model 3, we also control for layoff reasons (Restructuring Layoff dummy), layoff size, state of the economy, fiscal quarter, and industry. These additional explanatory variables and lag structure used in the regression are listed in Table 4 and estimated in Model 4:

$$\begin{aligned}\text{Absolute Discretionary Accruals over Lagged Assets}_{it} = {} & \alpha_{it} + \beta_1 \text{CEO Stockholding}_{i,\,t-1} \\ & + \beta_2 \text{OptionRatio}_{\,i,\,t-1} + \beta_3 \text{CashRatio}_{\,i,\,t-1} + \beta_4 \text{Interlock}_{\,i,\,t-1} + \beta_5 \ln(\text{CEOage}_{\,i,\,t-1}) \\ & + \beta_6 \ln(\text{CEO tenure}_{i,\,t-1}) + \beta_7 \ln(\text{Firm Size}_{i,\,t-1}) + \beta_8 \text{ROA}_{i,\,t-1} + \beta_9 \text{Stock return}_{i,\,t-1} \\ & + \beta_{10} \text{Restructuring Layoff}_{\,it} + \beta_{11} \ln(\text{Layoff Size})_{it} + \beta_{12} \text{State of Economy}_{\,it} \\ & + \beta_{13} \text{FiscalQuarter}_{\,it} + \beta_{14} \text{Industry}_{\,it} + \varepsilon_{it} \qquad (4)\end{aligned}$$

where subscript *i* represents firm *i,* and subscript t represents the year of layoff.

Earnings Management and Executive Compensation of Layoff Firms and Non-layoff Firms

To further validate our findings, we compare our sample to a control sample. Model 5 is based on a full sample of layoff and non-layoff control firms with a dummy variable (Lfirm) taking the value of 1 for layoff firms and the interaction terms of the layoff dummy with the test variables shown in Model 3.

$$\begin{aligned}\text{Absolute Discretionary Accruals over Lagged Assets}_{\,i,T} = {} & \alpha_{iT} + \beta_1 \text{Layoff}_{i,\,t-1} \\ & + \beta_2 \text{Layoff}_{i,\,t} + \beta_3 \text{Layoff}_{i,\,t+1} + \beta_4 \text{CEO Stockholding}_{i,\,T-1} + \beta_5 \text{OptionRatio}_{\,i,\,T-1} \\ & + \beta_6 \text{CashRatio}_{\,i,\,T-1} + \beta_7 \text{Interlock}_{\,i,\,T-1} + \beta_8 \ln(\text{CEOage}_{\,i,\,T-1}) + \beta_9 \ln(\text{CEO tenure}_{i,\,T-1}) \\ & + \beta_{10} \ln(\text{Firm Size}_{i,\,T-1}) + \beta_{11} \text{ROA}_{i,\,T-1} + \beta_{12} \text{Stock return}_{i,\,T-1} + \beta_{13} \text{Layoff}_{i,t-1} * \text{LFirm} \\ & + \beta_{14} \text{Layoff}_{i,\,t} * \text{LFirm} + \beta_{15} \text{Layoff}_{i,\,t+1} * \text{LFirm} + \beta_{16} \text{CEO Stockholding}_{i,\,T-1} * \text{LFirm} \\ & + \beta_{17} \text{OptionRatio}_{\,T-1} * \text{LFirm} + \beta_{18} \text{CashRatio}_{\,T-1} * \text{LFirm} + \beta_{19} \text{Interlock}_{\,T-1} * \text{LFirm} \\ & + \beta_{20} \ln(\text{CEOage}_{i,\,T-1}) * \text{LFirm} + \beta_{21} \ln(\text{CEO tenure}_{i,\,T-1}) * \text{LFirm} \\ & + \beta_{22} \ln(\text{Firm Size}_{i,\,T-1}) * \text{LFirm} + \beta_{23} \text{ROA}_{i,\,T-1} * \text{LFirm} \\ & + \beta_{24} \text{Stock return}_{i,\,T-1} * \text{LFirm} + \varepsilon_{iT} \qquad (5)\end{aligned}$$

where L Firm = '1' if the firm announced layoff, '0' otherwise. The other subscripts represent firm *i,* and subscript T represents layoff year t-1, t, t+1, or t+2. The other variables are defined above.

Table 4
DEFINITIONS OF REGRESSION VARIABLES

Restructuring layoff dummy variable:
1 if cost-cutting or reorganization are the reason of layoff, otherwise 0.
(Reasons of layoffs include cost-cutting, reorganization, increased competition, slump in demand, sales drop, plant closing, or contract cancellation.)

Layoff size: *Layoff size* is either the percentage of the layoff reported in the *Wall Street Journal*, or the number of employees laid off divided by the number of total employees in the year before the layoff.

State of economy dummy variable:
1 if the layoff is announced in a good economy (1997-2000 and 2004-2006) 0 if the layoff is announced in a recession (2001-2003)

Quarter dummy variable:
Quarter 1: 1 if the firm announced a layoff in the first quarter, otherwise 0 Quarter 2: 1 if a firm announced a layoff in the second quarter, otherwise 0 Quarter 3: 1 if the firm announced a layoff in the third quarter, otherwise 0

Industry dummy variable: based on SIC division.

SIC division	Industry
A	Agriculture, Forestry, And Fishing
B	Mining
C	Construction
D	Manufacturing
E	Transportation, Communications, Electric, Gas, And Sanitary Services
F	Wholesale Trade
G	Retail Trade
H	Finance, Insurance, And Real Estate
I	Services
J	Public Administration

$ROA_{i, t-1}$: Firm performance during the prior year. Firm size $_{i, t-1}$: log of total assets for the prior year
CEO age $_{j, t-1}$: CEO age in the prior year.

RESULTS

Earnings Management and Executive Compensation around Layoffs

Table 5 reports results of regressions of Absolute value of Discretionary Accruals for layoff years −1, 0, +1. The sample consists of 2,188 firm-year observations between1997 and 2006 for 201 layoff firms. Column 1 presents coefficient estimates from a pooled time-series cross-sectional regression of Eq. (3) without firm and fiscal year fixed effects. Column 2 presents estimates with firm and fiscal year fixed effects. The point estimates of the regression coefficients from both columns in Table 5 are highly similar.

Results of the regression without firm and fiscal year fixed effects appear in Column 1 of Table 5. The results imply that the absolute value of discretionary accruals as a percentage of total assets is 4.94% higher during the layoff year and 1.72% lower the year after layoffs. In other words, discretionary accruals are higher during the layoff year. Because the results reported in Column 1 do not control for firm and year characteristics, and the results reported in Column 1 are qualitatively similar to those reported in Column 2, we rely on Column 2 of Table 5 for our most convincing results.

The results show that the absolute value of discretionary accruals as a percentage of total assets tends to be higher during the layoff year for layoff firms and tends to be lower after the layoff year. We see in Column 2 that the absolute value of discretionary accruals as a percentage of total assets is 4.99% higher during the layoff year and 1.7% lower the year after layoff. The *F*-test on $\beta_2 = \beta_3$ is statistically significant, showing that the absolute value of discretionary accruals as a percentage of total assets is higher during the layoff year than the subsequent year, indicating that earnings management is significantly higher during the layoff year. The results also suggest positive relationships between CEO stock ownership, option ratio, cash ratio, compensation committee, firm size and earnings management, and negative relationships between CEO age, ROA and earnings management.

Results of our *F*-tests indicate that discretionary accruals change from the year before to the year of the layoff ($\beta_2>\beta_1$). However, discretionary accruals decrease the year after the layoff ($\beta_2>\beta_3$). Our empirical results indicate that firms tend to have higher earnings management intensity during the year of layoff announcement, and the intensity decreases after the layoff year. The results in Table 5 also indicate that, consistent with other research, option compensation has a tremendous impact on earnings management in this sample. The coefficient on option grants as a fraction of total annual compensation is approximately 0.0307. Using a coefficient estimate of 0.0307, an increase of one sample standard deviation in the option compensation variable increases the typical absolute value of discretionary accruals as a percentage of assets by about 4.43 percentage points. We also measure the dependence of CEO wealth on option value using the incentive ratio, which is based on total holdings of stock or options rather than annual grants. These alternative specifications have little impact on our results.
Results with the incentive ratio are virtually identical with those of option ratio, therefore we do not present results for these variations.

There is also some evidence of positive associations between the absolute value of discretionary accruals as a percentage of total assets and ownership percentage, compensation committee relation, and firm size. Our empirical analysis shows that earnings management intensity is related to the interlock relationship between the CEO and the compensation committee, providing evidence that CEOs involved in a relationship with compensation committee are more likely to manage earnings. The positive coefficient on the log of firm size indicates that larger firms are more likely to manage earnings.

There is also evidence of negative associations between the absolute value of discretionary accruals as a percentage of total assets and prior-year ROA and CEO age. Our results indicate that firms with lower profits and younger CEOs tend to have higher earnings management intensity. The other CEO characteristics, such as tenure, do not show significant impact on discretionary accruals. Neither CEO tenure nor prior-year stock return has a significant impact on accruals policy in the full-sample pooled regression.

We conclude that firms tend to have higher earnings management intensity during the year of layoff announcement, and executive compensation structures economically impact the intensity around layoff years. We believe these findings are related to the "big bath" hypothesis that investors and creditors expect better earnings/operating performance subsequent to layoff announcement compared to pre-announcement, and the bonus hypothesis that managers of layoff firms have greater incentive to manipulate earnings due to self-interested motives in firms' stock price.

Table 5
DISCRETIONARY ACCRUALS FROM MODIFIED JONES MODEL FOR LAYOFF FIRMS

The dependent variable is Abs(%DA), i.e., the absolute value of discretionary accruals (defined as the difference between actual accruals and accruals predicted from the modified Jones model as a percent of total assets). The regression sample consists of all 2,188 firm year observations between 1997 and 2006 for 201 layoff firms. The Column 1regression is estimated as a pooled time-series cross-section without fixed- firm effects. Column 2 presents firm and fiscal year fixed-effects results. Year 0 is the year of the layoff announcement. Stockholdings is the fraction of outstanding common shares owned by the CEO. CEO stock option grants are valued using the Black and Scholes (1973) option-pricing model adjusted for dividends. CEO total pay is the sum of cash and stock-based pay. Option ratio is option compensation as a fraction of total compensation. Cash ratio is salary and bonus as a fraction of total compensation. Interlock indicates the CEO is involved in a relationship with compensation committee. Size is the log of the book value of assets in millions of 1992 dollars. ROA is earnings before interest, taxes, depreciation, and amortization, as a percentage of book value of assets. Stock return is the percentage holding-period stock return. Firm and fiscal year dummy variable coefficients are not reported. Heteroskedastic-consistent *t*-statistics appear below each variable in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Explanatory variable	Pooled time-series/cross-section regression (no firm or fiscal year dummies) (1)			Firm and fiscal year fixed effects (2)		
	Beta	t	*p*	Beta	t	*p*
Intercept	0.2375	1.91	.10	--	--	
Layoff year -1(β_1)	0.0042	0.48		0.0047	0.53	
Layoff year 0 (β_2)	0.0494	5.64	.01	0.0499	5.69	.01
Layoff year 1 (β_3)	- 0.0172	-1.92	.10	-0.0170	- 1.89*	.10
Stockholding $_{t-1}$	0.1617	2.15	.05	0.1814	2.43**	.05
Option ratio $_{t-1}$	0.0248	1.68	.10	0.0307	2.13**	.05
Cash ratio $_{t-1}$	0.0392	2.15	.10	0.0450	2.5**	.05
Interlock $_{t-1}$	0.0555	3.29	.01	0.0549	3.26***	.01
lnAge $_{t-1}$	-0.0763	-2.48	.05	-0.0192	-2.57**	.05
lnTenure $_{t-1}$	0.0016	0.43		-0.0002	-0.05	
lnAssets $_{t-1}$	0.0119	4.74	.01	0.0124	4.96***	.01
ROA $_{t-1}$	-0.0008	-2.02	.05	-0.0008	-2.01**	.05
Stock return $_{t-1}$	0.0000	-0.60		0.0000	-0.58	
p-values of F-tests						
H0: $\beta_1 = \beta_2$	0.0577*			0.0586*		
H0: $\beta_2 = \beta_3$	<.0001***			<.0001***		
H0: $\beta_1 = \beta_3$	0.0610*			<.0001***		
N	2188			2188		
F-statistic			9.93***	73.85***		

Earnings Management, Executive Compensation, and Layoff Indicator Variables in the Year of Layoff

We investigate the impact of layoff characteristics and executive compensation on earnings management of layoff firms during the year of layoff. The results in Table 6 indicate that layoff characteristics, such as layoff size and reason of layoff, have no effects on firms' earnings management during the layoff year. In addition, CEO compensation structure has significant impact on earnings management in the year of layoff, larger firms tend to have greater discretionary accruals, and firms with lower ROA the year before announcing employee layoff are more likely to have greater discretionary accruals during layoff year.

We also control for industry characteristics and find that the estimated coefficient of the some industry dummies (Construction, Manufacturing, Transportation, Retail trade, and Finance) are negative and statistic significantly (not shown on the table), which indicates that layoff firms have lower earnings management during the year of layoff in the industries of Manufacturing, Transportation, Retail trade, Finance, and Services. There are no differences in discretionary accruals across fiscal quarters during layoff year. The regression results for industry and fiscal quarter are not presented in the table.

Table 6
REGRESSION OF DISCRETIONARY ACCRUALS ON LAYOFF INDICATOR VARIABLES DURING THE YEAR OF LAYOFF

The dependent variable is Abs (%DA), i.e., the absolute value of discretionary accruals (defined as the difference between actual accruals and accruals predicted from the modified Jones model as a percent of total assets). The sample includes 547 layoff firm-year observations between 1997 and 2006. CEO stock option grants are valued using the Black and Scholes (1973) option-pricing model adjusted for dividends. CEO total pay is the sum of cash and stock-based pay. Option ratio is option compensation as a fraction of total compensation. Cash ratio is salary and bonus as a fraction of total compensation. Interlock indicates the CEO is involved in a relationship with compensation committee. Size is the log of the book value of assets in millions of 1992 dollars. ROA is earnings before interest, taxes, depreciation, and amortization, as a percentage of book value of assets. Stock return is the percentage holding-period stock return. The other control variables include restructuring layoff dummy, layoff size, state of economy dummies, quarter dummies, and industry dummies. Firm and fiscal year dummy variable coefficients are not reported.

Explanatory variable	Pooled time-series/ cross-section regression with firm and fiscal year fixed effects	t-statistics	*p*
Stockholding $_{t-1}$	0.0001	0.92	
Option ratio $_{t-1}$	0.0749	1.68	0.10
Cash ratio $_{t-1}$	0.1160	2.06	0.05
Interlock $_{t-1}$	0.1989	3.77	0.01
lnAge $_{t-1}$	0.0118	0.12	
lnTenure $_{t-1}$	-0.0137	-1.17	
Firm size (lnAssets $_{t-1}$)	0.0238	2.52	0.05
ROA $_{t-1}$	-0.0025	-1.84	0.10
Stock return $_{t-1}$	0.0000	0.41	
Restructuring layoff	-0.0208	-1.13	
Ln(Layoffsize)	0.0049	0.81	
State of economy dummy	0.0363	1.82	0.10
Quarter dummies	Yes	Yes	
Industry dummies	Yes	Yes	
N	547		
F-statistics	4.52		0.01

Earnings Management and Executive Compensation of Layoff Firms and Non-layoff Firms

Regression results shown on Table 7 are based on a full sample of layoff and non-layoff control firms with a dummy variable taking the value of 1 for layoff firms and the interaction terms of the layoff dummy with the test variables. The regression sample consists of all 4,376 firm-year observations between 1997 and 2006 for 201 layoff firms and 201 non-layoff control firms matched on industry (two-digit SIC code), prior performance, and firm size. The positive coefficient on Interaction of L Firm Dummy and Layoff Year t suggests that the absolute value of discretionary accruals as a percentage of total assets is 0.07% higher in layoff firms than in non-layoff firms during the layoff year, consistent with our univariate evidence that firms which announce employee layoffs are more likely to engage in earnings management for window dressing during the layoff year.

The positive coefficient on Interaction of L Firm Dummy and option ratio suggests that CEOs of layoff firms who receive more option awards are more likely to engage in earnings management around layoff years. We suspect these findings support the bonus hypothesis, that CEOs who announce employee layoffs are more likely to engage in earnings management in order to maximize their equity-based compensation.

Our empirical analysis shows that earnings management intensity is related to the interlock relationship between the CEO and the compensation committee, implying that CEOs of layoff firms who are involved in a relationship with the compensation committee are more likely to manage earnings. The positive coefficient on the Interaction of L Firm Dummy and log of firm size indicates that layoff firms with larger size engage in higher intensity of earnings management than non-layoff firms. The results also indicate that layoff firms with younger CEOs and with longer tenure tend to have higher earnings management intensity, compared to non-layoff firms.

In summary, the results in Table 7 further validate our findings that firms tend to have higher earnings management intensity during the year of layoff announcement, and executive compensation structures economically impact the intensity. We suspect these findings are related to the aforementioned “big bath” and bonus hypotheses.

Robustness Testing

To examine whether our results are affected by potential noise associated with recessions, we perform analysis excluding layoff announcements in recession years (i.e. from 2001 to 2003) and obtain virtually the same results as those reported in the text. Table 8 shows that earnings management is significantly higher during the layoff year. The results also suggest positive relationships between CEO stock ownership, option ratio, cash ratio, compensation committee, firm size and earnings management.

Table 7
DISCRETIONARY ACCRUALS FROM MODIFIED JONES MODEL FOR LAYOFF FIRMS AND NON-LAYOFF FIRMS

The dependent variable is Abs (%DA), i.e., the absolute value of discretionary accruals (defined as the difference between actual accruals and accruals predicted from the modified Jones model as a percent of total assets). The regression sample consists of all 4,376 firm-year observations between 1997 and 2006 for 201 layoff firms and 201 non-layoff control firms matched on industry (two-digit SIC code), prior performance, and firm size. Presented are firm and fiscal year fixed effects results. LFirm = '1' if the firm is a layoff firm and '0' if a non-layoff firm. Year 0 is the year of the layoff announcement. Stockholdings is the fraction of outstanding common shares owned by the CEO. CEO stock option grants are valued using the Black and Scholes (1973) option-pricing model adjusted for dividends. CEO total pay is the sum of cash and stock-based pay. Option ratio is option compensation as a fraction of total compensation. Cash ratio is salary and bonus as a fraction of total compensation. Interlock indicates the CEO is involved in a relationship with compensation committee. Size is the log of the book value of assets in millions of 1992 dollars. ROA is earnings before interest, taxes, depreciation, and amortization, as a percentage of book value of assets. Stock return is the percentage holding-period stock return. Firm and fiscal year dummy variable coefficients are not reported. Heteroskedastic-consistent *t*-statistics appear below each variable in parentheses.

Explanatory variable	Firm and Fiscal Year Fixed Effects		
	Beta	t	*p*
Intercept	--	--	--
Layoff year -1	0.0536	3.22	0.05
Layoff year 0	0.0492	2.99	0.05
Layoff year +1	0.0457	2.75	0.05
Stockholding $_{t-1}$	0.0961	0.89	--
Option ratio $_{t-1}$	0.0333	1.84	--
Cash ratio $_{t-1}$	0.0952	4.51	0.01
Interlock $_{t-1}$	-0.0314	-1.09	--
lnAge $_{t-1}$	0.0108	2.67	0.05
lnTenure $_{t-1}$	-0.0114	-2.21	0.05
lnAssets $_{t-1}$	-0.0040	-1.54	--
ROA $_{t-1}$	-0.0058	-13.93	0.01
Stock return $_{t-1}$	0.0002	10.41	0.01
Interaction of LFirm dummy and layoff year -1	-0.0489	-2.58	0.05
Interaction of LFirm dummy and layoff year 0	0.0007	1.84	0.10
Interaction of LFirm dummy and layoff year +1	-0.0627	-3.29	0.01
Interaction of LFirm dummy and stockholding $_{t-1}$	0.0852	0.64	--
Interaction of LFirm dummy and option ratio $_{t-1}$	0.0275	1.84	0.10
Interaction of LFirm dummy and cash ratio $_{t-1}$	-0.0502	-1.78	0.10
Interaction of LFirm dummy and interlock $_{t-1}$	0.0863	2.56	0.10
Interaction of LFirm dummy and lnAge $_{t-1}$	-0.0300	-3.43	0.01
Interaction of LFirm dummy and lnTenure $_{t-1}$	0.0113	1.74	0.10
Interaction of LFirm dummy and lnAssets $_{t-1}$	0.0165	4.47	0.01
Interaction of LFirm dummy and ROA $_{t-1}$	0.0050	8.7	0.01
Interaction of LFirm dummy and stock return $_{t-1}$	0.0000	-1.83	0.10
N	4376		
F-statistic	56.75		0.01

Table 8
DISCRETIONARY ACCRUALS FROM MODIFIED JONES MODEL FOR LAYOFF FIRMS, EXCLUDING RECESSION YEARS 2001-2003

The dependent variable is Abs (%DA), i.e., the absolute value of discretionary accruals (defined as the difference between actual accruals and accruals predicted from the modified Jones model as a percent of total assets). The regression sample consists of 1,387 firm year observations during 1997-2000 and 2004-2006 for 201 layoff firms. The regression is estimated as a pooled time-series cross-section with firm and fiscal-year fixed-effects. Year 0 is the year of the layoff announcement. Stockholdings is the fraction of outstanding common shares owned by the CEO. CEO stock option grants are valued using the Black and Scholes (1973) option-pricing model, adjusted for dividends. CEO total compensation is the sum of cash and stock-based pay. Option ratio is option compensation as a fraction of total compensation. Cash ratio is salary and bonus as a fraction of total compensation. Interlock indicates the CEO is involved in a relationship with the compensation committee. lnAge is the log of CEO age. lnTenure is the log of CEO tenure. Firm size is the log of the book value of assets in millions of 1992 dollars. ROA is earnings before interest, taxes, depreciation, and amortization, as a percentage of book value of assets. Stock return is the percentage holding-period stock return. Firm and fiscal year dummy variable coefficients are not reported. Heteroskedastic-consistent *t*-statistics appear below each variable in parentheses.

Explanatory variable	Firm and Fiscal Year Fixed Effects		
	Beta	t	*p*
Layoff year -1(β_1)	0.0153	0.42	--
Layoff year 0 (β_2)	0.0452	2.03	0.05
Layoff year 1 (β_3)	-0.0202	-1.85	0.10
Stockholding$_{t-1}$	0.2973	2.07	0.05
Option ratio$_{t-1}$	0.0414	2.52	0.05
Cash ratio$_{t-1}$	0.0342	1.67	0.10
Interlock$_{t-1}$	0.1186	3.48	0.01
lnAge$_{t-1}$	-0.1131	-0.85	--
lnTenure$_{t-1}$	-0.0252	-1.49	--
Firm Size$_{t-1}$	0.0281	2.75	0.01
ROA$_{t-1}$	-0.0013	-1.54	--
Stock return$_{t-1}$	0.0000	-0.34	--
p-values of F-tests			
H_0: $\beta_1 = \beta_2$	0.0452**		
H_0: $\beta_2 = \beta_3$	<.0001***		
H_0: $\beta_1 = \beta_3$	<.0001***		
N	1387		
F-statistic	3.47**		

CONCLUSION

Management has variety of ways to manage earnings, e.g., changing accounting methods, liquidating LIFO, expensing R&D, or manipulating accruals. To document accounting choices around layoff announcement, we use the modified Jones model cash flow measure to detect earnings management.

Our results shows that earnings management intensity, as measured by the absolute value of discretionary accruals scaled by asset size, is greater in the layoff year and responds dramatically to management incentives. The importance of our findings is the strong evidence providing that compensation contract design does influence earnings management, and the quality of reported earnings degrades dramatically with option compensation on a presumption that (at least some) managers behave opportunistically, especially during the years of employee layoff announcements. This study contributes to the extant literature in at least two ways. First, this paper examines earnings management and executive compensation in layoff companies and show that earnings management

persists across time, without regard to the size or reason for layoff and in both economic upswings and downswings. Second, we demonstrate that managers use discretionary accruals to respond to external pressures and, when stock-based compensation is present, to serve self-interests in firms' stock prices.

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CEO CHARACTERISTICS, COMPENSATION AND REAL ACTIVITY MANAGEMENT IN MANUFACTURING COMPANIES

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ABSTRACT

Real activities management occurs when companies modify operating practices to meet earnings targets. While this is legal, it is not ethical. There has been extant management research on managerial characteristics associated with unethical behaviors. This study uses that research to predict CEO characteristics, including compensation, related to real earnings management for manufacturing companies.

Our results reveal that the real activity management techniques are related to different CEO characteristics. Less tenured, internally-promoted CEOs with higher ownership interests tend to accelerate sales and/or production. In addition, older CEOs tend to modify production schedules. In contrast, deferring discretionary expenses is associated with compensation variable, most specifically the options held by the CEO. These results are important in explaining the use of real activities management. First, researchers often combine all the techniques into one pool, and these results indicate there variation in when each would be employed. In addition, real activities management is not observable in the financial statements. Therefore, auditors and investors must extend their analysis to verify that earnings have not been manipulated. Accordingly, knowing the CEO characteristics and compensation associated with each technique provides auditors and investors keys to determine which financial results require additional analysis to determine if earnings manipulations are present.

While accounting frauds are the result of unethical behaviors by some executives, accounting results also can be manipulated in less egregious ways. Real activity management refers to changing operating decisions to achieve earnings targets. Managers often engage in this practice because they have incentives to meet earnings targets to receive bonuses and/or maintain a high stock price. While real activity management is not illegal, it is not ethical, especially if the purpose is to misrepresent the financial position of the firm. This study builds on past research that linking ethical behavior to management characteristics to predict and test which CEO characteristics are related to real activity management.

This research is critical to get a clearer picture of the intricacies of earnings management. Deceptive earnings results due to real earnings management is difficult to detect without additional financial statement analysis and other in-depth review. Accordingly, defining antecedents to real earnings manipulation allows auditors and investors to isolate the companies most likely to require this additional scrutiny. By determining the likelihood of different forms of earnings manipulations based on CEO characteristics, auditors and investors can focus their analysis to more efficiently evaluate company performance.

This paper finds there are different CEO characteristics associated with different real activity management techniques. The paper is organized beginning with a review of the earnings

management, followed by hypotheses derived primarily from the management literature. The method to estimate real earnings management follows. The data and regression model used is discussed, followed by the results and conclusions of this study.

LITERATURE REVIEW

The idea behind earnings management is that "managers act as if they believe users of financial reporting data can be misled into interpreting reported accounting earnings as equivalent to economic profitability" (Fields et al., 2001, pg. 279). The reason to manage earnings is normally to increase the firm's stock price and/or increase management compensation, which is often tied to reported earnings or the stock price. While earnings management is not illegal, it reflects a more aggressive interpretation of accounting rules and regulations. In addition, the goal of accounting is to best represent the financial position of the company, so manipulating financial data to distort the economic results is not ethical.

There are two basic types of earnings management techniques: discretionary accruals and real activity (earnings) management. Discretionary accruals occur when management makes a series of accounting method elections to manipulate earnings on the financial statements. Real activity management occurs when management changes the period in which activities are undertaken to change the period in which revenues or expenses are recognized. Unlike discretionary accruals, which have been studied extensively in the literature (Mizik, 2010), this paper will focus on real activity management.

Real activity management involves changing the timing of an event to move the revenue or expense into a different accounting period. For example, a company may relax credit terms to improve sales in the current year. Similarly, a company may choose to delay advertising or maintenance to move expenses to the next year. Again, these methods are not illegal, but if done strictly to change reported profits in the current year, it can result in deceptive financial results of the firm. This form of earnings management is especially unethical when it jeopardizes company performance in subsequent years.

While real activity management has not been as studied as extensively as discretionary accruals, Graham, et al., (2005) report that these techniques are commonly used in American businesses. Based on surveys of top company executives, the authors found that a majority of executives would employ one or more real activity management methods if their companies were faced with missing an earnings forecast. Therefore, investigating the antecedents of real activity management is necessary.

Next, the three real activity management techniques, accelerating sales, delaying or eliminating discretionary expenditures, and accelerating production schedules (Gunny, 2010), will be discussed. While these methods affect accounting results in the current reporting period, they also may have an effect on future firm profits and cash flows. In addition, these three methods also differ in their detectability by investors. Cuts to discretionary accruals are relatively transparent to investors, even though the underlying motivation behind that decision may not be obvious. On the other hand, activities like altering production schedules and adjusting credit terms are more hidden and are less likely to be recognized by investors.

Accelerating Sales

The first documented method of real activity management occurs when a company accelerates sales from the future into the current reporting period. This can be done by increasing

discounts and/or offering lenient credit terms to encourage customers to buy in the current period. The methods used to accelerate sales, for instance, are likely to have a negative effect on profit margins. While providing discounts may result in clearing inventory, it may cause customers to expect the discounts to continue. Relaxing credit terms has a greater potential for jeopardizing future cash flows, especially if cash is never collected from high-risk customers.

Production Scheduling

Production schedules can be changed to impact earnings in a manufacturing environment. Fixed production costs are charged to inventory until the units are sold. Accounting rules require production costs to be deferred until products are sold. By increasing ending inventory, some manufacturing fixed costs are deferred until the subsequent year, resulting in higher reported income in the current year. Therefore, this approach to real activity management results in moving expenses from one year to the next, but it ties up the firm's working capital in excess inventory.

Deferring Discretionary Expenses

Finally, executives can manage earnings by deferring discretionary expenditures on items like research and development or advertising or by eliminating a portion of those expenditures altogether. Delaying or reducing discretionary expenditures has the greatest potential for long-term harm to firm value. Depending on the firm's strategy, underinvesting or delaying investments in research and development can put the company's competitive advantage at risk (Mizik, 2010). Similarly, reducing advertising can jeopardize brand equity. Prior research has shown that investment in marketing and advertising is an easy target when a firm fears that it might fall short of an earnings forecast (Deleersnyder et al., 2009; Mizik, 2010). Finally, delaying maintenance and other discretionary expenses could lead to higher future costs and possibly quality control issues which could impact consumer perceptions and future product sales. Therefore, this approach to earnings management has the greatest possibility of impacting the long-term value of the firm (Mizik, 2010). However, it may be the easiest for investors to detect through comparisons of the financial statements.

HYPOTHESIS DEVELOPMENT

Executive Characteristics and Real Activity Management

In recent years, there has been increasing interest in the characteristics of a firm's top executives in predicting the likelihood of whether the firm will engage in manipulating financial reporting data (Chen, et al., 2015; Ndofor, et al., 2015). This builds on a longstanding tradition of research in strategic management that examines the role of top management team (TMT) characteristics in firm actions and performance (Carpenter, et al., 2004).

Within this tradition, Daboub, et al. (1995) developed a model that linked TMT characteristics to corporate illegal activity. Their model uses external antecedents (the industry and environment) and internal antecedents (size, performance, strategy, structure, and history) to predict corporate illegal behaviors. The authors suggest that various executive characteristics will either neutralize or enhance the impact of the antecedent factors on corporate illegal activity. Specifically, they identify age, length of service, functional background, MBA education,

military service, and a homogeneity/heterogeneity factor as having potential effects. Three aspects of the Daboub, et al. (1995) model will be included in our analysis: age, company tenure, and homogeneity (reliable data were not available for the other antecedents). Additionally, we add two other CEO characteristics to the model: gender and compensation/ownership.

We chose to focus on CEO, rather than the entire top management team, characteristics for two reasons. First, and most importantly, decisions involving earnings management are of the magnitude that CEO involvement is required and CEOs are held accountable for poor accounting choices. Additionally, CEO characteristics, ethics, and decision making have been a longstanding focus in the management literature. Each of the CEO characteristics used in this study is discussed below.

CEO Age

Researchers dating back to the 1960s have linked age to ethical decision-making; the basic premise being that an individual's moral compass develops over time. More recent empirical studies have continued to support the association between age and ethical decision-making in business-related contexts (Peterson, et al., 2001; Low, et al., 2000). Finally, a recent study has linked CEO age to superior financial reporting quality (Huang, et al., 2012). Therefore, older CEOs may be less likely to manage earnings because they are inherently more ethical.

CEO Tenure

Conflicting arguments can be made on the effect of a CEO's tenure on the likelihood that his/her firm may engage in earnings management. Research on corporate "impression management" has shown that CEOs consider meeting short-term earnings targets to be critical to maintaining a positive image both for themselves and for their firms (Graham, et al., 2005). Furthermore, research by Davidson, et al., (2004) links newer CEOs (particularly those who also hold the role of board chair) to being more likely to engage in earnings management as a way of creating positive impressions of their tenure. Additionally, a longer-tenured CEO may feel relatively entrenched and removed from pressures to meet short-term earnings targets.

In contrast, increased tenure can lead to a situation where the CEO accumulates additional power and has fewer checks on his/her behavior. A CEO in that situation may be free from the scrutiny that could temper the ability to engage in nefarious behaviors (Ndofor, et al., 2015). In addition, a longer tenured CEO may encounter the "horizon problem" where he/she chooses to take actions that lead to enhanced short-term performance rather than being geared towards long-term investment (Davidson, et al, 2007).

Given these contradictions, it is not surprising that past empirical studies have found inconsistent relationships between tenure and ethical decision-making (Hunton, et al., 2011). Both the competing arguments and the inconsistent results require us to not predict how CEO tenure will affect if a firm engages in real activity management.

Homogeneity (Internal/External CEO)

Daboub, et al., (1995) predict that homogeneity will strengthen the links between the antecedent factors and illegal activity. While we are focusing on CEO characteristics and not those of the entire TMT, characteristics of a CEO directly affects TMT homogeneity. For instance, the appointment of a CEO from outside the organization is usually a signal that there

will be further changes to the firm's TMT and its strategic decision-making processes. Such an external hire is often disruptive to the current management structure and is likely to cause a reexamination of currently-held beliefs and management practices. We believe that this disruption and resulting introspection is likely to lead to a situation where unethical decision-making, in this case, real activity management, is less likely to take place. Therefore, we predict internally-promoted CEOs will be more likely to engage in real activity management.

CEO Compensation and Ownership

Prior research on CEO compensation and ownership demonstrates that these variables affect strategic decision-making (Dow and Raposo, 2005). CEOs with a significant portion of their compensation tied to firm performance through bonuses (either cash or stock) have an incentive to engage in real activity management. Prior empirical research has supported this view (Achilles, et al., 2013; Bergstresser and Philippon, 2006; Harris and Bromiley, 2007).

While a CEO with a larger ownership position will have a significant stake in the stock price of the company, real activity manipulation generally only benefits the short term. Agency theory suggests that higher levels of ownership should make the CEO more concerned with long-term sustainable growth, as opposed to enhancing short-term earnings. This suggests that CEO ownership should serve as a disincentive to manage earnings in a way that harms long-term firm value.

Thus, we believe that bonus-based CEO compensation and CEO stock ownership will influence the likelihood of real activity management in different ways. CEOs with a higher proportion of their pay earned through bonuses will be more likely to engage in real earnings management, which higher levels of stock ownership will reduce the likelihood of manipulation.

CEO Gender

The influence of gender on ethical choices has been well scrutinized in the literature. While most studies have demonstrated that women typically demonstrate a higher level of ethical behavior (Akaah, 1989; Betz, et al., 1989, Barua, et al., 2010), some have not found any relationship between gender and ethical decisions (Kidwell, et al., 1987). Peterson, et al. (2001) present some evidence that there may be an interaction between age and gender in determining ethical behavior. They found evidence to suggest that while there is a significant difference between younger males and females and ethical behavior, there is little or no difference between older males and females on this dimension. Given the limited number of female CEOs (less than 2% of our sample), we lack the degrees of freedom to test this interaction, so our hypothesis is based on the Akaah (1989) and Betz, et al. (1989) results. We propose that firms with female CEOs will be less likely to engage in real activity management.

METHOD - MEASURING REAL ACTIVITY MANAGEMENT

Models introduced by Roychowdhury (2006) use industry specific relationships to predict the expected level of sales, discretionary expenses, and production. The expected value is estimated for each industry and year and then the company's actual values are subtracted from the expected, resulting in the unexpected amount which is attributed to activities management. The use of this technique has resulted in a stream of accounting research (Xu, et al., 2007).

The first step, therefore, is to estimate normal values. Regression is run on the equations below for each year and each industry (2-digit SIC) to determine the coefficients to predict the expected sales, production and discretionary expenditures for all companies in that industry for that specific year. The variable definitions for the equations below are:

A = Total assets
S = Sales and ΔS_t is sales in year t minus sales in year t-1
CFO = Cash flow from operations
COGS = Cost of goods sold
ΔINV_t = Ending inventory year t minus ending inventory year t-1
PROD = COGS + ΔINV

Accelerating Sales

The potential acceleration of sales is derived from regressing actual cash flows against sales for all companies in the industry. If cash flows are down relative to sales, this may be the result of accelerated sales.

$$CFO_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(\Delta S_t/A_{t-1}) + \varepsilon_t$$

The coefficients from this regression are used to determine if there are unexpected (accelerated) sales relative to each company's cash flows.

Production Scheduling

The dollar value of production is estimated by examining the cost of goods sold and the change in inventory. The following two equations are used to estimate expected levels of those variables.

$$COGS_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \varepsilon_t$$
$$\Delta INV_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(\Delta S_t /A_{t-1}) + \beta_2(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t$$

The value of expected production is the sum of the cost of goods sold and the change in inventory. This sum is substituted for PROD in the equation below.

$$PROD_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(\Delta S_t/A_{t-1}) + \beta_3(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t$$

Again, these regressions are run on each industry and the coefficients used to estimate expected production for each company.

Deferring Discretionary Expenses

Expected discretionary expenditures are determined by the normal percentage of sales within the industry.

$$DISCEXP_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta(S_{t-1}/A_{t-1}) + \varepsilon_t$$

Discretionary expenses are the sum of adverting, research and development, and selling general and administrative expenses. The industry coefficients are used to predict normal discretionary expenses for each company.

Abnormal or Unexpected Activity

The data for each company in the sample are substituted into the equations for the appropriate industry/year to arrive at the expected cash flows, production, and discretionary expenditures. The reported values for each company are subtracted from this expected to get the unexpected or abnormal amount. The amount that differs from the predicted is considered to be the result of activities management. The negative unexpected cash flows are attributed to accelerating sales. The unexpected increase production or reductions in discretionary expenditures are assumed to be the result of delaying those activities.

DATA AND MODEL

Compustat was used to collect the data needed to compute the real activity management variables from 2005–2010. ExecuComp provided the CEO characteristics as well as the compensation data. The sample will be limited to manufacturing because the available activities management techniques vary by industry. The production manipulation, in particular, relates to primarily to manufacturing. This resulted in 4,191 manufacturing firm/years with all required data.

The model tested is:

$$AM = \alpha + \beta_1 Age + \beta_2 Tenure + \beta_3 External + \beta_4 Gender + \beta_5 Ownership + \beta_6 Bonus + \beta_7 OptionsGrant + \beta_8 VestedOptions + \beta_9 GDP + \beta_{10} Assets + \beta_{11} MktBook + \beta_{12} SuspectNI$$

where:

AM = Activity management strategy – either sales, production, or discretionary expenses
Age = Age of the CEO
Tenure = Length of time as CEO
External = 1 if the CEO was with the company less than 2 years prior to becoming CEO; 0 otherwise
Gender = 1 if female; 0 otherwise
Ownership = number of shares owned by the CEO
Bonus = CEO's bonus as a percent of total compensation
OptionsGrant = number of shares granted during the year
VestedOptions = total number of vested options
GDP = percentage change in U.S. GDP from the prior year
Assets = natural log of assets
MktBook = market to book ratio
SuspectNI = 1 if net income divided by lagged assets is between 0 and 1%; 0 otherwise

The control variables were taken from Roychowdhury (2006) and Cohen, et al. (2008) and represent overall market conditions as well as company specific conditions that might impact real activity management other than the CEO characteristics.

Dependent Variables (Activity Management Strategy)

For sales and discretionary expenditures, a reduction in the above measures is indicative of earnings management. This relationship is clear for discretionary accruals, since if the manager delays discretionary expenditures, the reported expenses will be lower than expected. The relationship is less obvious for sales. Accelerating sales is detected by lower cash flows given the reported sales. Therefore, when managers are more lenient with payment terms, the result is less cash flows in the current period than expected given the sales of the company.

For production, when a manufacturer builds inventory, two things happen that will increase this year's earnings. First, the manufacturer's fixed costs are divided among more units, resulting in a lower fixed cost per unit. Second, fixed costs allocated to units produced, but not sold, remain in inventory until the product is sold. This defers a portion of the fixed costs to the next period. Therefore, by increasing production over the expected amount, a manager can increase this period's earnings. Accordingly, positive unexpected production is indicative of activities management to improve financial performance.

To make interpretation easier, we use the inverse of the abnormal cash flows and abnormal discretionary expenditures so a positive sign on each coefficient represents activities management, e.g., a positive sign on a coefficient in the cash flow model indicates it is positively related to accelerated sales.

Independent Variables

Prior research has investigated several variables related to real activity management (Xu, et al. 2007). We used a reduced model from Cohen, et al. (2008). The basic constructs align with Daboub, et al. (1995) and include market conditions and company characteristics.

The percentage change in GDP from the prior year is a measure of the overall health of the economy. The natural log of assets is a commonly used measure of size. The market to book ratio was a significant explanatory variable in Roychowdhury's, et al. (2006) work. In addition, Roychowdhury, et al. (2006) focused on companies with suspect net income, i.e., reported earnings just above zero. This measure is a dummy variable of 1 if net income divided by total assets is positive and less than 1%. This may indicate that the manipulation may have been necessary to avoid a reporting a net loss.

The CEO characteristics were extracted from ExecuComp, so the ExecuComp labels are included below. Age and gender are self-explanatory. Tenure is measured as the years served as CEO. Because there may have been some succession planning, the CEO is identified as an external hire if the CEO is with the company less than two years before being appointed CEO. Ownership is the number of shares owned, excluding options plus the number of restricted shares (SHROWN_EXCL_OPTS + STOCK_UNVEST_NUM) divided by the total shares outstanding from Compustat. Bonus is defined as the annual bonus (BONUS) divided by total cash compensation of salary (SALARY) plus bonus reported on ExecuComp. Options Granted is the number of options granted in the current year (OPTIONS_AWARDS_NUM) divided by the total shares outstanding. The vested options are the total number of unexercised vested options (OPT_UNEX_EXER_NUM) divided by total outstanding shares.

RESULTS

Table 1 presents descriptive statistics and Table 2 shows the correlations. In our sample, the average CEO is 55 years old and has been on the job for about seven years. Approximately 30% were hired from outside the organization and about 2% are female. The CEO averages 10% ownership in the company. In general, these statistics do not differ significantly from prior studies, although the sample appears to have slightly more "outsider", a slightly higher ownership percentage, and fewer female CEOs than recent surveys of corporate leadership report. The regression with all manufacturing companies shown in Table 3 will be analyzed next.

Table 1
Descriptive Statistics

Variable	N	Mean	Std Dev	Min	Max	
Age	4,191	55.39	6.95	29.00	80.00	
Tenure	4,191	6.88	6.72	0.00	30.00	
External	4,191	0.28	0.45	0.00	1.00	
Gender	4,191	0.02	0.16	0.00	1.00	
Ownership	4,191	10.56	14.82	0.00	51.00	*
Bonus	4,191	0.032	0.063	0.00	0.47	
OptionsGrant	4,191	1.70	3.90	0.00	143.34	
VestedOptions	4,191	8.609	13.389	0.00	289.07	
GDP	4,191	0.0124	0.0203	-0.03	0.03	
Assets	4,191	7.33	1.63	0.00	13.07	
MktBook	4,191	1.61	1.61	0.04	14.50	
SuspectNI	4,191	0.03	0.17	0.00	1.00	
Accelerated Sales	4,191	0.28	1.43	-1.70	2.30	*
Production Scheduling	2,750	-0.07	0.46	-5.32	4.30	
Deferring Expenses	4,033	0.04	1.19	-24.21	6.22	

* Winsorized at 1%

Table 2
Correlations

	Tenure	External	Gender	Ownership	Bonus	OptionsGrant	VestedOptions	GDP	Assets	MktBook	SuspectNI
Age	0.4401	-0.0723	-0.0375	0.2065	0.0512	-0.0461	0.0571	0.0286	0.0381	-0.0678	-0.0134
Tenure		-0.0760	-0.0425	0.5633	0.0228	0.0060	0.2604	0.0147	-0.1608	0.0724	-0.00184
External			0.0148	-0.0902	-0.0391	-0.0592	-0.0627	0.0327	0.1541	-0.0323	-0.0344
Gender				-0.0304	-0.0259	-0.0091	-0.0160	-0.00997	0.0355	-0.3328	0.0056
Ownership					0.0422	0.0743	0.2486	0.0017	-0.3162	0.05097	0.01256
Bonus						-0.0462	0.0404	0.1964	-0.0113	0.0279	0.0078
OptionsGrant							0.3072	-0.0236	-0.1952	0.0556	0.0102
VestedOptions								0.03488	-0.27489	0.03305	0.01047
GDP									0.0082	0.1789	-0.0019
Assets										-0.158	-0.0288
MktBook											-0.08626

Table 3
Regression Results
$REM = \alpha + \beta_1 Age + \beta_2 Tenure + \beta_3 External + \beta_4 Gender + \beta_5 Ownership + \beta_6 Bonus + \beta_7 OptionsGrant + \beta_8 VestedOptions + \beta_9 GDP + \beta_{10} Assets + \beta_{11} MktBook + \beta_{12} SuspectNI$

	Expected	Accelerating Sales				Production Scheduling				Deferring Discretionary Exp.			
	Sign	Estimate	Std Err	t-value	Prob	Estimate	Std Err	t-Value	Prob	Estimate	Std Err	t-Value	Prob
Intercept		0.6205	0.1759	3.5278	0.0004 [a]	-0.1599	0.0843	-1.8963	0.0580 [b]	-0.2256	0.1880	-1.1998	0.2303
CEO Characteristics													
AGE	-	-0.0023	0.0029	-0.8016	0.4229	0.0042	0.0014	3.0547	0.0023 [a]	0.0037	0.0030	1.2032	0.2290
TENURE	?	-0.0106	0.0035	-2.9839	0.0029 [a]	-0.0040	0.0017	-2.3234	0.0202 [a]	0.0029	0.0038	0.7675	0.4428
EXTERNAL	-	-0.0985	0.0397	-2.4849	0.0130 [a]	-0.0318	0.0191	-1.6674	0.0955 [b]	-0.0567	0.0419	-1.3538	0.1759
GENDER	-	-0.1323	0.1103	-1.2000	0.2302	-0.1018	0.0558	-1.8252	0.0681 [b]	-0.0968	0.1155	-0.8384	0.4019
OWNERSHIP	?	0.0041	0.0015	2.7431	0.0061 [a]	0.0013	0.0007	1.8995	0.0576 [b]	-0.0026	0.0016	-1.5981	0.1101
Compensation Variables													
BONUS	+	-0.4652	0.2852	-1.6311	0.1029	0.1807	0.1291	1.3995	0.1618	-0.0618	0.3026	-0.2044	0.8381
OPTIONSGRANT	+	0.0013	0.0048	0.2608	0.7942	-0.0024	0.0021	-1.1330	0.2573	-0.0091	0.0051	-1.7781	0.0755 [b]
VESTEDOPTIONS	+	-0.0005	0.0016	-0.3395	0.7343	-0.0005	0.0007	-0.6739	0.5005	0.0041	0.0016	2.5091	0.0121 [a]
Control Variables													
GDP		-5.6498	0.8936	-6.3226	0.0000 [a]	2.1140	0.3874	5.4562	0.0000 [a]	-5.7756	0.9475	-6.0957	0.0000 [a]
ASSETS		-0.0117	0.0120	-0.9776	0.3284	-0.0068	0.0058	-1.1795	0.2383	0.0223	0.0130	1.7240	0.0848 [b]
MKTBOOK		0.0140	0.0113	1.2309	0.2184	-0.0577	0.0051	-11.4132	0.0000 [a]	-0.0122	0.0122	-1.0019	0.3164
SUSPECTNI		-0.2053	0.1019	-2.0133	0.0441 [a]	0.0862	0.0525	1.6404	0.1010	-0.1467	0.1080	-1.3588	0.1743
		N	4,191			N	2,750			N	4,033		
		F	6.74			F	15.69			f	5.26		
		Adj R^2	0.1620			Adj R^2	0.0602			Adj R^2	0.0125		

[a] Two-tailed significance < .05 [b] Two-tailed significance < .10

Control Variables (GDP, Assets, Market to Book Ratios, Suspect Net Income)

With regard to the control variables, GDP is consistently significant, but the sign varies. The size of the firm is significant for discretionary expenditures and the market to book ratio is related to production scheduling. The acceleration of sales is the only method related to suspect net income.

Dependent Variables

Broadly speaking, the results of the regression analysis confirm that characteristics of the CEO are related to the likelihood that a firm will engage in real activity management. However, the relationships between CEO characteristics and the specific activities management technique are not always consistent. This leads to the conclusion that auditors and investors can use the CEO characteristics to predict which activity management behaviors are more likely.

Accelerating sales is associated with less tenured CEOs and they are more likely to be promoted from within the company. In addition, accelerating sales are more likely from CEOs with a higher ownership interest.

The production scheduling technique is employed more by younger CEOs. Like with accelerating sales, these CEOs tend to be have less tenure with the company, but still be not be external hires. More ownership again is associated with unexpected production increases. Males

are more likely to undertake this form of activities management, but that result must be interpreting carefully, since our sample is less than 2% female.

With regard to discretionary accruals, the compensation of the CEOs are predictive of this behavior. The CEO stock options are the significant variables. The more vested options the CEO has, the higher the likelihood that discretionary expenses may be deferred.

These results support the contention that there is a distinction between the CEO characteristics associated with real activity management methods. The characteristics of CEOs choosing to accelerate sales ore production are more similar than those modifying discretionary expenditures. Perhaps this is because of deferring discretionary expenses has a higher probability of affecting long-term firm performance.

CONCLUSION

The results of this study indicate that CEO characteristics are associated with real activity management. Perhaps the most interesting finding from this study is that there are differences in the determinants of the three methods of real activity management. More specifically, the more expedient, but riskier, delay or decrease of discretionary expenditures to increase earnings differs from the use of production and sales activities management. An internally-promoted CEO with fewer years in office but a higher ownership interest is more likely to engage in activities management through sales and production operating decisions. Delaying discretionary expenditures are more related to the CEO's vested options.

Our study has clear limitations. All the models were significant, but, while not unusually low in earnings management research, the R^2 ranged from 16% to 1.2%, indicating there are additional variables to explain these activities. In addition, the CEO is not the only executive to influence real activities management. Thus, capturing information on more members of the firm's top management team would have value. Unfortunately, less data are consistently available for other members of a firm's top management. Other economic, industry, and firm level, variables, such as measures of corporate governance, should be investigated to learn more about the likelihood of real activities management.

There are several implications from our findings. For researchers, further studies of real activities management should not consider the concept as being homogeneous. Rather, the variables related to deferring and/or reducing discretionary expenditures may differ from than those resulting in sales and production activities management.

The most significant is for auditors, boards of directors, and investors. Real activities management only becomes evident when additional business analytics are applied to the financial statements. Understanding the antecedents to activities management will alert auditors, boards, and investors to the situations where the financial statements may be misleading due to real activities management. Not only will this focus the additional analysis to complete audits more efficiently, but it also determines when heightened monitoring by boards and shareholder groups is required.

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UNETHICAL BUSINESS BEHAVIOR AND STOCK PERFORMANCE

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ABSTRACT

This paper examines the stock performance of firms that were implicated in unethical conduct involving bribery, illegal payments, employee discrimination, environmental pollution, and insider trading. A firm's stock performance is compared to the performance of an industry portfolio over the 5-years before and 5, 10, 15, and 20+ years after the announcement of ethical violations. The results show no significant difference between the sample firms' performance and the industry portfolio before the announcement of unethical behavior. However, over the five years following the announcement of ethical violations, there is a significant underperformance for firms relative to their respective industry portfolios. This suggests that unethical business behavior is detrimental to a firm's goal of shareholder wealth maximization. Interestingly, this underperformance disappears in the 5-10 year, 10-15 year and 15-20+ year range, which implies that firms can recover from a lapse in ethical corporate conduct.

INTRODUCTION

A well-established concept in corporate finance is that business decisions should be based on maximizing the wealth of its shareholders. However, a criticism of this concept is that the goal of wealth maximization will encourage businesses to engage in unethical business behavior. Dobson (1993) suggests that ethical business behavior may become secondary to a firm's materialistic objectives, that is, only profits matter. Over the past two decades a variety of headlines (Madoff, Enron, WorldCom, and Arthur Anderson, to name a few) suggest this may be the case. However, many disagree with this statement, believing instead that reputation is superior to profits. It is reasonable to assume that management will be concerned with how consumers view the firm. The advent of the internet makes information on just about anything immediately available. For example, it is easy to quickly compile lists such as: Best Places to Work; Most Liked Firms; and Best Socially Responsible Firms. Dobson (1999) suggests that it may be in the best interest for a rational firm to build and maintain its reputation in order to achieve future economic success.

Several studies such as Long and Rao (1995), Gunthorpe (1997), Karpoff, Lee, and Martin (2008), and Queen (2015) have addressed this question by looking at the effects of unethical business behavior on stock prices in the months prior to and the months after the announcement of unethical behavior. The purpose of this paper is to extend these works by examining the effects of unethical business practices on stock performance over an extended period of time in intervals of 5, 10, 15, and 20+ years.

LITERATURE REVIEW

One problem that arises in the literature is how unethical business behavior is defined. Ethicists often find themselves arguing about how firms should or should not act. For example, is it unethical for a company to implement a strategy of cost cutting that leads to large layoffs? Some would argue that the damage such layoffs impose on local communities outweighs any gains current shareholders may receive. However, the consequences of continuing to operate an inefficient plant also need to be considered. For example, failure to cut costs could lead to bankruptcy and to even greater job losses than the original planned layoff. Dufrene and Wong (1996) believe that the goal of shareholder wealth maximization provides the best framework to serve the needs of all stakeholder groups, not just shareholders. As pointed out by Dufrene and Wong (1996), stockholders do not receive their claim on residual income until all other stakeholder groups such as employees, creditors, suppliers, and federal and state governments have been paid. A basic understanding in business is that risk takers (i.e., shareholders) must be adequately compensated for the risk of losing their invested capital. If shareholders are not adequately rewarded, then they will reduce their risks by withholding capital. Ultimately, the loser will not be the shareholders, but the very groups that ethicists supposedly are trying to protect (stakeholders).

However, Hawley (1991), and Aupperple, Carroll, and Hatfield (1985) suggest that firms may have an incentive to act irresponsibly in order to gain an economic advantage over firms acting responsibly. In his study, Hawley (1991) sites cases where management decisions were harmful to individuals and the environment. However, these cases generally did not involve illegal activity, but simply substituted Hawley's (1991) own moral opinion for what he thought was good or bad corporate behavior. However, Karpoff, Lee and Martin (2008) examined firms under investigation by the SEC from 1978-2002 for financial misrepresentation, and found that there is no economic advantage to be gained from misconduct. The total cost of misconduct was estimated at over $3.08 for every one dollar that market value was increased. They also found that the legal penalties imposed were small ($.36) in comparison to the losses associated with reputational market value ($2.71) after misconduct was discovered. In a similar study, Murphy, Shrieves, and Tibbs (2009) examined the impact of corporate misconduct on earnings and risk. They found significantly negative abnormal returns and higher risk after announced misconduct. Only 6.5% of the loss in shareholder value was due to penalties and fines, while over 90% of the losses in equity value was associated with lost reputation. Thus, given these findings, one would expect that such potential losses should act more as a deterrent to corporate misconduct rather than as an incentive to act irresponsibly as suggested by Hawley (1991).

Long and Rao (1995) averted the controversy as to what is or is not ethical behavior by defining unethical behavior as specific illegal activity (i.e., white collar crime involving bribery and illegal payments, employee discrimination, environmental pollution, and insider trading). Most observers would agree that illegal behavior equals unethical behavior. Therefore, the question is not whether such behavior is ethically wrong, but whether the goal to maximize shareholder wealth encourages such behavior. Long and Rao (1995) also suggest that any gain or advantage received from misbehavior will be lost in the form of penalties, lawsuits, additional monitoring costs of management, and stock price declines. This in turn will lead all stakeholders (stockholders, bondholders, employees, and suppliers, etc.) to question the integrity of the firm and its ability to continue to meet its fiduciary responsibilities. Their findings showed significantly negative cumulative returns totaling almost -2.50% over the month following the announcement of unethical business behavior. Gunthorpe (1997) also examined the stock

performance of firms engaged in illegal, and thus, unethical behavior involving consumer and security fraud, bribery, price fixing, kickbacks, OSHA violations, conspiracy, patent infringement, and EPA violations. However, her study was conducted over a much shorter time period. Gunthorpe's (1997) findings showed a significant one-day penalty of almost 1.3%, and possibly as much as 2.3% over a five-day period following the announcement of ethical misconduct.

In a contrasting study, Tibbs, Harrell, and Shrieves (2011) analyzed long-run operating and stock performance before and after disclosure of misconduct. Their hypothesis was that corporate crime is approached as any other business decision: Are economic gains from misconduct larger than the economic losses? Their results show significantly positive abnormal returns in the five years prior to discovery of misconduct. However, the negative returns in the five year period following discovery only partially offset these gains. Thus, the combined pre- and post-discovery periods showed an overall net benefit from corporate misconduct.

In a more recent study, Queen (2015) examines if maximizing shareholder wealth (shareholder theory) is compatible with corporate social responsibility (stakeholder theory). Enlightened shareholder maximization is a theory that both these objectives are simultaneously compatible. In this study the returns of the 100 Top Corporate Citizens as ranked by Corporate Responsibility Magazine is compared to the returns of the S&P 500 Index from 2000-2012. She finds no significant difference between the returns of The Top 100 companies and the S&P 500 Index, suggesting that being a good corporate citizen toward all stakeholders did not sacrifice maximizing returns to shareholders. Thus, it appears that these firms were able to successfully implement an "enlightened shareholder maximization" strategy without reducing shareholder wealth.

However, Orlitzy (2013) suggests that firm management has some control over information used in reporting corporate social responsibility (CSR). Therefore, management could potentially mask a firm's real CSR effort. To counter this criticism, Elayan, Li, Liu, Meyer, and Felton (2016) use the Covalence Ethical Quote (CEQ) index which ranks the ethical performance of multinational firms. The CEQ does not rely on information controlled by firms and tracks a wide range of corporate ethical issues. Elyan, et al (2016) finds that corporate ethical performance as measured by the CEQ has a significant impact on firm value. A positive change in the CEQ index corresponded with a positive increase in firm value, and a negative change in the CEQ index led to a decrease in firm value.

Overall empirical findings show that unethical business behavior is not compatible with shareholder wealth maximization. That is, firms who act unethically pay a significant penalty in stock price performance. However, most of these studies do not tell us if there is a lasting negative impact on stock price performance, or how much of a deterrent a negative market response may have on management misbehavior. This leads us to another question. Short of large scale fraud, is it possible for firms to recover from prior ethical lapses or violations? We attempt to answer this question by examining the long-term wealth effect of firms committing prior ethical business violations.

DATA AND METHODOLOGY

Data

As previously stated, this research analyzes the firms that were guilty of unethical business practices used in the study by Long and Rao (1995). In their study, they originally listed

49 firms with various ethical violations such as bribery/illegal payments, employee discrimination, environmental pollution, and insider trading. These categories were chosen because they all involved illegal activity, which is clearly unethical by any definition. We chose this particular data set because sufficient time had passed since the announced unethical behavior, making it now possible to measure performance over an extended 20+ year timeframe.

However, various firm changes such as mergers, name changes, sell offs, etc. resulted in missing return data. This reduced the original list of 49 firms to 37 firms over the -5 year to +10 year time period surrounding the unethical behavior announcements. This number reduces to 29 firms for the +10 to +15 year period, and to 23 firms for the +15 to December 31, 2015 time period surrounding unethical behavior announcements. Table 1 shows the 37 firms, their ethical violations, and the date the violation was announced. Return data was collected from the 2015 Center for Research Security Prices (CRSP) database.

Table 1
COMPANY NAMES, DATES, AND ETHICAL VIOLATIONS

Company Name	Date	Ethical Violation	Company Name	Date	Ethical Violation
Albertson's Inc.	05/28/92	Employee Discrimination	Merrill Lynch	04/11/89	Bribery
BankAmerica	01/15/91	Insider trading	Morgan Stanley Group	07/04/92	Bribery
Bethlehem	04/06/90	Enviro Pollution	Northrop	05/03/89	Bribery
Boeing Co.	07/02/92	Enviro Pollution	Nynex Corp	07/12/90	Bribery
Bristol-Meyers Squibb	04/07/92	Enviro Pollution	Nynex Corp Nynex Corp	08/09/91 01/14/93	Insider Trading Employ Discrimination
Coca-Cola Coca-Cola	12/18/90 09/24/92	Employee Discrimination	Occidental Petroleum	09/13/90	Enviro Pollution
Cooper Co	05/22/92	Insider Trading	Pacific Enterprises	03/09/92	Insider Trading
Data General Corp	10/08/92	Bribery, Illegal Payments	PPG Industries	05/17/90	Enviro Pollution
Delta Air Lines	02/14/92	Employee Discrimination	Precision Castaparts	05/16/90	Employee Discrimination
Dexter	06/27/89	Enviro Pollution	Publicker Industries	04/26/91	Enviro Pollution
Digital Equip	03/23/92	Employee Discrimination	Rite Aid	04/28/89	Bribery
Emerson Electric	03/20/89	Bribery, Illegal Payments	Rockwell International	06/27/89	Enviro Pollution
General Dynamics	01/18/89 05/07/90	Bribery, Employee Discrimination	Schering Plough Corp	04/15/92	Insider Trading
General Electric	06/02/89	Bribery	Sundstrand	01/06/89	Bribery
Great Atlantic & Pacific Tea Co.	06/06/90	Insider Trading	Tandem Computers	03/07/91	Insider trading
IBM Corp	02/20/90 09/10/91	Employee Discrimination	Unisys Corp	03/09/89	Bribery
Johnson & Johnson	05/20/92	Bribery	United Technologies	01/05/90	Enviro Pollution
Louisiana Pacific Corp	09/10/91	Enviro Pollution	Unocal Corp	02/23/90	Enviro Pollution
McDonald's Corp	02/28/90	Employee Discrimination	Whittaker Corp	01/31/89	Bribery

Methodology

In most of the earlier mentioned works, an event study methodology was used to measure cumulative excess returns over an n-day period before and after the announcement of unethical corporate behavior. The pre-period ranged anywhere from -5 years to -2 days and the post-period anywhere from +3 days to +5 years. An event methodology generally uses a market model to estimate expected returns and thus find abnormal returns over the event period. However, beta tends to be unstable over long timeframes and in changing market conditions. Therefore, we believe an event methodology is not appropriate in this study, because the time period used is -5 years to 20+ years from the discovery of unethical behavior. Instead of a market model, we compare a firm's performance between the pre-announcement period and the post-announcement period to a benchmark of industry portfolios. By using industry portfolio returns as a benchmark it is not necessary to further risk-adjust each individual firm's daily returns since firms within the same industry generally face similar type risks.

An equally weighted industry portfolio is created for each industry by combining all companies with the same SIC code as the firms in the study. So each firm has a corresponding industry portfolio based on the firm's SIC code. We then collect daily returns from the 2015 CRSP dataset and calculate the average daily return for each individual company and their respective industry portfolios over five different time periods. The time periods used are: (1) the five years prior to the announcement of unethical behavior (-5 to 0 years); (2) the five years after the announcement of unethical behavior (0 to +5 years); (3) the five years to ten years after the announcement (+5 to +10 years); (4) ten years to fifteen years after announcement (+10 to +15 years); and (5) fifteen years to December 31, 2015 after the announcement (+15 to December 31, 2015 years).

To compare how a firm performs relative to its matching SIC industry portfolio, we find the difference between the average daily return for each firm and their respective industry portfolio's average daily return. These differences are then aggregated across all companies in the study within their respective time period to find a mean difference. A paired-T test is then performed to test if the sample firms' average daily returns are significantly different than the average daily portfolio returns. This is repeated for each of the five time periods. This allows a comparison of a firm's performance relative to the performance of their respective SIC industry portfolio.

There is no reason to expect the mean return differences in the pre-announcement period (-5 to 0 years) to be significantly positive or negative. However, based on prior research, we expect the mean differences in daily average returns to be significantly negative in the 0 to +5 year post-announcement period. This would be consistent with prior research. Also, in this research we test if this negative return effect dissipates over time. If this is true, then we expect to find no significant differences in the mean returns for the time periods after 5 years (e.g., +5 to +10; +10 to +15; and +15 to December 31, 2015).

RESULTS

The results of our study are presented in Table 2 and Table 3. Table 2(a) shows the paired-T tests for the -5 to 0 years pre-announcement period. The average daily return for our sample firms in the five years before unethical behavior is about 0.06003%. Comparatively, the average daily return for the industry portfolios is 0.06035%. The difference between the average returns is only -0.00032%. This is not significantly different from zero (p=.976), meaning that

the performance of the sample firms is not statistically different than the performance of the industry portfolios in the 5-year period before the announcement of unethical behavior. However, the results in Table 2(b) show that in the 5-years following the announcement of unethical behavior the average daily return for the sample firms is 0.0717% compared to 0.1073% for the industry portfolios. Thus as hypothesized, we find that the average daily returns for the sample firms significantly underperform the average returns of the industry portfolios by -0.0357% (p=0.025) in the 5-years following the unethical behavior. This result is consistent with and provides further support for Long and Rao (1995), Gunthorpe (1997), Karpoff, Lee, and Martin (2008), and Queen's (2015) findings of significant underperformance in the post-announcement period. This result also makes Hawley (1991), Aupperple, Carroll, and Hatfield (1985), and more recently Tibbs, Harrell, and Shrieves (2011) suggestion that firms can gain an economic advantage by acting irresponsibly less convincing. In fact, it appears that firms face a significant and prolonged period of underperformance (+5 years) relative to other firms in their respective industries.

Table 2
PAIRED-T TESTS OF MEAN RETURNS (-5 YEARS AND +5 YEARS)

Panel (a) Pre-Announcement (-5 years)	**Firm Average Daily Return**	**Industry Portfolio Average Daily Return**	**Difference between mean returns**
Mean	0.06003%	0.06035%	-0.00032%
Std. Error	0.0076%	0.0070%	0.0107%
t-value	7.90	8.57	0.03
Pr>|t|	<0.0001	<0.0001	0.976
Panel (b) Post-Announcement (+5 years)	**Firm Average Daily Return**	**Industry Portfolio Average Daily Return**	**Difference between mean returns**
Mean	0.0717%	0.1073%	-0.0357%
Std. Error	0.0100%	0.0121%	0.0176%
t-value	7.16	8.88	-2.03
Pr<t (left tail test)	<0.0001	<0.0001	0.025

Another purpose of this study was to determine if the underperformance continued 10, 15, or even 20+ years past the prior unethical behavior. Table 3 shows the results of extending the time period beyond five years. We looked at three additional timeframes: +5 to +10 years in Table 3(a); +10 to +15 years in Table 3(b); and +15 to December 31, 2015 years in Table 3(c). These results are interesting because we find that the underperformance disappears in all timeframes past 5 years. Although the sample firms had lower average returns than their respective industry portfolios, the differences in their means (-0.0224%, -0.0216%, -0.0038%) are not significantly different from zero. This implies that in all three subsequent time periods past 5 years the sample firms performed no better or worse than the average firm in their respective industry. This is encouraging because it suggests that firms may be able to recover after a lapse in ethical corporate conduct.

Table 3
PAIRED-T TESTS OF MEAN RETURNS OVER VARIOUS TIMEFRAMES

Panel (a) Pre-Announcement (+5 to +10 years)	**Firm Average Daily Return**	**Industry Portfolio Average Daily Return**	**Difference between mean returns**
Mean	0.0648%	0.0872%	-0.0224%
Std. Error	0.0246%	0.0086%	0.0247%
t-value	2.64	10.10	-0.91
Pr>|t|	0.012	<0.0001	0.371
Panel (b) Post-Announcement (+10 to +15 years)	**Firm Average Daily Return**	**Industry Portfolio Average Daily Return**	**Difference between mean returns**
Mean	0.0614%	0.0830%	-0.0216%
Std. Error	0.0228%	0.0086%	0.0263%
t-value	2.69	9.70	-0.82
Pr>|t|	0.012	<0.0001	0.419
Panel (c) Pre-Announcement (+15 to 12/31/2015	**Firm Average Daily Return**	**Industry Portfolio Average Daily Return**	**Difference between mean returns**
Mean	0.0540%	0.0578%	-0.0038%
Std. Error	0.0120%	0.0060%	0.0142
t-value	4.52	9.70	-0.27
Pr>|t|	0.0002	<0.0001	0.79

CONCLUSIONS

Based on the results of this study and prior studies, it appears that ethical behavior does matter. Firms who act unethically apparently pay a significant penalty in stock price performance once the behavior is discovered. The associated penalties in firm reputation and fines have resulted in significantly negative stock returns. More importantly this study shows that the penalty can last as long as five years past discovery. The implication of this is that unethical business behavior is not compatible with shareholder wealth maximization.

Another focus of our study was to examine whether firms could recover from prior ethical violations. Here we find encouraging news. It appears that the negative effect on firm performance disappears after five years. We find all three timeframes after five years show no significant difference between our sample firms' average return versus their respective industry's average return. Although five years of underperformance can have a significant impact on a stockholder's return, it appears that firms are able to eventually recover from their past unethical behavior. Therefore, corporate managers, CEO's, and Boards of Directors may find the information in this study useful. Given the potential downside effects of unethical behavior on stock price, it would be prudent for management to quickly rectify any type of ethical misbehavior. The failure of management to acknowledge the importance of business ethics could result in stockholders earning significantly lower returns.

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DOES BOOK-TAX DIFFERENCE INFLUENCE THE VALUE RELEVANCE OF BOOK INCOME? EMPIRICAL EVIDENCE FROM JAPAN

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ABSTRACT

This paper analyzes the effects of the book-tax difference (BTD) on accounting accruals and value relevance. Recent studies argued that book-tax conformity increases earnings quality. However, other studies argued that book-tax conformity decreases earnings quality. The previous studies failed to isolate the components of BTD, and they did not consider the design of the operation of accounting or tax systems, which is the reason for the conflicting results. This paper isolates the elements of BTD and compares these elements and similar items. In addition, this paper focuses on the timing of changing accounting and tax systems. We predict and find that (1) large discretionary book-only accruals (DBOA) reduce the value relevance of earnings, (2) the value relevance of firms with large non-discretionary book-only accruals (NBOA) are higher than other firms. However, this result is not clear from a comparison of the value relevance of firms with large non-discretionary book-tax accruals (NBTA), and (3) the relationship between BTD and value relevance depends on the accounting system and the taxation system.

INTRODUCTION

This paper analyzes the effects of the book-tax difference (BTD) on accounting accruals and value relevance. In 1999, the US Treasury (US Department of the Treasury, 1999) noted increasing differences between reported income and taxable earnings. The issue of BTD has since been widely debated in the United States. BTD also attracted attention in Japan, where problems developed with respect to the strong relationship between individual financial statements and taxable income and the treatment of individual financial statements under International Financial Reporting Standards (IFRS).

The Japanese tax system had been designed with conforming book income and taxable income until around the year 2000. This book-tax system design contributes to reducing costs for taxpayers and tax authorities; for example, the costs of tax income recalculation for the taxpayer and the costs of tax inspections for tax authorities. However, one of the purposes of a tax system is to implement fair taxation. This purpose differs from that of financial accounting systems, which provide information to investors. Around the year 2000, financial accounting systems were rapidly changed to harmonize with IFRS (or International Accounting Standards: IAS). Because these new rules require the provision of information to investors, Japanese tax authorities and accounting standard setters are considering whether or not book-tax conformity is necessary (Suzuki 2013). If the tax system infers firm manager accounting behaviors, firm managers may prioritize tax savings rather than the provision of information to investors, and the purpose of accounting systems will not be achieved. The purpose of this paper is to investigate whether the book-tax conformity (or difference) influences earnings quality.

Dechow and Schrand (2004) defined earnings quality and stated that “a high-quality earnings number is one that accurately reflects the company’s current operating performance, is a

good indicator of future operating performance, and is a useful summary measure for assessing firm value (Dechow and Schrand 2004, p.5)." Earnings quality has been discussed in various forms. For example, accrual quality, earnings persistence, and the usefulness of forecasting are popular indicators of earnings quality. Dechow and Dichev (2002) defined accrual quality as the magnitude of the estimation error of future cash flow. Lev (1983), Ali and Zarowin (1992), and Francis *et al.* (2004) used a first-order autoregressive model (AR1) to estimate earnings persistence. Dechow *et al.* (1998) developed models of accounting processes and revealed that accruals improve the accuracy of future cash flow forecasting.

The relationship between earnings and stock return (value relevance) is also a popular indicator of earnings quality. This relationship is estimated by the coefficient of earnings in a return-earnings regression model. This coefficient is called the earnings response coefficient (ERC). The value relevance is changed by the information that correlates with economic income. Kothari and Zimmerman (1995) and Kothari (2001) indicated that value relevance decreases when the income includes noise that is uncorrelated with economic income. This study focuses on the value relevance of book income to investigate the relation between BTD and information content of book income.

Many articles that investigate BTD and earnings quality have been published; however, there is no consensus with respect to the effects of BTD on earnings quality. Some studies have argued that book-tax conformity improves earnings quality (Desai 2003, 2005; Hanlon 2005; Mills 1998; Mills and Newberry 2001), whereas other studies have argued that BTD improves earnings quality. Hanlon *et al.* (2008), for example, used a sample of firms that were required for tax purposes to adopt the accrual method in place of the cash method, thereby increasing the degree of conformity between book and taxable income. The authors found that firms employing the accrual method exhibited a greater decrease in the earnings-return relationship compared to the same firms using the cash method. Moreover, Atwood *et al.* (2010) indicated that BTD improves earnings persistence and earnings to future cash flow relations.

Using a sample of Japanese firms, we attempt to study the potential implications of BTD caused by various factors such as earnings management and system change. A major BTD difference between Japan and other countries is that, in Japan, the majority of BTD is composed of accruals. We link the studies on BTD and accruals using Japanese data. Moreover, after 1998, Japanese accounting and tax systems changed, and Japanese firms faced an expansion in BTD. Using Japanese data, we observe the influence of BTD in different environments. Observing the effect of BTD components and the effect of a changing environment is significant because prior studies have revealed that managers select methods of earnings management to achieve financial and tax purposes[1]. Some prior studies have also suggested that the influence of BTD on earnings quality might be changed by the design and the operation of accounting and tax systems (Ali and Hwang 2000, Guenther and Young 2000, Hung 2001). These factors might resolve the conflicting results of previous BTD studies.

Accrual based earnings management research includes studies of earnings management with relatively low book-tax conformity and earnings management with relatively high book-tax conformity. Northcut and Vines (1998) conducted a study of earnings management with relatively low book-tax conformity and found that managers use accruals with relatively low book-tax conformity to minimize political cost. Phillips *et al.* (2003; 2004) indicated that deferred tax expense (one of the components of accruals with relatively low book-tax conformity) can be applied to detect earnings management. Guenther (1994) conducted a relative study of earnings management with relatively high book-tax conformity and found that managers

use working capital accrual[2] for tax purposes. Guenther *et al.* (1997) and Yamashita and Otogawa (2008) also indicated that firms use accruals with relatively high book-tax conformity to minimize tax cost. Calegari (2000) investigated discretionary book-tax accruals (DBTA) and discretionary book-only accruals (DBOA). He revealed that managers distinguish between the two types of accrual and use DBTA (DBOA) to minimize tax cost (to accomplish financial reporting objectives).

Some studies concerning BTD have tested the effects of institutional BTD and discretionary BTD on earnings quality (Ayers *et al.* 2009; Blaylock *et al.* 2012; Tang and Firth 2012). These studies indicated that increasing discretionary BTD (BTD caused by earnings management and tax avoidance) reduces earnings persistence and value relevance. Tang and Firth (2012) decomposed Chinese firm BTD to institutional BTD and discretionary BTD. The authors found that increasing institutional and discretionary BTD reduced earnings persistence. Moreover, the authors found that discretionary BTD causes lower earnings persistence than institutional BTD. The authors also found that institutional BTD increases value relevance. These results suggest that the influence of these elements is different.

This study decomposes total book-only accruals to non-discretionary book-only accruals (NBOA) and DBOA. Almost all BTD in Japan occurs from total book-only accruals. Therefore, we can decompose total book-only accruals easily using a Japanese dataset. This decomposition allows us to unite the studies of BTD and accruals. A substantial number of prior studies address accruals. We can discuss BTD using these accrual studies. Moreover, we compare the accruals (NBOA and DBOA) and accruals that do not cause BTD (non-discretionary book-tax accruals: NBTA and DBTA). The accruals relate to future cash flow and the accuracy of forecasting (Dechow and Dichev 2002, Dechow *et al.* 1998). To investigate the specific influence of BTD, we compare the two types of accruals (book-tax accruals and book-only accruals)[3]. This subject is one of our contributions to the existing research.

We focus on the timing of accounting and tax system changes. Hanlon, Maydew, and Shevlin (2008) and Tang and Firth (2012) indicated that BTD (especially institutional BTD) improves earnings quality. Ali and Hwang (2000) and Guenther and Young (2000) also revealed that several country-specific factors, which include the degree of BTD and legal factors, influence earnings quality. However, Hung (2001) used BTD as a control variable to test for value relevance and indicated that BTD did not show significant influence after controlling for other factors. BTD is likely to be dependent on legal systems, and the BTD effect might be altered by the design and the operation of the accounting and tax system. Therefore, BTD (institutional BTD) do not always improve earnings quality. To test this, we focus on the period of the accounting big bang in Japan. During this period, although the degree of BTD increased, accounting standards were unstable.

In addition, the analysis in the current study uses individual Japanese financial statements. Taxable income is calculated from book income of individual financial statements; therefore, tax avoidance through havens does not affect Japanese BTD. Moreover, the Japanese companies also disclosed actual taxable income up to fiscal year 2004.[4] Therefore, it is possible to reduce the estimation error of the taxable income. These points are advantages for our research design and allow us to accurately estimate BTD.

Our results reveal the following: (1) large discretionary book-only accruals (DBOA)[5] reduce the value relevance of earnings, (2) the value relevance of firms with large non-discretionary book-only accruals (NBOA) is greater than the value relevance of other firms; however, this result is not clear from a comparison of the value relevance of firms with large

non-discretionary book-tax accruals (NBTA), and (3) the relationship between BTD and value relevance depends on the accounting system and the taxation system. The relationship between BTD and earnings quality is complex. Because large NBOA increases the value relevance, earnings quality is improved when the BTD increases. However, our results suggest that this improvement occurs from accruals and is not BTD-specific. Moreover, large discretionary BTD (DBOA) decreases earnings quality. Therefore, if the accounting system and the tax system are separate, reducing the discretion of financial statements might be effective in improving the quality of earnings. Additionally, the relationship between BTD and earnings quality is affected by both the accounting and tax systems. Therefore, policy makers of accounting systems should consider the accounting and tax systems to improve the quality of book income.

This paper is organized as follows. Section 2 provides an overview of Japanese BTDs. The simple model and hypotheses are presented in Section 3. Section 4 contains the research design. The main results and robustness checks are described in Section 5, and Section 6 presents the conclusions.

BOOK-TAX DIFFERENCE IN JAPAN

Institutional Book-tax Difference

The Japanese corporate tax system is dependent on the accounting system. There is, therefore, a strong relationship between the corporate tax system and the accounting system (Suzuki 2013). In Japan, book income is calculated by individual financial statements first, and taxable income is calculated from book income. Therefore, the accounting policy that is used to calculate book income must also be applied to the calculation of taxable income. Moreover, taxable revenue and taxable expense must be accounted for in book revenue and book expense. These relationships between the accounting system and the corporate tax system are called "kakutei-kessan shugi." Under the Japanese tax system, individual financial statements are not affected by consolidated grouping,[6] and tax avoidance does not cause BTD.

The financial accounting system is based on the accrual method to provide useful information to investors. However, the tax accounting system is based on the vesting principle to ensure fairness and to prevent tax avoidance. Therefore, when depreciation and allowance for doubtful accounts exceed the upper limit as determined by tax law, they are not recognized in taxable income. Bonus allowances can be recognized in book income; however, they cannot be recognized in taxable income. The result is that the majority of BTD is caused by accounting accruals (such as depreciation, amortization, and allowances), and Japanese BTD is mostly negative.

The Tax Reform Act of 1998 and the Accounting Big Bang

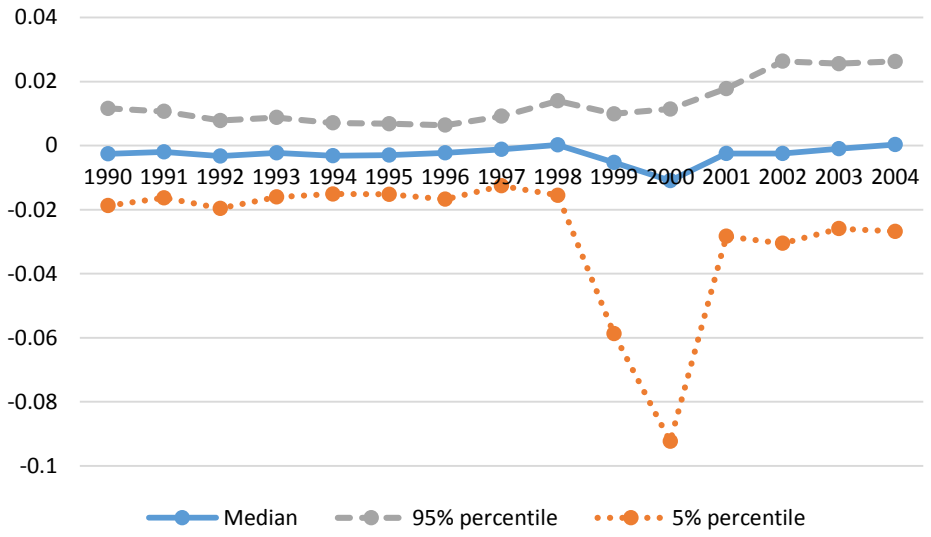
From fiscal year 1998 to 2001, significant accounting system and institutional tax system change occurred. These institutional changes had the following effect. Because discretionary taxable income decreased following the Tax Reform Act of 1998, and the accounting system was significantly revised by the Accounting Big Bang, firms were forced to increase BTD.

The corporate tax system no longer accepted certain accounting treatments that were accepted by accounting standards for the securing of financial resources. The Tax Reform Act of 1998 that was implemented included the abolition of installment sales, the abolition or reduction

of allowances, and the unification of the straight-line method of depreciation for buildings. As a result of the Tax Reform Act of 1998, the relationship between book income and taxable income was weakened.

From 1998, accounting standards for individuals were progressively established to harmonize with international accounting standards (a phase called the Accounting Big Bang in Japan). The standards included those for tax effect accounting and the standards for retirement benefits, which were established in 1998; the standards for financial instruments, which were established in 1999; and the standards for the impairment of fixed assets, which were established in 2002. As a result of the continuous revisions in accounting standards, companies expanded the degree of BTD because the various accounting treatments of new accounting standards differed from treatments, which the taxation system had defined.

Figure 1
BTD IN JAPAN



Summary of BTD of our sample from Japan. BTD is calculated by net income minus taxable income and is deflated by total assets t - 1.

Figure 1 summarizes the magnitude of the accounting big bang in Japan. Before 1997, the median BTD (deflated by total assets of t - 1) of our sample tends to become negative, and BTD is distributed near zero. Contrastingly, since 1998, the distribution of BTD has expanded. Kometani (2006) investigated the impact of these system changes on BTD. The author indicates that BTD increased after 1998, and the system changes of 1998 affected the characteristics of BTD in Japan.

HYPOTHESIS DEVELOPMENT

Simple model

To provide a structure on which to base the hypotheses, we introduce a simple model based on the research of Hanlon *et al*. (2008) (Kothari and Zimmerman 1995 and Kothari, 2001 also indicate this type of model). We define *X* as accounting income, *x* as economic income, *u* as noise, and *f* as bias. Hanlon *et al*. (2008) define *f* as downward bias. However, the bias is not defined as downward bias because doing so would prevent a discussion concerning upward earnings management. Given the limitations of adjusted earnings, the range assumes $-1 < f < 1$.

$$X = (1 + f)\, x + u \tag{1}$$

Assume that stock returns reflect economic earnings, $R = x$. However, the firm's reported earnings are not *x* but rather, *X*, and we estimate

$$R = a + bX + e \tag{2}$$

where *b* is the estimated earnings response coefficient (ERC).

$$b = (1 + f)\, \sigma^2(x) / \{(1 + f)^2 \sigma^2(x) + \sigma^2(u)\} \tag{3}$$

The following relationship is derived differentiating each noise ($\sigma^2(u)$) and bias (*f*) in equation (3).

$$\partial b / \partial \sigma^2(u) < 0 \tag{4}$$

$$\partial b / \partial f < 0 \quad \text{if} \quad f > \{\sigma(u)/\sigma(x)\} - 1 \tag{5}$$

$$\partial b / \partial f > 0 \quad \text{if} \quad f < \{\sigma(u)/\sigma(x)\} - 1 \tag{6}$$

If accounting income (*X*) reflects economic income (*x*) perfectly, $b = 1$. However, equations (4), (5), and (6) show that the ERC (*b*) is influenced by both noise *u* and bias *f*. For instance, if the ratio of noise and economic income is 1:5, ERC becomes negative when bias is greater than -0.8 ($f > -0.8$), and ERC become positive when bias is less than -0.8 ($f < -0.8$). Tax income is linked to book income in Japan; therefore, manager usually does not reduce the tax income extremely. Moreover, the standard deviation of the adjustable portion is usually less than the standard deviation of economic income. Therefore, equation (5) is true in most cases.[7]

Value Relevance and Book-tax Difference in Earnings Management

Mills and Newberry (2001) and Phillips *et al*. (2003, 2004) revealed the existence of earnings management with relatively low book-tax conformity. Mills and Newberry (2001) indicated that earnings management incentives, such as financial distress, influence BTD. Phillips *et al*. (2003, 2004) posited that room for earnings management in taxable income is less than that for book income, and the authors indicate that BTD is useful in the detection of earnings management to avoid loss and decline.

If the management of earnings can be achieved with relatively low book-tax conformity, managers will exhibit greater upward earnings because they are not required to consider tax cost. For instance, Guenther *et al*. (1997) indicated that firms employ upward earnings management in cases of large BTD. Calegari (2000) indicated that managers use DBOA for long-term upward earnings without a corresponding upward taxable income.

These prior studies suggest that DBOA creates noise (u) and an upward bias ($f > 0$) in accounting earnings. Noise and upward bias decrease the earnings response coefficient (equations 4 and 5). However, accounting accruals are useful for forecasting future earnings (Dechow, 1994) and these do not always create noise and bias in book income. Therefore, we focus on firms with substantial DBOA.

H1a *Ceteris paribus, the ERC of firms with a large absolute value of DBOA is low compared to other firms.*

The difference between DBOA and DBTA must be considered. Extreme earnings management creates noise in book income. However, in a book-tax conformity situation, downward earnings management is increased because tax cost is considered. Guenther *et al*. (1997) indicated that managers largely engage in downward earnings management in situations of book-tax conformity. Guenther (1994) and Calegari (2000) suggested that DBTA is used to minimize tax cost. Baez-Diaz and Alam (2013) also indicated that DBTA is lower than DBOA.

Earnings management by DBTA, although it creates noise (u) similar to earnings management by DBOA, also creates downward bias ($f < 0$ or $f = 0$) in book income. Therefore, earnings management by DBOA reduces the earnings response coefficient to a greater extent than earnings management by DBTA (equation 5).

H1b *Ceteris paribus, the ERC of firms with a large absolute value of DBOA is lower than the ERC of firms with large absolute value of DBTA.*

Value Relevance and Institutional Book-tax Difference

Recent studies suggest that increasing institutional BTD can improve earnings quality. Hanlon *et al*. (2008) and Tang and Firth (2012) indicated that earnings quality improves in situations of large BTD because managers can use book income to reflect private information without concern for tax costs. Atwood *et al*. (2010) suggested that earnings persistence and earnings to future cash flow relations are weak in countries that require book-tax conformity. Baez-Diaz and Alam (2013) argued that the market creates mispricing of earnings persistence by the tax system because the tax system is complex and not designed to provide investor information. Previous studies have found that, if the accounting system is disconnected from the tax system, private manager information is reflected in book income, and the ERC increases because noise is reduced (equation 4). We propose the following hypotheses to examine these findings.

H2a *Ceteris paribus, the ERC of firms with a large absolute value of NBOA (non-discretionary accruals that generate institutional BTD) is higher compared to other firms.*

H2b *Ceteris paribus, the ERC of firms with a large absolute value of NBOA is higher than the ERC of firms with large absolute value of NBTA (non-discretionary accruals that do not generate BTD).*

The relationship between the value relevance and elements of BTD depends on the design and operation of the accounting (tax) system. For example, when accounting standards are unstable, or when noise is not included in taxable income, the ERC may not increase with an increase in BTD. In 1998, the tax system was revised to reduce discretionary taxable income, and the relationship between book income and taxable income became weak in Japan. Additionally, the Japanese accounting standards were revised after 1998. Consequently, although BTD increased, the book income of substantial BTD firms began to include some temporary components.

Hanlon *et al*. (2005) compared the information content of taxable income and book income. The authors revealed that taxable income also contains additional information concerning firm performance. Kometani (2005) investigated the value relevance of book and taxable income in Japan. He revealed that the difference between the explanatory power of book income and taxable income on stock returns in Japan is minimal. Additionally, the explanatory power of taxable income is greater than that of book income in several periods of analysis. Onuma, Suzuki, and Yamashita (2009) indicated that the value relevance of book income became lower than the value relevance of taxable income in Japan after 1998. We, therefore, propose the following hypothesis.

H3a *Ceteris paribus, following revisions in the accounting and tax systems (after fiscal year 1998), the ERC of firms with large absolute value of DBOA/NBOA is lower than it had been prior to the accounting and tax system revisions (before fiscal year 1997).*

H3b *Ceteris paribus, the level of reduction in the ERC of firms with large absolute value of DBOA/NBOA, as a result of accounting and tax system revisions, is greater than the level of reduction of the ERC of firms with large absolute value of DBTA/NBTA.*

EMPIRICAL DESIGN

Measuring Accruals

To analyze BTD, we decompose the accruals. The total accruals (TA) are calculated as follows.

$$TA = \Delta(CA - CASH - FINANCIAL\_CA) - \Delta(CL - FINANCIAL\_CL) - \Delta OTHER\_ALLOWANCE + OTHER\_PL\_ACC - DEP \quad (7)$$

In equation 7, Δ represents the difference from year t - 1 to year t, CA represents current assets, CASH represents cash and deposits, CL represents current liabilities, and DEP represents depreciation and amortization. We have calculated other items as follows:

FINANCIAL_CA: Short-term investment securities + short-term loans receivable + treasury stock + money held in trust.

FINANCIAL_CL: Short-term loans payable + commercial papers + current portion of long-term loans payable + current portion of bonds and convertible bonds + notes payable facilities + accounts payable facilities.

OTHER_ALLOWANCE: Δallowance for doubtful accounts (in fixed assets) +Δprovision (in fixed liabilities).

OTHER_PL_ACC: Gain in asset valuation − loss in asset valuation + gain in revaluation of securities (extraordinary item) − loss in revaluation of securities (extraordinary item) − impairment loss.

Total book-only accrual (TBOA) is obtained by calculating BTD. Calegari (2000) and Baez-Diaz and Alam (2013) calculate TBOA and total book-tax accrual (TBTA) by classifying each component of the accrual. However, we cannot classify each component of the accrual under Japanese accounting standards because the items are eliminated from a calculation of taxable income when they exceed the predetermined amount. Northcut and Vines (1998) consider that BTD is TBOA. We assume that BTD is TBOA because the majority of BTD elements are accruals in Japan.

$$TBOA = net\ income\ before\ tax - taxable\ income \quad (8)$$
$$TBTA = TA - TBOA \quad (9)$$

To estimate discretionary accruals (DBOA, DBTA), we employ the Jones model (Jones, 1991) and the forward-looking (FL) model by Dechow *et al.* (1995) and Dechow *et al.* (2003). Because Japanese TBOA (BTD) includes items that are affected by forward-looking statements such as allowances, we also employ the FL model. We estimate these models by each industry[8] and each year. Subscripts that represent the industry and the year are omitted.

$$TBTA = a_0 + a_1 \Delta REV + a_2\, GPPE + e_1 \quad (10)$$
$$TBOA = b_0 + b_1 \Delta REV + b_2\, GPPE + e_2 \quad (11)$$

$$TBTA = c_0 + c_1\,((1+k)\Delta REV - \Delta AR) + c_2\, GPPE + c_3\, LAG\_TBTA + c_4\, GR\_REV + e_3 \quad (12)$$
$$TBOA = d_0 + d_1\,((1+k)\Delta REV - \Delta AR) + d_2\, GPPE + d_3\, LAG\_TBOA + d_4\, GR\_REV\, e_4 \quad (13)$$

REV represents revenue, AR represents accounts receivable, GPPE represents gross property, plant, and equipment and these variables are deflated by total assets for the year t - 1. LAG_TBTA (LAG_TBOA) represents the lagged variable of TBTA (TBOA). GR_REV represents the growth rate of revenue.[9] The value of k is the regression coefficient of ⊿REV for ⊿AR.[10] NBTA is estimated by equation 10 and equation 12, and these residuals are DBTA. NBOA is estimated by equation 11 and equation 13, and these residuals are DBOA.

The Empirical Model

This paper investigates the relationship between BTD components and value relevance by comparing firms with large DBOA (NBOA) and firms with large DBTA (NBTA). Consistent with Kothari and Zimmerman (1995), Francis and Schipper (1999), and Hanlon *et al*. (2008), we use the following regression model.[11] This model supposes that the market return provides richer information than accounting earnings; therefore, these models do not require that financial statements be the earliest source of information.

$$RET = \alpha_0 + \alpha_1 QDBTA + \alpha_2 QDBOA + \alpha_3 QNBTA + \alpha_4 QNBOA + \alpha_5 X + \alpha_6 X*QDBTA + \alpha_7 X*QDBOA + \alpha_8 X*QNBTA + \alpha_9 X*QNBOA + \alpha_{10} Change + \alpha_{11} Change * QDBTA + \alpha_{12} Change * QDBOA + \alpha_{13} Change*QNBTA + \alpha_{14} Change * QNBOA + \alpha_{15} Change*X + \alpha_{16} Change * X * QDBTA + \alpha_{17} Change * X * QDBOA + \alpha_{18} Change * X * QNBTA + \alpha_{19} Change * X * QNBOA + \alpha YEAR + \alpha IND + \varepsilon_1 \quad (14)$$

$$RET = \beta_0 + \beta_1 QDBTA + \beta_2 QDBOA + \beta_3 QNBTA + \beta_4 QNBOA + \beta_5 BV + \beta_6 BV * QDBTA + \beta_7 BV * QDBOA + \beta_8 BV * QNBTA + \beta_9 BV * QNBOA + \beta_{10} X + \beta_{11} X * QDBTA + \beta_{12} X * QDBOA + \beta_{13} X * QNBTA + \beta_{14} X * QNBOA + \beta_{15} Change + \beta_{16} Change * QDBTA + \beta_{17} Change * QDBOA + \beta_{18} Change * QNBTA + \beta_{19} Change * QNBOA + \beta_{20} Change * BV + \beta_{21} Change * BV * QDBTA + \beta_{22} Change * BV * QDBOA + \beta_{23} Change * BV * QNBTA + \beta_{24} Change * BV * QNBOA + \beta_{25} Change * X + \beta_{26} Change * X * QDBTA + \beta_{27} Change * X * QDBOA + \beta_{28} Change * X * QNBTA + \beta_{29} Change * X * QNBOA + \beta YEAR + \beta IND + \varepsilon_2 \quad (15)$$

RET: Market value of equity at the fiscal year end of t. It is scaled by the market value of equity at the fiscal year end of t - 1.

X: Net income before tax. It is scaled by the market value of equity at t - 1.

BV: Book value of net assets. It is scaled by the market value of equity at t - 1.

QDBOA: QDBOA is a dummy variable. If the absolute value of DBOA is 25% of the highest ranking of each year, it is 1 and 0 otherwise.

QDBTA: QDBTA is a dummy variable. If the absolute value of DBTA is 25% of the highest ranking of each year, it is 1 and 0 otherwise.

QNBOA: QNBOA is a dummy variable. If the absolute value of NBOA is 25% of the highest ranking of each year, it is 1 and 0 otherwise.

QNBTQ: QNBTA is a dummy variable. If the absolute value of NBTA is 25% of the highest ranking of each year, it is 1 and 0 otherwise.

Change: Change is a dummy variable. It is set equal to 1 if the observation is after the fiscal year 1998 (1998 to 2004) and equal to 0 if the observation is prior to fiscal year 1998 (1990 to 1997).

YEAR: YEAR is a vector of the year dummy variables.

IND: IND is a vector of the industry dummy variables.

α7 (β12) is the coefficient of the interaction term QDBOA and X. It represents the difference between the ERC of firms with a large DBOA and the ERC of other firms. Hypothesis 1a predicts α7 (β12) < 0, if DBOA creates noise and bias in book income. The effect of QDBOA becomes apparent by a comparison with the coefficient of the interaction term QDBTA and X, α6 (β11). We predict that α7 (β12) is smaller than α6 (β11), according to Hypothesis 1b.

Hypothesis 2a is tested using the coefficient of the interaction term QNBOA and X, α9 (β14). We predict α9 (β14) > 0 and α9 (β14) will be greater than the coefficients of the interaction term QNBTA and X (α8, β13), according to Hypothesis 2b.

α17 (β27) is the coefficient of the interaction term QDBOA and X and Change. α19 (β29) is the coefficient of the interaction term QNBOA and X and Change. These are indicators of a change in the ERC of firms with large BTD. We predict these coefficient signs will become negative, according to Hypothesis 3a. We also predict that α17 (β27) and α19 (β29) will be smaller than α16 (β26) and α18 (β28), according to Hypothesis 1b. α16 (β26) and α18 (β28) are an indicator of the firms with large DBTA and large NBTA.

Sample Selection

We select a sample of observations from the Nikkei NEEDs database and the Kabuka CD-ROM database from fiscal year 1990 to 2004[12] that meet the following criteria:

1. The firm is listed in Section 1 of the Tokyo Stock Exchange.
2. The taxable income has exceeded 40 million yen for the last two years.
3. The observations for estimating discretionary accruals are available.
4. The firms are listed throughout the analysis period, and the firms have not changed the accounting period.
5. The observations are available to estimate the empirical model.

We estimate discretionary accruals using the sample, according to the third criterion. To mitigate the effects of mergers and acquisitions or new listings, we established the fourth criterion. We process 0.1% of both ends of the distribution of each variable as outliers. Consequently, the final sample is composed of 11,987 firm-year observations.

Table 2 contains the descriptive statistics for the sample. The data exhibit higher performance than usual as a result of the second criterion. The average of X (net income before tax / market value of equity) is approximately 5%.

Table 3 summarizes the characteristics of the descriptive statistics of firms with large accruals. The firms with large DBOA are summarized on Panel A (Panel E) of Table 3. This indicates that the mean of X for these firms is smaller than other firms. There is a possibility that the estimation of DBOA is affected by corporate performance.

Table 1
SAMPLE SELECTION

Panel A: Pooled sample

		Firm-year
[1]	The firm is listed in Section 1 of the Tokyo Stock Exchange.	22,081
[2]	The taxable income has exceeded 40 million yen for the last two years.	15,905
[3]	The observations for estimating discretionary accruals are available.	15,364
[4]	The firms are listed throughout the analysis period and the firms have not changed the accounting period.	12,861
[5]	The observations are available to estimate the empirical model.	12,055
	Elimination of outliers	68
	Final sample	11,987

Panel B: Sample by year

	Year	Firm-year
[1]	1990	811
[2]	1991	902
[3]	1992	891
[4]	1993	837
[5]	1994	840
[6]	1995	880
[7]	1996	923
[8]	1997	887
[9]	1998	785
[10]	1999	773
[11]	2000	811
[12]	2001	727
[13]	2002	647
[14]	2003	662
[15]	2004	611
	Total	11,987

Panel C: Sample by industry classification

		Total	Top 25% absolute value firms			
			DBOA	DBTA	NBOA	NBTA
[1]	Foods	710	201	159	42	246
[2]	Textiles & Apparel	294	100	57	64	95
[3]	Pulp & Paper	90	4	12	32	51
[4]	Chemicals/Pharmaceuticals	1,409	468	265	533	219
[5]	Petroleum/Rubber	217	74	28	85	84
[6]	Glass & Ceramics	212	56	39	61	68
[7]	Steel/Nonferrous Metals	724	197	189	101	177
[8]	Machinery	930	242	263	185	70
[9]	Electric Machinery	1,150	321	294	366	194
[10]	Shipbuilding/Automobiles & Auto parts/ Transportation Equipment	564	208	141	217	383
[11]	Precision Instruments	267	89	73	112	22
[12]	Other Manufacturing	398	83	74	121	37
[13]	Fishery/Mining	69	11	8	13	8
[14]	Construction	960	205	304	520	46
[15]	Trading Companies	1,137	184	367	111	100
[16]	Retail	672	122	173	49	183
[17]	Other Financial Services	224	8	94	38	137
[18]	Real Estate	173	23	59	5	58
[19]	Railway & Bus/Land Transport/Marine Transport/ Air Transport/Warehousing	657	115	96	95	269
[20]	Communications	63	20	13	37	43
[21]	Electric Power/Gas	224	9	2	63	223
[22]	Services	843	257	287	147	284
	Total	11,987	2,997	2,997	2,997	2,997

DBOA = Discretionary book only accruals, DBTA = Discretionary book-tax accruals, NBOA = Non-discretionary book only accruals, and NBTA = Non-discretionary book-tax accruals.

Table 2
SUMMARY STATISTICS

Panel A: Descriptive statistics (N = 11,987)

	Mean	Median	5%	95%	Std. Dev.
RET	1.015	0.952	0.583	1.658	0.375
X	0.059	0.051	0.008	0.155	0.060
BV	0.755	0.615	0.222	1.786	0.507

Panel B: Pearson correlation matrix (N = 11,987)

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[1]	RET	1.000	0.337	0.272	0.025	0.022	0.024	0.019	0.010	0.024	0.049	0.044
[2]	X		1.000	0.307	0.024	0.024	-0.096	-0.093	0.002	0.035	0.009	0.002
[3]	BV			1.000	-0.012	-0.007	-0.057	-0.055	-0.064	-0.049	-0.016	-0.030
[4]	QDBTA(Jones)				1.000	0.745	0.054	0.048	-0.004	0.024	0.015	0.025
[5]	QDBTA(FL)					1.000	0.049	0.046	-0.004	0.023	0.007	0.020
[6]	QDBOA(Jones)						1.000	0.754	-0.023	-0.016	0.117	0.130
[7]	QDBOA(FL)							1.000	-0.028	-0.022	0.104	0.154
[8]	QNBTA(Jones)								1.000	0.680	-0.010	-0.010
[9]	QNBTA(FL)									1.000	0.008	0.015
[10]	QNBOA(Jones)										1.000	0.573
[11]	QNBOA(FL)											1.000

RET = Market value of equity at the fiscal year end of t, X = Net income before tax, and BV = Book value of net assets. These are scaled by the market value of equity at the fiscal year end of t - 1. QDBTA (QDBOA) is a dummy variable. If the absolute value of DBTA (DBOA) is 25% of the highest ranking of each year, it is 1 and 0 otherwise. QNBTA (QNBOA) is a dummy variable. If the absolute value of NBTA (NBOA) is 25% of the highest ranking of each year, it is 1 and 0 otherwise. The estimation model is shown in parentheses. Jones = Jones Model and FL = Forward-looking Model.

Table 3
SUMMARY OF EACH GROUP

Estimated by Jones Model	Mean	Median	5%	95%	Std. Dev.
Panel A:					
Top 25% of the absolute value of DBOA (N = 2,997)					
RET	1.030	0.953	0.582	1.728	0.419
X	0.049	0.050	-0.068	0.156	0.085
BV	0.705	0.589	0.208	1.643	0.468
Panel B:					
Top 25% of the absolute value of DBTA (N = 2,997)					
RET	1.031	0.953	0.564	1.765	0.430
X	0.061	0.053	0.006	0.170	0.067
BV	0.745	0.598	0.201	1.837	0.521
Panel C:					
Top 25% of the absolute value of NBOA (N = 2,997)					
RET	1.047	0.980	0.597	1.730	0.401
X	0.060	0.057	0.003	0.152	0.067
BV	0.741	0.590	0.206	1.782	0.520
Panel D:					
Top 25% of the absolute value of NBTA (N = 2,997)					
RET	1.021	0.968	0.598	1.652	0.357
X	0.059	0.049	0.008	0.156	0.056
BV	0.699	0.595	0.214	1.556	0.440

Estimated by Forward-looking Model	Mean	Median	5%	95%	Std. Dev.
Panel E:					
Top 25% of the absolute value of DBOA (N = 2,997)					
RET	1.027	0.948	0.572	1.727	0.410
X	0.049	0.050	-0.061	0.155	0.084
BV	0.707	0.592	0.209	1.659	0.467
Panel F:					
Top 25% of the absolute value of DBTA (N = 2,997)					
RET	1.029	0.953	0.567	1.743	0.424
X	0.061	0.052	0.007	0.170	0.065
BV	0.749	0.598	0.202	1.843	0.524
Panel G:					
Top 25% of the absolute value of NBOA (N = 2,997)					
RET	1.043	0.967	0.594	1.730	0.399
X	0.059	0.057	0.001	0.151	0.069
BV	0.729	0.586	0.209	1.764	0.503
Panel H:					
Top 25% of the absolute value of NBTA (N = 2,997)					
RET	1.030	0.974	0.599	1.666	0.372
X	0.063	0.051	0.009	0.165	0.055
BV	0.712	0.595	0.212	1.598	0.458

RET = Market value of equity at the fiscal year end of t, X = Net income before tax, and BV = Book value of net assets. These are scaled by the market value of equity at the fiscal year end of t - 1.

THE RESULTS

The Main Results

Table 4 presents the results of equations 14 and 15. The coefficient [13] of the interaction term QDBOA and X has a negative sign, and is statistically significant in all of the models in Table 4. This result suggests that the ERC of the firms with large DBOA is less than the ERC of other firms, which is consistent with Hypothesis 1a. The impact of earnings management in firms with large DBOA is clear in a comparison of the ERC of firms with high DBTA. The difference between the coefficient [13] and coefficient [12] is a negative sign in all of the models in Table 4, which is consistent with Hypothesis 1b. These results suggest that earnings management with relatively low book-tax conformity reveals unique information and causes a lower ERC than earnings management with relatively high book-tax conformity.

The coefficient [15] of the interaction term QNBOA and X has a positive sign, and is statistically significant in Models 1, 2, and 4. This result suggests that the ERC of firms with high institutional BTD is greater than other firms, which is consistent with Hypothesis 2a and prior studies. However, the difference between coefficient [15] and coefficient [14] is not statistically significant in all of the models in Table 4. The impact of institutional BTD (NBOA) is not clear in a comparison of the ERC of firms with large NBTA. This is not consistent with Hypothesis 2b. These results suggest that the non-discretionary accruals that cause institutional BTD to improve the earnings do not have a unique effect because the impact cannot be distinguished from the non-discretionary accruals that do not cause institutional BTD.

The coefficients [28] and [30] indicate the impact of the change in DBOA and NBOA after 1998. These coefficients exhibit a negative sign and the coefficient [30] is particularly statistically significant. Moreover, the null hypothesis that the coefficients [28] and [30] are zero is rejected in all of the models in Table 4. This is consistent with Hypothesis 3a and suggests that the institutional changes after 1998 caused lower ERCs in the firms with large BTD after 1998.

To compare the impact of the change in DBOA (NBOA) and DBTA (NBTA), we established a null hypothesis that [28] - [27] = 0 and [30] - [29] = 0. The result of this restricting test is that this null hypothesis is rejected in Models 3 and 4. However, the null hypothesis is not rejected in Models 1 and 2. This will be verified in a robustness test.

Table 4
MAIN RESULT

Panel A: Jones Model (N = 11,987)

			Model 1			Model 2		
			coeff	*t*-statistic		coeff	*t*-statistic	
[1]	const		0.824	24.07	***	0.811	42.97	***
[2]	QDBTA		-0.033	-1.79	*	-0.034	-1.55	
[3]	QDBOA		0.034	3.01	***	0.000	0.02	
[4]	QNBTA		0.017	1.42		0.040	1.73	*
[5]	QNBOA		0.009	0.49		0.016	0.67	
[6]	BV					0.112	5.10	***
[7]	BV*QDBTA					0.012	0.33	
[8]	BV*QDBOA					0.074	1.92	*
[9]	BV*QNBTA					-0.045	-1.12	
[10]	BV*QNBOA					-0.015	-0.38	
[11]	X		2.479	7.80	***	2.268	11.80	***
[12]	X*QDBTA		0.814	2.19	**	0.794	2.74	***
[13]	X*QDBOA	H1a:(-)	-0.734	-2.37	**	-0.818	-2.96	***
[14]	X*QNBTA		0.238	0.83		0.272	0.89	
[15]	X*QNBOA	H2a:(+)	0.821	1.90	*	0.985	3.30	***
[16]	Change		0.108	3.31	***	0.094	4.20	***
[17]	Change*QDBTA		0.011	0.40		-0.030	-0.96	
[18]	Change*QDBOA		0.137	4.41	***	0.089	2.75	***
[19]	Change*QNBTA		-0.038	-1.27		-0.046	-1.39	
[20]	Change*QNBOA		0.030	0.93		0.018	0.54	
[21]	Change*BV					-0.049	-2.00	**
[22]	Change*BV*QDBTA					0.032	0.80	
[23]	Change*BV*QDBOA					0.002	0.06	
[24]	Change*BV*QNBTA					0.040	0.89	
[25]	Change*BV*QNBOA					0.011	0.26	
[26]	Change*X		-0.108	-0.23		-0.150	-0.70	
[27]	Change*X*QDBTA		-0.402	-0.91		-0.402	-1.28	
[28]	Change*X*QDBOA		-0.771	-2.01	**	-0.418	-1.40	
[29]	Change*X*QNBTA		-0.101	-0.28		-0.149	-0.44	
[30]	Change*X*QNBOA		-1.197	-2.25	**	-1.300	-4.05	***
	YEAR_DUM		YES			YES		
	IND_DUM		YES			YES		
	Adj. R2		0.323			0.335		
Null hypothesis								
			difference	*F*-statistic		difference	*F*-statistic	
[13]-[12] = 0		H1b:(-)	-1.548	13.061	***	-1.612	12.498	***
[15]-[14] = 0		H2b:(+)	0.583	0.750		0.713	1.004	
[28]-[27] = 0			-0.369	0.152		-0.015	0.041	
[30]-[29] = 0			-1.095	2.633		-1.151	2.592	
			mean	*F*-statistic		mean	*F*-statistic	
[27] = 0 and [29] = 0			-0.252	1.172		-0.276	1.188	
[28] = 0 and [30] = 0		H3a:(-)	-0.984	9.262	***	-0.859	6.993	***
[28]-[27] = 0 and [30]-[29] = 0		H3b:(-)	-0.732	1.473		-0.583	1.309	

Panel B: Forward-looking Model (N = 11,987)

			Model 3		Model 4	
			coeff	*t*-statistic	coeff	*t*-statistic
[1]	const		0.825	23.90 ***	0.816	19.92 ***
[2]	QDBTA		-0.019	-1.03	-0.030	-1.32
[3]	QDBOA		0.032	2.37 **	0.007	0.48
[4]	QNBTA		0.002	0.23	0.028	1.99 **
[5]	QNBOA		0.007	0.43	0.004	0.15
[6]	BV				0.104	1.54
[7]	BV*QDBTA				0.035	1.92 *
[8]	BV*QDBOA				0.051	1.48
[9]	BV*QNBTA				-0.056	-1.77 *
[10]	BV*QNBOA				0.012	0.41
[11]	X		2.568	7.27 ***	2.379	7.68 ***
[12]	X*QDBTA		0.423	1.19	0.304	0.98
[13]	X*QDBOA	H1a:(-)	-0.800	-2.31 **	-0.839	-2.06 **
[14]	X*QNBTA		0.412	1.74 *	0.476	1.62
[15]	X*QNBOA	H2a:(+)	0.671	1.63	0.781	2.31 **
[16]	Change		0.111	2.99 ***	0.101	2.14 **
[17]	Change*QDBTA		0.035	0.80	0.006	0.13
[18]	Change*QDBOA		0.118	2.91 ***	0.040	1.33
[19]	Change*QNBTA		-0.040	-1.18	-0.089	-1.82 *
[20]	Change*QNBOA		0.031	1.34	0.035	0.79
[21]	Change*BV				-0.050	-0.63
[22]	Change*BV*QDBTA				0.002	0.10
[23]	Change*BV*QDBOA				0.048	1.22
[24]	Change*BV*QNBTA				0.099	3.00 ***
[25]	Change*BV*QNBOA				-0.017	-0.40
[26]	Change*X		-0.282	-0.55	-0.308	-0.58
[27]	Change*X*QDBTA		-0.225	-0.50	-0.086	-0.21
[28]	Change*X*QDBOA		-0.559	-1.42	-0.301	-0.68
[29]	Change*X*QNBTA		0.013	0.04	-0.193	-0.56
[30]	Change*X*QNBOA		-1.022	-2.22 **	-1.097	-2.81 ***
	YEAR_DUM		YES		YES	
	IND_DUM		YES		YES	
	Adj. R2		0.322		0.333	
Null hypothesis						
			difference	*F*-statistic	difference	*F*-statistic
[13]-[12] = 0		H1b:(-)	-1.223	5.420 **	-1.142	4.286 **
[15]-[14] = 0		H2b:(+)	0.259	2.084	0.305	1.589
[28]-[27] = 0			-0.334	0.653	-0.215	0.322
[30]-[29] = 0			-1.035	6.510 **	-0.904	4.838 **
			mean	*F*-statistic	mean	*F*-statistic
[27] = 0 and [29] = 0			-0.106	0.115	-0.140	0.050
[28] = 0 and [30] = 0		H3a:(-)	-0.790	9.163 ***	-0.699	7.835 ***
[28]-[27] = 0 and [30]-[29] = 0		H3b:(-)	-0.684	4.569 **	-0.559	3.071 **

Table 4 reports the summary of the main results. The asterisks indicate statistical significance at the 10% (*), 5% (**), and 1% (***) levels. Standard errors are computed after clustering observations by year to mitigate the effects of cross-sectional correlation.

ROBUSTNESS TESTS

Earnings Persistence

To verify robustness, we test the earnings persistence of firms with each accrual. Kothari (2001) proposed one of the original models of Hanlon *et al*. (2008), and Kothari (2001) linked ERC to earnings persistence. We use 12-month stock returns for the dependent variable in equation 14 and 15 because we assume that stock return contains richer information than accounting earnings. However, the stock market does not evaluate the firm value correctly at all times. The stock return is also related to other factors, such as systematic risk. Therefore, we test the robustness of the dependent variable by verifying earnings persistence (Table 5).

The results of this test support Hypotheses 1a, 1b, and 3a. This test also supports Hypothesis 3b. However, this test does not support Hypotheses 2a and 2b. These results suggest that the ERC of firms with large DBOA is less than the ERC of other firms, and the ERC of firms with large BTD was affected by the institutional changes after 1998. However, in this case, earnings persistence cannot explain the increase in the ERC of firms with large NBOA.

Mitigation of Multicollinearity

Our regression models (equations 14 and 15) may have a problem of multicollinearity. To mitigate this problem, we re-tested using X and BV, which were centered (Aiken and West, 1991). The results of these tests were similar to the main results. Therefore, multicollinearity does not have a significant impact on the main results.

Performance-Adjusted Jones-type Models

The summary of the sample indicates that the performance of the firms with large DBOA is inferior to other firms (Table 3). Prior studies suggest that the estimation error of discretionary accruals is related to firm performance (Dechow *et al*. 1995; Kothari, Leone, and Wasley, 2005). Hayn (1995) noted that ERC varied according to firm performance.[13] Therefore, the estimation model of discretionary accruals may influence ERC. We use a performance-adjusted Jones-type model (an ROA-modified Jones model (Kothari *et al*. 2005)) that is controlled by $ROA_{t-1;}$ a CFO-modified Jones model (Subramanyam, 1996) that is controlled by $CFO_{t;}$ and a ΔCFO-modified Jones model (Kasznik 1999) that is controlled byΔCFO_t) to verify robustness.

The results of this test show that Hypotheses 1a, 1b, and 3a are supported. These results show that the sign of the coefficient is consistent with Hypothesis 2a, and these are almost statistically significant. Hypotheses 2a and 3b are not supported by this test.

The Selection of Firms with Substantial Accruals

This paper focuses on firms with substantial accruals, and we define these firms as the top 25% of firms with the largest accruals for each year. However, the grouping of these firms depends on the subjectivity of the author. To verify the robustness of this point, we test using indicator variables of the top 20% of firms with the largest accruals or the top 30% of firms with the largest accruals. These results were similar to the results presented in Table 4.

Mitigation of the Sample Selection Bias

The sample firms included in this paper are limited to the firms with 40 million yen or more of annual taxable income. To mitigate problems in the sample selection, we use the sample selection model of Heckman's (1976; 1979) two-step approach.

We establish a selection equation for the accounting for taxation from prior Japanese studies such as Yamashita and Okuda (2006). Japanese taxable income is calculated from book income. However, if the firm carries forward a tax loss, the firm's taxable income is calculated separately from current book income. We consider that taxable income is a function of current book income and book income of a single prior year. The selection equation can be expressed as follows:

$$TAX = \gamma_1 + \gamma_2 NIBT + \gamma_3 LAG\_NIBT + \varepsilon_3 \quad (16)$$

TAX: This represents the dummy variable. If the firm's taxable income is larger than 40 million yen, it is 1 and 0 otherwise.

NIBT: This represents net income before tax of year t, defeated by total assets at the end of year t - 1.

LAG_NIBT: This represents the NIBT of year t - 1.

We estimate equations 14 and 15, which includes the inverse Mills ratio.

The result of this test, the sign of the coefficient on the inverse Mills ratio is positive and statistically significant. Given these selection biases, Hypotheses 1a, 1b, 2a, 3a, and 3b are supported. We do not observe significant results concerning Hypothesis 2b.

The results of these multiple robustness checks indicate that Hypotheses 1a, 1b, 2a, 3a, and 3b are almost supported. However, Hypothesis 2b is not supported. Earnings management that increases BTD reduces ERC to a greater extent than earnings management that has no relation to BTD. However, the accruals related to institutional BTD increase ERC and the effect cannot be distinguished from accruals not related to institutional BTD. Additionally, the impact of accruals related to BTD on ERC is dependent on the accounting and tax system.

Table 5
TEST OF EARNINGS PERSISTENCE

Panel A: Jones Model (N = 11,987)

			Model 5		Model 6	
			coeff	*t*-statistic	coeff	*t*-statistic
[1]	const		0.006	2.31 **	0.006	1.48
[2]	QDBTA		0.006	2.57 **	0.002	1.00
[3]	QDBOA		0.010	3.28 ***	0.009	2.17 **
[4]	QNBTA		-0.001	-0.74	-0.003	-1.08
[5]	QNBOA		0.006	3.54 ***	0.015	5.41 ***
[6]	BV				0.003	0.33
[7]	BV*QDBTA				0.011	3.15 ***
[8]	BV*QDBOA				0.004	1.08
[9]	BV*QNBTA				0.004	0.62
[10]	BV*QNBOA				-0.022	-4.81 ***
[11]	X		0.850	15.45 ***	0.849	21.29 ***
[12]	X*QDBTA		-0.107	-3.34 ***	-0.139	-3.74 ***
[13]	X*QDBOA	H1a:(-)	-0.191	-3.85 ***	-0.206	-4.41 ***
[14]	X*QNBTA		0.003	0.06	-0.012	-0.22
[15]	X*QNBOA	H2a:(+)	-0.069	-1.32	-0.007	-0.15
[16]	Change		-0.002	-0.47	0.006	0.56
[17]	Change*QDBTA		0.004	1.01	-0.005	-0.88
[18]	Change*QDBOA		0.032	4.97 ***	0.015	2.35 **
[19]	Change*QNBTA		0.006	0.88	0.005	1.03
[20]	Change*QNBOA		0.006	1.75 *	-0.015	-1.74 *
[21]	Change*BV				-0.010	-0.67
[22]	Change*BV*QDBTA				0.003	0.36
[23]	Change*BV*QDBOA				0.016	2.25 **
[24]	Change*BV*QNBTA				-0.001	-0.09
[25]	Change*BV*QNBOA				0.034	3.83 ***
[26]	Change*X		-0.205	-2.60 ***	-0.187	-2.71 ***
[27]	Change*X*QDBTA		0.033	0.71	0.041	0.73
[28]	Change*X*QDBOA		-0.255	-3.05 ***	-0.246	-3.50 ***
[29]	Change*X*QNBTA		0.015	0.23	0.017	0.20
[30]	Change*X*QNBOA		-0.025	-0.37	-0.093	-1.53
	YEAR_DUM		YES		YES	
	IND_DUM		YES		YES	
	Adj. R2		0.305		0.312	
Null hypothesis						
			difference	*F*-statistic	difference	*F*-statistic
[13]-[12] = 0		H1b:(-)	-0.084	4.380 **	-0.067	7.583 ***
[15]-[14] = 0		H2b:(+)	-0.072	0.639	0.005	1.232
[28]-[27] = 0			-0.288	8.375 ***	-0.287	15.645 ***
[30]-[29] = 0			-0.040	0.115	-0.110	0.395
			mean	*F*-statistic	mean	*F*-statistic
[27] = 0 and [29] = 0			0.024	0.260	0.029	3.110 **
[28] = 0 and [30] = 0		H3a:(-)	-0.140	4.783 ***	-0.170	16.138 ***
[28]-[27] = 0 and [30]-[29] = 0		H3b:(-)	-0.164	4.630 ***	-0.199	8.175 ***

Panel B: Forward-looking Model (N = 11,987)

			Model 7			Model 8		
			coeff	*t*-statistic		coeff	*t*-statistic	
[1]	const		0.004	1.31		0.005	1.23	
[2]	QDBTA		0.005	2.23	**	0.003	2.02	**
[3]	QDBOA		0.008	4.57	***	0.005	1.88	*
[4]	QNBTA		0.000	0.27		-0.001	-0.52	
[5]	QNBOA		0.012	2.67	***	0.017	3.43	***
[6]	BV					0.001	0.09	
[7]	BV*QDBTA					0.006	1.55	
[8]	BV*QDBOA					0.009	2.72	***
[9]	BV*QNBTA					0.005	0.80	
[10]	BV*QNBOA					-0.012	-3.52	***
[11]	X		0.876	12.77	***	0.881	17.22	***
[12]	X*QDBTA		-0.091	-2.79	***	-0.104	-2.64	***
[13]	X*QDBOA	H1a:(-)	-0.161	-5.44	***	-0.186	-6.88	***
[14]	X*QNBTA		-0.042	-1.22		-0.060	-1.90	*
[15]	X*QNBOA	H2a:(+)	-0.150	-1.76	*	-0.115	-1.44	
[16]	Change		0.004	0.71		0.006	0.56	
[17]	Change*QDBTA		-0.002	-0.25		-0.009	-1.24	
[18]	Change*QDBOA		0.033	9.62	***	0.017	2.62	***
[19]	Change*QNBTA		0.000	-0.06		0.006	0.93	
[20]	Change*QNBOA		-0.002	-0.32		-0.012	-1.73	*
[21]	Change*BV					-0.002	-0.13	
[22]	Change*BV*QDBTA					0.004	0.33	
[23]	Change*BV*QDBOA					0.010	1.07	
[24]	Change*BV*QNBTA					-0.010	-0.77	
[25]	Change*BV*QNBOA					0.017	2.89	***
[26]	Change*X		-0.291	-2.90	***	-0.295	-3.41	***
[27]	Change*X*QDBTA		0.114	1.89	*	0.108	1.45	
[28]	Change*X*QDBOA		-0.239	-4.38	***	-0.216	-5.47	***
[29]	Change*X*QNBTA		0.115	2.21	**	0.140	2.15	**
[30]	Change*X*QNBOA		0.036	0.33		0.005	0.05	
	YEAR_DUM		YES			YES		
	IND_DUM		YES			YES		
	Adj. R2		0.301			0.306		

Null hypothesis							
		difference	*F*-statistic		difference	*F*-statistic	
[13]-[12] = 0	H1b:(-)	-0.070	4.214	**	-0.082	9.857	***
[15]-[14] = 0	H2b:(+)	-0.109	0.003		-0.055	0.299	
[28]-[27] = 0		-0.353	9.206	***	-0.324	16.548	***
[30]-[29] = 0		-0.080	0.717		-0.135	0.885	
		mean	*F*-statistic		mean	*F*-statistic	
[27] = 0 and [29] = 0		0.114	0.271		0.124	2.315	*
[28] = 0 and [30] = 0	H3a:(-)	-0.102	7.530	***	-0.106	16.803	***
[28]-[27] = 0 and [30]-[29] = 0	H3b:(-)	-0.216	4.613	***	-0.229	8.478	***

Table 5 reports the summary of the test of earnings persistence. The asterisks indicate statistical significance at the 10% (*), 5% (**), and 1% (***) levels. Standard errors are computed after clustering observations by year, to mitigate the effects of cross-sectional correlation.

CONCLUSION

This study examined the relationship between the earnings response coefficient (ERC) and accounting accruals (DBOA, DBTA, NBOA, and NBTA) to determine the BTD-specific influence on book income. Recent studies that discuss the difference between book income and taxable income argued that high book-tax conformity increases earnings quality. However, other previous studies argued that high book-tax conformity decreases earnings quality. These conflicting opinions exist because these studies did not decompose BTD into elements or compare the elements and similar items. Additionally, they did not consider the design and the operation of accounting and tax systems. This paper presents the distinguishing BTD factors, compares these components, and focuses on the timing of changes in the accounting and tax systems.

We found that the ERC of firms with large DBOA is lower than that of other firms. This is clear from a comparison of the ERC of firms with large DBTA. These results suggest that the value relevance of accounting earnings is reduced by extreme earnings management with relatively low book-tax conformity. This is consistent with Desai (2005); book-tax conformity prevents a decrease in ERC caused by earnings management.

The ERC of firms with large NBOA is higher than that of other firms. This is consistent with Hanlon *et al*. (2008). BTD improves earnings quality; however, this is not clear from a comparison with the ERC of firms with substantial NBTA. These results suggest that accruals cause an improvement in earnings quality, although this influence is not BTD-specific. Moreover, the improvement in the ERC by NBOA or by large BTD is not always observed. The empirical results indicate that a deterioration in the ERC of firms with large BTD (especially the ERC of firms with large NBOA) is more evident after 1998. The relationship between BTD and value relevance depends on the accounting system and the taxation system. Therefore, BTD might decrease value relevance of book income in an unstable accounting system environment, such as the period of transition to International Financial Reporting Standards.

Our research contributes to policy making with respect to accounting systems. Earnings quality of book income is affected by the tax system. Accounting system policy should consider the tax system, not just the accounting system. If the accounting system and the tax system are separate, reducing the discretion of financial statements might be effective in improving the quality of earnings.

There are still some concerns. First, the method of decomposition of accruals requires further study. We used BTD and Jones-type models to estimate DBOA, NBOA, DBTA, and NBTA. However, these methods are not the same at that of prior studies because accounting and tax systems are different in each country. We should thoroughly study the estimation method that best suits each country. Second, we did not analyze whether the accounting system or the tax system influences earnings quality to a greater extent. These are the challenges for future research.

ENDNOTES

1 Many managers face several incentives for earnings management. We think that bonus plan, debt contracts, political cost, and beat earnings benchmarks are examples of incentives for financial purpose earnings management. Tax avoidance is an example incentive for tax purpose earnings management. For example, Scholes et al. (1992), Guenther (1994), Maydew (1997), and Lopez *et al.* (1998) revealed that managers shifted their earnings to other periods for tax avoidance. Moreover, they also revealed that the magnitude of the income shifting is different by the debt ratio and firm size. Shackelford and Shevlin (2001) survey the accounting tax research.

2 In the United States, working capital accrual and accrual with relatively high book-tax conformity is almost identical.

3 Baez-Diaz and Alam (2013) indicate that DBOA, DBTA, NBOA, and NBTA (they are used by Calegari, 2000) result in mispricing. DBTA and NBTA particularly result in mispricing. However, the authors did not investigate the value relevance of these accruals.

4 The public disclosure of taxable income required by companies was abolished in 2006. Therefore, this study used data from the financial year 2004 (April 2004 to March 2005).

5 Large accruals are defined if the absolute values of each accrual are 25% of the highest ranking for each year.

6 Manzon and Plesko (2002) discuss BTD in the United States. In the United States, BTD is also caused by consolidated grouping.

7 In the sample used in this paper, the standard deviation of DBTA (DBOA) was 0.041 (0.015); the standard deviation of operating cash flow (normalized by total assets) excluding the accruals from the pre-tax net income was 0.064. According to the characteristics of the sample used in this paper, the ratio of the noise and economic performance is assumed to be 2:3. Equation (5) is true when f is greater than -0.36.

8 We used 22 industries that were reclassified based on the Nikkei industry classification.

9 The growth rate of revenue is defined as the difference between revenue t + 1 and revenue t, divided by revenue t.

10 We adjust the value of k to be $1 \geqq k \geqq 0$.

11 Francis and Schipper (1999) indicate that there are some regression models concerning value relevance. Models using a change in accounting income are reflected by revisions in the accounting standards and tax system. Additionally, these models add complexity to dummy variables. Therefore, we adopted the described model.

12 Public disclosure of taxable income was abolished in 2006. Therefore, we use data up to 2005 (fiscal year 2004) when taxable income is available.

13 Hayn (1995) noted that there is a correlation between the ERC and performance. In the current paper, we eliminated the firms that do not account for 40 million yen for the last two consecutive years, and we do not include a substantial amount of companies with a loss in the sample.

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BUDGETARY SLACK: EXPLORING THE EFFECT OF DIFFERENT TYPES, DIRECTIONS, AND REPEATED ATTEMPTS OF INFLUENCE TACTICS ON PADDING A BUDGET

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ABSTRACT

Prior research in accounting showed decision-makers were more likely to make inappropriate decisions when under pressure from their superiors. However, pressure to obey from a superior is only one form of influence that an individual may receive. Studies from the leadership field showed that decision-makers may experience alternative types of influence (such as rational persuasion) and directions of influence (such as from peers). This study explored the effect of alternative types and direction of influence on the likelihood that a decision-maker will violate company policy by adding budgetary slack. The authors found that neither type nor direction of the influence predicted compliance with requests to violate company policy. However, regardless of the influence tactic received, the majority of decision-makers went against policy and added budgetary slack. Furthermore, those who violated company policy once were far more likely to do it again. These findings suggest a need for increased attention to training that more heavily emphasizes reasoning behind company policies, as well as training that heightens managers' awareness of the tactics others may use to encourage the violation of such policies.

INTRODUCTION

The purpose of this study was to determine if different forms of external influence affected managers' willingness to violate corporate policy by creating budgetary slack. Budgetary slack occurs when managers intentionally misreport upcoming budgetary estimates in a way that makes the business unit appear worse than what the manager actually expects. Specifically, we examined if the type of influence tactic (rational persuasion or obedience pressure) and the direction from which the influence originated (superior or peer) impacted the likelihood and/or extent that managers "padded the budget," by intentionally overestimating costs for the upcoming year. We also explored if padding the budget in response to an initial request increased the likelihood of managers padding the budget again.

This research was motivated by the need to further understand what led managers and accountants to make inefficient and potentially harmful decisions. Budgetary slack can be detrimental to a company, potentially leading to inappropriate resource allocations, decreased profits, and lost opportunities (Schiff and Lewin 1970, Onsi 1973). By exploring which types of influence attempts were more likely to increase such behavior, companies can develop training that heightens its managers' awareness of how others may try to influence their budgetary decisions.

The present study offers two valuable contributions to the accounting literature on budgetary slack. First, prior research showed that a manager's willingness to create budgetary slack may be affected by a number of factors, such as personality (Hartmann and Maas 2010), the underlying pay scheme and financial benefits (Hobson et al. 2011, Church et al. 2012), control and ethical work climate (Özera and Yilmaz 2011), the manager's participation in the budgeting process (Merchant 1985, Venkatesh 2014), overall participation in the organization (De Baerdemaeker and Bruggeman 2015), role conflict (Maas and Matejka 2009), reputational concerns (Webb 2002), or whether or not the budget can be rejected (Rankin et al. 2008, Douthit and Stevens 2015). However, little research has explored the extent to which managers created budgetary slack because someone else influenced them to do so, and the few that have focused only on one type of influence attempt: pressure by a superior to obey (e.g., Davis et al. 2006, Hartmann and Maas 2010).

Research on leadership behavior suggested that obedience pressure from a superior was only one type of influence. Another type, "rational persuasion"—using logical arguments to convince another party to carry out a specific request—was found to be generally more successful than obedience pressure in influencing another party (Yukl 2013). Furthermore, peers can also be a significant source of influence (Yukl 2013). The present study addressed these gaps in the literature and examined two types of influence (rational persuasion and obedience pressure) from two different directions (superiors and peers).

Next, the present study examined if those who padded the budget once were willing to do it again. Prior research focused only on the initial decision, so it was unknown if the decision to add slack was a one-time event or a potentially recurring problem. If the latter was the case, then the danger caused by having managers adding slack in their budgets extends to multiple years. Therefore, multiple parties and stakeholders can benefit from research that identifies factors contributing to a manager's willingness to perform unethical actions, thereby providing organizations an opportunity to address such factors and better prevent unethical actions from occurring and recurring.

Additionally, the present study offers a valuable contribution to the leadership literature. Previous research found that different types and different directions of influence may impact the effectiveness of an influence attempt (e.g., Kipnis et al. 1980, Falbe and Yukl 1992, Yukl and Tracey 1992). However, most of these studies were conducted by asking participants to reflect on remembered experiences in their professional careers and if they responded with enthusiastic commitment or compliance. Instead, the current paper employed an experimental design that directly manipulated the type and direction of influence. Such experiments are rare and provide important insights that supplement the large number of survey studies on the topic.

Sixty-six MBA students engaged in a budgeting task, in which the recipient received either rational persuasion or obedience pressure, from either a superior or a peer. Results showed that regardless of type or direction, the majority of decision-makers were willing to violate the corporate policy and pad the budget. We also found that those who padded the budget once were more likely to do it again (but to a lesser extent). However, we did not find that different types or directions of influence significantly increased the likelihood of padding the budget.

The next section of the paper examines prior research and theory leading to the study's hypotheses. The third section describes the experimental context. The fourth discusses results, and the final section concludes.

THEORY AND HYPOTHESIS DEVELOPMENT

Budgetary Slack

Douglas and Wier (2000) defined budgetary slack as "the difference between planned performance targets and real performance capabilities" (267). Hobson et al. (2011) extended this definition by describing it as a situation "when a subordinate understates their capabilities or the capabilities of a business unit in their budget," which can be accomplished by overstating costs, or understating revenues or production estimates (88, footnote 1).

The decision to add slack is an ethical one. On one hand, managers have incentives to "game the system" and misreport budgets (Salterio and Webb 2006). Doing so may make it easier to meet performance targets, thereby receiving favorable reviews, monetary rewards, and bonuses (Lukka 1988, Douglas and Wier 2000). On the other hand, budgetary slack can be harmful to the firm as it may lead to inappropriate resource allocations and "less than optimum" profits (Onsi 1973), and lost opportunities to the firm and increases to its cost function (Schiff and Lewin 1970). In other words, when managers add slack, they use inside knowledge for personal gain, while simultaneously hurting other business units and investors (Douglas and Wier 2000).

Prior research demonstrated that receiving pressure from a superior increased the likelihood of adding budgetary slack. For example, Davis et al. (2006) reported that almost half of their respondents added slack (by overestimating expenses) when under pressure from their immediate superiors to do so. The authors also found that the average amount of overestimated expenses was higher among those who received such pressure, compared to a control group of respondents who were not pressured. Hartmann and Maas (2010) discovered that if managers were high on a Machiavellianism scale and highly involved in the management of an organization, they were more likely to add slack (by underestimating unit performance) if under pressure from a superior to do so.

However, obedience pressure from a superior is only one form of influence tactic that a manager may receive. The present study extended the prior work by Davis et al. (2006) and Hartmann and Maas (2010) by including two types of influence tactics (rational persuasion and obedience pressure) and two directions of influence (from a superior or from a peer).

Type of Influence Attempt: Rational Persuasion or Obedience Pressure

With respect to external sources of influence, prior research in accounting focused primarily on obedience pressure, occurring when individuals were pushed to do something by someone else, generally by someone in authority (DeZoort and Lord 1994, Lord and DeZoort 2001, Davis et al. 2006). However, an examination of research in the field of leadership showed other types of influence. One of these was rational persuasion (Yukl 2013).

In fact, rational persuasion was more commonly used and more likely to be successful than obedience pressure (Yukl and Falbe 1991). In contrast, obedience pressure was more likely to result in resistance, be negatively correlated with commitment, and require unusual effort and persistence from the other party to ensure the action was carried out (e.g., Yukl and Tracey 1992, Yukl et al. 1999, Yukl et al. 2005, Yukl et al. 2008). Obedience pressure was used primarily when other attempts to influence someone had failed or compliance was expected to be difficult (Yukl and Tracey 1992).

Relating to rational persuasion, prior research on financial statement fraud suggested that managers were more likely to commit fraud when they rationalized the activity (see Trompeter et al. 2013 for an overview of research in this area). Much of the research in this area built on Festinger's (1957) cognitive dissonance theory, in which individuals attempted to alleviate discomfort that arose when there were discrepancies between taking actions and how they felt about those actions. Rationalization, as summarized by Trompeter et al. (2013), "can be characterized as a mental process that allows individuals to justify dishonest actions and feel less guilty or uncomfortable about their acts" (293).

While adding budgetary slack may not be viewed as extreme as committing financial statement fraud, some characteristics of the two acts are similar. Both are intentional acts, result in material misstatements and presenting misleading information, and are done by the perpetrator taking advantage of proprietary information in order to generate a benefit. Furthermore, both present ethical dilemmas. In fact, Davis et al. (2006) found that 86% of their respondents reported that it was wrong to pad a budget. When asked if the case presented an ethical dilemma, the average ratings of respondents was 3.36 (using an 11-point scale anchored at -5 for strongly disagree to 5 for strongly agree). Therefore, because adding slack may be considered an ethical dilemma, if an attempt to influence someone to pad the budget is made using rational persuasion, it may be easier for individuals to use those logical arguments to convince themselves that the action is justifiable.

Based on the above discussion, managers are expected to be more likely to violate corporate policy and add budgetary slack (i.e., padding the budget by overestimating expenses) if the source of the influence attempt uses rational arguments rather than obedience pressure. Stated formally,

H1: Those who receive rational persuasion are more likely to pad a budget than those who receive obedience pressure.

Direction of Influence Attempt: Superior or Peer

Prior research in accounting showed accountants were susceptible to conforming to obedience pressure from a superior. For example, DeZoort and Lord (1994) discovered auditors were more likely to violate professional policy (such allowing a client the opportunity to potentially falsify inventory records, or filing an inaccurate number of continuing education hours) if told by a superior to do so. Lord and DeZoort (2001) reported auditors were more likely to accept material misstatements on client's financial records if it was demanded by a superior. Chong and Syarifuddin (2010) found managers were more likely to escalate commitment to a failing project if under pressure from superiors to do so. Davis et al. (2006) reported that when pressured to do so by their immediate superior, accountants were more willing to violate corporate policy and pad a budget.

Each of the above-noted studies examined outcomes of obedience pressure from a superior. However, peers may also impact individuals' perceptions and intent with respect to their ethical behavior (e.g., Jones and Kavanagh 1996, Keith et al. 2003, McManus and Subramaniam 2009). Despite this reported influence of peers, very little accounting research had been done with respect to exploring the effect of a peer when making an ethical decision. One notable exception was Lord and DeZoort (2001) who examined the role of peers in an audit task; however, the subjects in their study received only a recommendation from a peer rather than an influence attempt.

While it is possible that peers may influence decision makers, Lord and DeZoort (2001) also suggested that power over the decision maker held by superiors was likely to be greater than that held by peers, arguing that this was "…based in large part on superiors' authority to formally evaluate performance and affect career progression within the firm" (218, footnote 6). In other words, one may be less likely to go against a superior's wishes than a peer's. Therefore, the following is hypothesized:

H2: Those who receive influence attempts from a superior are more likely to pad a budget than those who receive influence attempts from a peer.

If H1 and H2 are true, then it is assumed that those who receive rational persuasion from a superior will be most likely to pad the budget. However, if either H1 or H2 are not true, it is difficult to predict, ex ante, which effects will be the most significant. However, Yukl (2013) noted that obedience pressure was more likely to be used by superiors than peers, and the use of threats and warnings as a means to influence may be more credible when coming from a superior. Therefore, the following is expected:

H3: Those who receive obedience pressure from a superior are more likely to pad a budget than those who receive obedience pressure from a peer.

Repeated Influence Attempt

In the wake of well-known financial statement fraud scandals, history showed financial statement fraud was often not just a one-time occurrence; instead, it was a recurring practice. Research on financial statement fraud suggested that managers committed fraud when there was incentive, opportunity, and rationalization (i.e., the "fraud triangle", see Trompeter et al. (2013) for an overview of research on financial statement fraud).

While the majority of research on misreporting focused on financial statement fraud, this theory could also apply to budgetary slack. Accounting fraud is an ethical scenario and is defined as: "an intentional act that results in a material misstatement in financial statements that are the subject of an audit" (AICPA 2002, SAS 99). Some reasons cited for why managers engaged in fraudulent activities included: acting for the good of the company, the company has a culture of "making the numbers," and increasing year-end performance-based bonuses (Cohen et al. 2010). Similarly, budgetary slack creates an ethical decision situation in which managers may intentionally misstate numbers, and do so for many of the same reasons as financial statement fraud.

Murphy (2012) created an experiment in which participants were given a quiz, told their results, and then were paid based on what they claimed was their quiz score. The author found that misreporting was highly correlated with measures of negative affect, and those who misreported tended to justify their decision, to reduce levels of guilt about misreporting. Murphy and Dacin (2011) reviewed literature in the area of financial statement fraud and proposed a decision model on psychological factors that lead individuals to commit fraud. They suggested that once individuals committed fraud, they experienced negative affect (such as guilt). If the negative affect was high enough, they may choose to either fix the fraud, or commit to not engaging in the activity again. However, if they excused the fraud, or justified it with "situation-specific perceptions" (610), they can continue to engage in fraudulent activities while still upholding their personal moral values.

Prior research in accounting fraud typically measured whether the respondents complied with a single request to perform an unethical action. As of the writing of this paper, research has not yet examined whether subsequent requests to add budgetary slack were more successful with managers who already added budgetary slack in a prior year. On one hand, it is possible that individuals may view padding the budget as a "one-time" event, especially if reminded in the subsequent year that it is not acceptable, thereby making them unwilling to participate a second time.

On the other hand, we believe the stronger determinant of future action will be the precedent set by an individual's response to the first request of a similar nature. As suggested by Murphy and Dacin (2011), those who excused or justified the fraud can continue to engage in it. Therefore, if managers added slack the first year and were able to justify it—perhaps by using the information presented in the influence attempt—then they may be more prone towards doing it again.

However, those that did not succumb to the influence attempt the first year would likely not have a strong reason to add slack in the following year. This is also in line with results shown in Webb (2002)—when budgets were important to an organization, those who have a reputation for providing reliable budgets were more likely to reduce slack in order to avoid losing that reputation. If these results hold, then it is expected that those who did not add slack the first year may be concerned about their reputations for providing accurate budgets, and therefore are not likely to add slack the second year.

In sum, we anticipated that the success or failure of the initial influence attempt will have a substantial impact on a manager's response to subsequent requests, leading to our final hypothesis:

H4: The likelihood of padding the budget in response to a second influence attempt is greater for those who padded the budget in the previous year.

METHOD

Participants and Experimental Design

A total of 66 MBA students participated in our study. The MBA students all came from a small liberal arts college and were solicited by email. The email briefly described that the participants would be asked to read through a hypothetical decision-making scenario and then they would be required to answer questions via an online survey. The email provided a link to the survey, and participants were assured that their responses would remain confidential and that no personal information could be tied to their responses.

In designing the experiment, we adapted and expanded the task in Davis et al. (2006) as it offered a previously-tested scenario, from which we could explore different forms of influence attempts in regard to padding a budget. The participants were placed in the role of a division president at a manufacturing company. Their role required providing a recommended final budget number for overhead spending expense for the upcoming year. Participants were told their recommendation was important because: (1) it was the first component of a budgeting paper trail subject to review by auditors and top executives, (2) meeting spending goals was a factor in calculating annual bonuses for all hourly employees in the division, and (3) the division had a proud legacy of never exceeding its budgeted spending limits (the last two are reasons suggested by Cohen et al. 2010 as reasons some managers might be willing to commit fraud).

Similar to Davis et al. (2006), the information stated that in the past, division presidents typically added a 10% cushion to their final budgeted numbers. However, at the beginning of the new fiscal year, the CEO called a teleconference and indicated a new budget policy was to go into effect: budgeted numbers should be set as accurately as possible, and spending levels should represent "challenging but attainable goals."

In our study (see Appendix), the participants were told that controllable overhead spending for the upcoming fiscal year was $5,000,000 (therefore, if they were to add the "traditional" 10% cushion, they would submit a final budgeting spending amount of $5,500,000).

Independent and Dependent Variables

The online survey randomly assigned each participant into one of four conditions: 1) rational persuasion from a superior, 2) obedience pressure from a superior, 3) rational persuasion from a peer, and 4) obedience pressure from a peer. After reading the background information, the participants read that they were approached by an external party—either their superior (the Chief Operating Officer) or a peer (a fellow division president in the company).

Furthermore, this external party used either rational persuasion or obedience pressure. Those who received rational persuasion were given logical reasons to go against corporate policy and increase the budget from $5 million to $5.5 million. Specifically, the other party explained that it was important to have a safety net because of uncertainty in the company and in the economy, and adding $500,000 will allow for extra room while not removing the "challenging but attainable goals" set by the CEO.

On the other hand, obedience pressure is characterized by the use of threats, warnings, and assertive behavior (Yukl 2013). In this context, obedience pressure was created when the external party told participants to consider submitting a budget of $5.5 million, and if they did not, the external party would make sure everyone within that division would blame the participant when things went badly, and that the external party would "remember this later."

It is worth noting that a peer using obedience pressure may not have used the exact same language as a superior. However, we wanted to maintain consistency between treatments so that any differences in results could be traced to this manipulation, and not potentially confounded by the use of different language. In the end, we decided that the language used was similarly threatening, regardless of where it originated—the external party promised to let the participant's department know to blame the participant when things go badly. This is a threat that either a superior or a peer would be able to carry out.

After reading through the respective scenarios, participants provided a final number to submit as their budgeted overhead spending. The range was anchored between $5 million (the original calculated amount) and $5.5 million (the original amount plus 10% slack added). The higher their final number, the more budgetary slack was added. The final budgeted number was used to test the first three hypotheses, as were dummy variables denoting if the respondent chose to not pad the budget at all (by submitting $5 million), some budget padding (between $5 and $5.5 million), or maximum budget padding ($5.5 million).

To test the fourth hypothesis, participants were told that in the following year, the CEO sent out a memo reminding all division presidents to make the budget estimates as accurate as possible. The memo also expressed displeasure because it appeared that some divisions had continued to pad the budget last year. Once again, controllable overhead spending was calculated to be $5 million. Finally, before submitting the final recommendation, they were approached by

the same external party as the prior year, who again asked that the participant increase the budgeted amount to $5.5 million, citing the same reasons as before. Participants submitted their final budgeted number, which is the dependent variable for H4.

RESULTS

The 66 MBA students consisted of 37 males, 23 females, and 6 who did not answer the gender question. The average age was 29.71 years with a standard deviation 6.89 years. The participants reported average years of work experience and management experience to be 9.24 and 3.26 years, respectively (standard deviations of 7.69 and 4.64 years). Due to random assignment, the four manipulation categories had the following number of subjects: rational persuasion from a superior, 10; obedience pressure from a superior, 20; rational persuasion from a peer, 20; obedience pressure from a peer, 16.

Table 1 shows the number of participants who chose no budget padding (submitting $5,000,000), some budget padding (between $5,000,000 and $5,500,000), and the maximum amount of budget padding ($5,500,000). The table also shows the average budget submission overall and the average amount among those who submitted between $5,000,000 and $5,500,000. In total, 68.2% padded the budget to some extent, either by the full amount (12.1%) or a partial amount (56.1%). In effect, the majority of respondents violated corporate policy and lied about their final budget numbers.

The table also includes an overview based on the main manipulations (superior vs. peer, and rational persuasion vs. obedience pressure). Within each condition, the majority of subjects padded the budget to some extent: 73.3% of those who received influence from a superior, 63.9% of those who received influence from a peer, 66.7% of those who received rational persuasion, and 69.4% of those who received obedience pressure.

Table 2 provides information on the budget numbers provided based on the subject group. Similar to Table 1, in each condition, the majority chose to violate the corporate policy by padding the budget to some extent: 70.0% among those who received rational persuasion from a superior, 75.0% among obedience from a superior, 65.0% among rational persuasion from a peer, and 62.5% from those who received obedience pressure from a peer. Taken together, it appears that regardless of tactic or direction, most individuals are willing to pad the budget.

Table 1
NUMBER OF RESPONDENTS AND PERCENT OF THOSE WHO SUBMITTED NO BUDGET PADDING, SOME BUDGET PADDING, AND MAXIMUM BUDGET PADDING, SORTED BY DIRECTION AND TYPE OF INFLUENCE

Budget Submission	All Subjects (n = 66)	Influence from Superior (n = 30)	Influence from Peer (n = 36)	Rational Persuasion (n = 30)	Obedience Pressure (n = 36)
No Budget Padding ($5,000,000)	21 31.8%	8 26.7%	13 36.1%	10 33.3%	11 30.6%
Some Budget Padding (between $5,000,000 and $5,500,000)	37 56.1% (average 5,232,973)	16 53.3% (average 5,240,625)	21 58.3% (average 5,227,143)	14 46.7% (average 5,214,286)	23 63.8% (average 5,244,348)
Maximum Budget Padding ($5,500,000)	8 12.1%	6 20.0%	2 5.6%	6 20.0%	2 5.6%
Percentage of those who padded the budget	68.2%	73.3%	63.9%	66.7%	69.4%
Average and Standard Deviation within Category	Average 5,191,212; standard deviation 171,926	Average 5,228,333; standard deviation 186,937	Average 5,160,278; standard deviation 154,189	Average 5,200,000; standard deviation 188,002	Average 5,183,889; standard deviation 159,647

Table 2
NUMBER OF RESPONDENTS AND PERCENT OF THOSE WHO SUBMITTED NO BUDGET PADDING, SOME BUDGET PADDING, AND MAXIMUM BUDGET PADDING, SORTED BY MANIPULATION CATEGORY

Budget Submission	Superior & Rational Persuasion (n=10)	Superior & Obedience Pressure (n = 20)	Peer & Rational Persuasion (n = 20)	Peer & Obedience Pressure (n=16)
No Budget Padding ($5,000,000)	3 30.0%	5 25.0%	7 35.0%	6 37.5%
Some Budget Padding (between $5,000,000 and $5,500,000)	3 30.0% (average 5,183,333)	13 65.0% (average 5,253,846)	11 55.0% (average 5,222,727)	10 62.5% (average 5,232,000)
Maximum Budget Padding ($5,500,000)	4 40.0%	2 10.0%	2 10.0%	0 0.0%
Percentage of those who padded the budget	70.0%	75.0%	65.0%	62.5%
Average and Standard Deviation within Category	Average 5,255,000; standard deviation 226,630	Average 5,215,000; standard deviation 168,664	Average 5,172,500; standard deviation 165,016	Average 5,145,000; standard deviation 143,295

Table 3 shows a summary of the percentage and number of respondents who padded the budget to some extent in each condition. It is worth noting that regardless of type or direction of influence, between 62.5% and 75.0% chose to pad the budget.

Table 3
PERCENTAGE (AND NUMBER) OF RESPONDENTS WHO PADDED THE BUDGET IN EACH CONDITION

	Superior	Peer	Total
Rational Persuasion	70.0% (7/10)	65.0% (13/20)	66.7% (20/30)
Obedience Pressure	75.0% (15/20)	62.5% (10/16)	69.4% (25/36)
Total	73.3% (22/30)	63.9% (23/36)	68.2% (45/66)

A two-way ANOVA was run using the final budget submission as a dependent variable. The independent variables were dummy variables representing type of influence attempt (rational persuasion vs. obedience pressure), direction (superior vs. peer), and their interaction. The interaction was not significant ($p = 0.89$). Type of influence attempt was also not significant ($p = 0.45$), and neither was direction ($p = 0.09$). Chi-squared tests comparing the proportions of those who padded the budget between superiors and peers, and between rational persuasion and obedience pressure were also not significant (p-values of 0.41 and 0.81, respectively).

Further analyses were performed with respect to the hypotheses. All tests below were conducted using two-tailed tests with a significance level of 0.05. Due to the small sample size within some groups, the first three hypotheses were tested using nonparametric tests (throughout the remainder of this section, the parametric independent sample t-tests and Pearson Chi-Square tests were also conducted and the results found were the same as the non-parametric tests). Two sets of tests were done. First, using the final budgeted number as a dependent variable (between \$5 million and \$5.5 million, inclusive) the distributions were compared using the Independent Mann-Whitney U test. Second, dummy variables were assigned that recorded if their final submission was no budget padding (\$5,000,000), some budget padding (between \$5,000,000 and \$5,500,000), or maximum budget padding (\$5,500,000). These variables were used to determine if the different forms of influence led to differences in how likely the respondents are to not pad the budget at all, do some padding, or the maximum padding. Each of these dummy variables was tested as a dependent variable using the 2-Independent Samples Mann-Whitney U test.

H1 predicted that those who received rational persuasion were more likely to pad the budget than those who received obedience pressure. To test this, the distributions of the final submitted budget number were compared between those who received rational persuasion and those who received obedience pressure. Differences between those who received rational persuasion (mean 5,200,000, standard deviation 188,002) and those who received obedience pressure (mean 5,183,889, standard deviation 159,647) were not significant ($p = 0.874$). Subsequent tests on the categories of final answers were also not significant (p-values for no padding and some padding were 0.811 and 0.164, respectively). The difference between those who padded the maximum amount (20.0% of those who received rational persuasion compared to 5.6% of those who received obedience pressure)—which would mean that rational persuasion may be more likely to lead to the most extreme budgetary slack—was marginally significant at p-value of 0.076, but overall, H1 was not supported. See Table 4 for an overview of the results.

Table 4
TABULATED p-VALUES FROM COMPARING RATIONAL PERSUASION TO OBEDIENCE PRESSURE

Sample Tested	Dependent Variable (numerical): Submitted Budget Number	Dependent Variable (dummy): No Padding	Dependent Variable (dummy): Some Padding, Between Maximum and No Padding	Dependent Variable (dummy): Maximum Padding
H1: All (n=66)	0.874	0.811	0.164	0.076
Superiors (n=30)	0.746	0.774	0.075	0.057
Peers (n=36)	0.648	0.878	0.655	0.199

As a further analysis, the tests listed above were performed again, first only on those who received influence from a superior (see Table 2 for information related to each category). Within this subgroup, differences between the final budgeted number from those receiving obedience pressure (mean 5,215,000, standard deviation 168,664) and those receiving rational persuasion (mean 5,255,000, standard deviation 226,630) was not significant ($p = 0.746$). Tests comparing whether the respondent was more likely to engage in no padding was also not significant ($p = 0.774$). However, tests comparing the likelihood of doing either the maximum padding or not (40% of those who received rational persuasion compared to 10% who received obedience pressure) was marginally significant ($p = 0.057$). The likelihood of doing some padding was also marginally significant (30% of those who received rational persuasion compared to 65% of those who received obedience pressure, $p = 0.075$).

The same tests were performed on just the subset of those who received influence from a peer. Differences in the final budgeted number were not found to be significant (rational persuasion mean 5,172,500, standard deviation 165,016; obedience pressure mean 5,145,000, standard deviation 143,295; $p = 0.648$). No significant differences were found with respect to whether or not the respondent did no padding, some padding, or maximum padding among those who received influence from a peer (p-values of 0.878, 0.655, and 0.199, respectively).

H2 predicted that those who received influence attempts from a superior were more likely to pad a budget than those who received attempts from a peer. First, the final budgeted number was compared between the two groups, superior (mean 5,228,333, standard deviation 186,937) and peer (mean 5,160,278, standard deviation 154,189). This difference was not significant ($p = 0.129$). Tests on dummy variables for no padding and some padding were not significant (p-values of 0.416 and 0.686), but the difference between those who padded the full amount (20% for superior and 5.6% for peer) was marginally significant ($p = 0.076$). Thus, H2 is not supported. See Table 5 for an overview of the test results.

Table 5
TABULATED p-VALUES FROM COMPARING INFLUENCE FROM SUPERIORS TO INFLUENCE FROM PEERS

Sample Tested	Dependent Variable (numerical): Submitted Budget Number	Dependent Variable (dummy): No Padding	Dependent Variable (dummy): Some Padding, Between Maximum and No Padding	Dependent Variable (dummy): Maximum Padding
H2: All (n=66)	0.129	0.416	0.686	0.076
Rational Persuasion (n=30)	0.448	0.788	0.203	0.057
H3: Obedience Pressure (n=36)	0.189	0.425	0.878	0.199

As a further analysis, differences between influence attempts between a superior and a peer were examined among only those who received rational persuasion. As before, we tested the final budgeted numbers. The average budget submitted from those who received rational persuasion from a superior was 5,255,000 (standard deviation 226,630), while those who received rational persuasion from a peer was 5,172,500 (standard deviation 165,016). This difference was not significant ($p = 0.448$). Significant differences were not found among those who chose to do no padding or some padding (p-values of 0.788 and 0.203), but the difference between choosing to pad the maximum amount (40% from a superior compared to 10% from a peer) was marginally significant at $p = 0.057$.

H3 predicted that those who received obedience pressure from a superior were more likely to pad a budget than those who received obedience pressure from a peer. Focusing only on those who received obedience pressure, the differences between the final budgeted numbers was examined. The average budget for those who received obedience pressure from a superior was 5,215,000 (standard deviation 168,664); the average for those receiving obedience pressures from a peer was 5,145,000 (standard deviation 143,295). This difference was not significant ($p = 0.189$). Furthermore, no significant differences were found in the likelihood of the respondent choosing no padding, some padding, or the maximum padding (p-values of 0.425, 0.878, and 0.199, respectively). Thus, H3 was not supported.

H4 anticipated that those who added budgetary slack in response to the first influence attempt were more likely to add budgetary slack in response to a subsequent influence attempt, compared to those who did not add slack after the first attempt. For this test, six subjects who padded the budget the first year were removed because they did not answer the survey questions with respect to what they would do the following year. Of the remaining subjects, of those who padded the budget the first year, 74.4% (29 out of 39) padded the second year. In contrast, of those who did not pad the budget the first year, only 4.8% (1 out of 21) padded the second year. The difference is significantly different ($p < 0.001$ using Pearson chi-square test), implying that if someone violated corporate policy once, they were far more likely to do it again. Significant differences were also found when performing similar tests using only the subsets of those who received rational persuasion, obedience pressure, peer, superior, and tests within those in each subject condition (all p-values were 0.026 or lower, with the only exception being those who received rational persuasion from a superior, $p = 0.183$) on the Independent Sample Mann-Whitney U Test.

Table 6 provides a further breakdown, showing within those who padded the budget the first year, the percentage of those who continued to pad the budget the second year. In every

condition, more than half of the respondents who padded the budget the first year padded again the second year.

Table 6
WITHIN THOSE WHO PADDED THE BUDGET THE FIRST YEAR, THE PERCENTAGE (AND NUMBER) OF RESPONDENTS WHO PADDED THE BUDGET THE SECOND YEAR

	Superior	Peer	Total
Rational Persuasion	57.1% (4/7)	66.7% (6/9)	62.5% (10/16)
Obedience Pressure	78.6% (11/14)	88.9% (8/9)	82.6% (19/23)
Total	71.4% (15/21)	77.7% (14/18)	74.4% (29/39)

Table 7 summarizes the differences in average budget submission for the second year between those who padded the budget in the first year and those who did not pad the budget in the first year. Overall, the dollar amount participants were willing to pad the budget in the second year was greater among those who padded the budget the first year (mean 5,146,154, standard deviation 142,526), compared to those who did not pad the budget the first year (mean 5,004,762, standard deviation 21,822). This difference was significant (independent sample t-test p-value < 0.001). Similar to before, significant differences were also found when performing independent sample t-tests and nonparametric Mann-Whitney tests using only the subsets of those who received rational persuasion, obedience pressure, peer, superior, and those within each combined category (all p-values were 0.023 or lower, with the only exception once again being those who received rational persuasion from a superior, $p = 0.109$ on the Mann-Whitney).

Table 7
THE AVERAGE SECOND YEAR BUDGET SUBMISSION (AND NUMBER OF RESPONDENTS) IN EACH CONDITION COMPARING THOSE WHO PADDED THE FIRST YEAR VS. THOSE WHO DID NOT PAD THE FIRST YEAR

	Superior	Peer	Total
Rational Persuasion	5,178,571 (7) vs. 5,000,000 (3)	5,155,556 (9) vs. 5,000,000 (7)	5,165,625 (16) vs. 5,000,000 (10)
Obedience Pressure	5,150,000 (14) vs. 5,020,000 (5)	5,105,556 (9) vs. 5,000,000 (6)	5,132,609 (23) vs. 5,009,091 (11)
Total	5,159,524 (21) vs. 5,012,500 (8)	5,130,556 (18) vs. 5,000,000 (13)	5,146,154 (39) vs. 5,004,762 (21)

Overall, those who pad the budget in response to the first influence attempt were more likely to pad the budget in response to a second influence attempt, and to a greater magnitude than those who did not follow the first influence attempt. H4 was supported.

It is also worth noting that while those who padded the budget the first year were more likely to pad the budget the second time, the magnitude tended to decrease. Within those who padded the budget the first year, the average budget submission was 5,282,051 in the first year, and 5,146,154 in the second year (standard deviations 130,529 and 142,526, respectively), a difference that is significant (paired-sample t-test, $p < 0.001$). A more detailed analysis showed that among the 39 who padded the budget in the first year, in the second year, 26 (66.67%) padded the budget by a smaller amount, 11 (28.21%) by the same amount, and 2 (5.13%) by a

larger amount. So while the second influence attempt was still successful among those who padded the budget the first year, there was more reluctance the second year.

An ANOVA was run among those who padded both years to see if type of influence, direction of influence, or interaction could predict the amount submitted for a budget in the second year, but none of the terms were significant, and tests on the proportion of those who choose to pad the budget a second time were not found to be significant when comparing direction or type of influence attempt.

Additional Analyses of H4

While not originally planned, looking at the entire sample of those who provided a second year budget number, independent t-tests were run comparing both the original budget number and the second year budget number based on demographics (gender, and whether they had encountered a similar situation to the case in practice) and Pearson correlations were done comparing the budget numbers and numerical demographics (age, years of work experience, years of managerial experience, and years of budgeting experience). None of the demographics yielded significant results; however, gender was almost significant for first and second year budget submissions. Among those who provided budget numbers for both years, the average first year budget submitted for females was $5,130,435 (standard deviation 158,644) and the average for males was $5,216,216 (standard deviation 172,825), $p = 0.059$. Within the second year budget numbers, the average for females was $5,058,696 (standard deviation 91,269) and males was $5,120,270 (standard deviation 150,674), $p = 0.083$. While the results did not reach significance, it appeared that females may be less willing to add budgetary slack.

The first year budget number and the second year budget number yielded a significantly positive Pearson correlation (0.624, $p < 0.001$), as was the correlation between the first year budget number and a dummy variable denoting whether or not the respondent padded the budget the second year (0.530, $p < 0.001$). These correlations remained significant after controlling for gender: for the second year budget amount (0.603, $p < 0.001$), and whether or not the respondent padded the second year (0.500, $p < 0.001$).

Next, a regression was run with the second year budgeted amount as a dependent variable and the following independent variables: the first year budget submission, whether the respondent received rational persuasion or obedience pressure, whether the respondent received influence from a superior or a peer, whether they encountered a similar experience in practice, gender, age, years of work experience, years of managerial experience, and years of budgeting experience. The first year budget submission was the only significant predictor ($p < 0.001$, although it is worth noting that when the regression was run using only those who padded the budget the first year, then the first year budget number was only marginally significant at $p = 0.082$).

Finally, a logistic regression was run with a dummy dependent variable signifying if the respondent padded the budget or not the second year. The independent predictors were the same, except that the first year budget number was replaced with a dummy variable indicating if the respondent padded the budget or not in the first year. The results of this regression show that the most significant predictor in this regression of whether or not the budget is padded in the second year is if it is padded in the first year ($p = 0.001$).

Altogether, it appears that one of the biggest predictors with respect to whether or not the individual pads the budget the second year (and the extent of the padding) was whether or not the budget was padded in the first year, thereby providing stronger support for H4.

CONCLUSION

The purpose of this study was to determine whether managers were more likely to pad a budget when receiving different types of influence (rational persuasion or obedience pressure) and directions of influence (superior or peer). The results of our study indicated that receiving different forms of influence attempts do not significantly impact the amount or likelihood of the decision maker to pad the budget. This may indicate that many individuals were willing to add budgetary slack if they received *any* influence to do so.

A high number of participants were willing to pad the budget, regardless of the type or direction of influence. Among all subjects, 68.2% chose to violate company policy and add budgetary slack. Also noteworthy is that after budget submissions were made, according to follow-up questions, among those who padded the budget 84.6% reported that this case presented an ethical dilemma and 46.2% believed it was wrong to pad a budget—and did it anyway. Within those who did not pad the budget, 95.2% reported that this case presented an ethical dilemma, and 81.0% believed it was wrong to pad the budget.

Our study also examined if an individual was more likely to violate company policy and pad a budget if they did so already in the prior year. Among those who padded the budget in the first year, 74.4% chose to pad the budget again in response to a subsequent request. This may indicate that problems created by budgetary slack may continue beyond just one attempt, although as noted, the magnitude of slack in a following year tended to decrease.

Such findings suggest a need for increased attention to training that more heavily emphasizes the importance of and reasons behind select company policies, and training that heightens managers' awareness of the influence tactics others may use to encourage the violation of such policies. Managerial training on such influence tactics can also help managers to promote ethical behavior and encourage adherence to company policies. Findings from our study also indicate that equipping managers with such training should be done as early as possible, because once managers violated corporate policy once, they were likely to do it again.

In addition to the above-noted practical implications of this research study, there are also theoretical implications for accounting. Especially insightful is the finding that rational persuasion is not a stronger predictor than obedience pressure in regard to a manager's willingness to add budgetary slack. This finding suggests that perhaps it is not so much receiving obedience pressure from a superior that led to these decisions, as much as it is receiving one of many possible forms of influence from someone. In light of this, the prior research on obedience pressure and budgetary slack may need to be interpreted in a broader influence context.

However, in addition to its strengths, the present study also has limitations. As with any experiment, participants' responses to the online survey in a “safe”, experimental context may not be indicative of how they would respond if faced with real potential negative consequences or negative affect from violating company policy. It is also possible that there was a self-selection bias among those who chose to participate in the survey. While the average work and management experience among respondents was 9.24 and 3.26 years, respectively, having a relatively small subject pool of MBA students may also impact the generalizability of this study, and future research should explore if similar results can be found among more experienced

business managers. Finally, while we argued that receiving some sort of influence tactic—regardless of type or direction—appeared to result in the majority of individuals being willing to add budgetary slack, it is also possible that there may be some other underlying reason as to why individuals chose to violate corporate policy, which can be addressed by future research.

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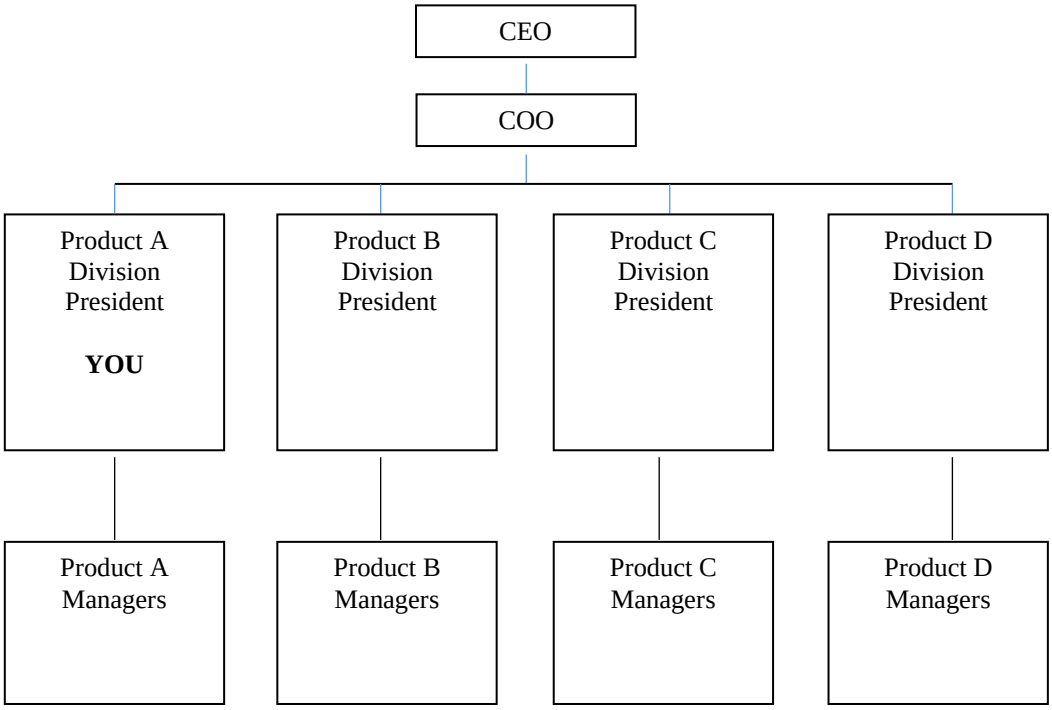
APPENDIX: EXPERIMENTAL TASK

Background

You are employed by Lamdre Manufacturing, Inc. (LMI). LMI is separated into four main product divisions: Product A, Product B, Product C, and Product D. Your job is the Division President overseeing Product A. The LMI corporate hierarchy with respect to operations is shown below.



As the division president of Product A, you report directly to the COO, who completes your performance evaluations and determines your annual raises and promotions. Directly underneath you are the various managers responsible for making sure the manufacturing process runs smoothly and efficiently.

One of your duties is to compile and analyze information provided to you by the senior staff accountant and various managers in order to prepare a single budgeted amount of predicted overhead for the division's overhead spending for the upcoming fiscal year. Your final recommendation is critically important because it is the first component of a budgeting paper trail that is subject to review by auditors and top executives within the organization.

After receiving the necessary reports, you calculate that controllable spending for Product A in its 2013 fiscal year will be $5,000,000. In passing, you have mentioned this calculation to the COO and the other Product Division Presidents.

Historically, it has been an unofficial company policy to include an additional 10% cushion to the calculated budgeted amounts in order to ensure actual spending does not exceed the budget. This practice is common among all four of LMI's divisions. If you were to do this, then your final budgeted number for overhead would be $5,500,000.

Meeting budgeted spending goals is considered important for two reasons. First, annual bonuses for all hourly employees are determined based on actual versus budgeted spending.

Second, historically, the Product A Division has never exceeded its budgeted spending limits. This is a matter of division-wide pride among the division managers and is taken very seriously.

The Current Situation

Just after the start of this year's budgeting process, the CEO of LMI called a teleconference to discuss a new budget policy. During the teleconference, the CEO discussed that because of a recent downturn in the economy, spending budgets for divisional overhead should be set as accurately as possible. Specifically, the CEO stated that budgeted spending levels should represent "challenging but attainable goals."

Manipulation—type of Influence Attempt (participants randomly received one of the four following scenarios).

Rational Persuasion/Superior: At the end of the teleconference, the COO, Chris, pulls you aside and says: "I want you to consider including the traditional 10% cushion and increase your budgeted recommendation from $5 million to $5.5 million. This is entirely your decision to make, but here are some things to consider when making your decision. While I understand the reasoning behind the CEO's policy, we need to continue to keep a safety net in the budget. This is not to make ourselves look good later, but to account for the uncertainty in the company and economy. The additional $500,000 will allow the division managers some extra room while still keeping the "challenging but obtainable" goals. Given these realities, would you consider increasing the budget to $5.5 million? This conversation needs to stay between you and me."

Obedience Pressure/Superior: At the end of the teleconference, the COO, Chris, pulls you aside and says: "I want you to consider changing your $5 million recommendation to $5.5 million. If you do not, I will make sure that everyone knows you are the one to blame when things go badly for your division. Keep this in mind when you make your decision. I will remember this later. This conversation needs to stay between you and me.

Rational Persuasion/Peer: At the end of the teleconference, the Product B Division President, Chris, pulls you aside and says: "I want you to consider including the traditional 10% cushion and increase your budgeted recommendation from $5 million to $5.5 million. This is entirely your decision to make, but here are some things to consider when making your decision. While I understand the reasoning behind the CEO's policy, we need to continue to keep a safety net in the budget. This is not to make ourselves look good later, but to account for the uncertainty in the company and economy. The additional $500,000 will allow the division managers some extra room while still keeping the "challenging but obtainable" goals. Given these realities, would you consider increasing the budget to $5.5 million? This conversation needs to stay between you and me."

> Obedience Pressure/Peer: At the end of the teleconference, the Product B Division President, Chris, pulls you aside and says: "I want you to consider changing your $5 million recommendation to $5.5 million. If you do not, I will make sure that everyone knows you are the one to blame when things go badly for your division. Keep this in mind when you make your decision. I will remember this later. This conversation needs to stay between you and me.

Based on the information presented, and the fact that you report directly to the COO, what overhead budget amount would you recommend?

In the following year, in preparation for 2014's budget, the CEO sends out a memo reminding all of the managers about the corporate policy to make the budget estimates as accurate as possible. According to the memo, the CEO expressed displeasure because it appeared that some division managers had continued to pad the budget in the prior year. Once again, you calculate the controllable overhead for the upcoming year to total $5 million.

Once again, before submitting your final recommendation, you are approached by Chris who asks you to increase your budgeted recommendation by the traditional 10% cushion, citing the same reasons as the previous year. Doing so would increase your final estimate from $5 million to $5.5 million.

What overhead spending would you recommend for 2014?

Does the case present an ethical dilemma? (Yes or No)

Do you believe it is wrong to pad a budget to ensure that the budget is met? (Yes or No)

Demographic questions follow.

AN EXPERIMENTAL TESTING OF FACTORS ASSOCIATED WITH FINANCIAL STATEMENT FRAUD

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ABSTRACT

This paper documents an experiment conducted with accounting students to test which incentives are associated with fraudulent behavior. The incentives were designed to be similar to incentives to misstate financial statements faced by corporate managers, including compensation, competition, and meeting expectations.The results partially confirm the expectation that earnings are overstated when incentives are present. An especially interesting result is that (a) female participants underperformed compared to male participants when the opportunity to misstate earnings was not present, and (b) increased their reported earnings significantly when they had the opportunity to conceal their actual performance.

INTRODUCTION

Financial statement fraud is the deliberate misstating of financial statements, usually to maintain or increase the stock price of the relevant company. High profile cases throughout history have motivated legislation designed to prevent future misstatement, including the Securities Acts of 1933 and 1934 and the Sarbanes-Oxley Act of 2002 (SOX). This legislation requires publicly traded companies, among other things, to

- File financial statements with the Securities and Exchange Commission
- Have those financial statements audited by a Certified Public Accountant
- Have their internal control system audited by a Certified Public Accountant.

Fraud is modeled to depend upon the presence of opportunity, motivation, and rationalization (Dellaportas, 2013). The regulatory response to financial statement fraud has focused on opportunity. For example, SOX requires management to maintain and auditors to evaluate internal control systems to prevent financial statement fraud ("Public Law 107-204," 2002). Another avenue to understand financial statement fraud is through its motivation. This paper describes a testing of motivations of financial statement fraud.

FINANCIAL STATEMENT FRAUD

Financial statement fraud is usually modelled as the fraud triangle (opportunity, motivation, and rationalization, as noted above) and the elements of the fraud (fraudulent act, concealment, and conversion) (Trompeter, Carpenter, Desai, Jones, & Riley Jr, 2013).

Within this context, fraudulent behavior is predicted by manager attitudes (Carpenter & Reimers, 2005) and the attitudes and behavior of their peers (O'Fallon & Butterfield, 2012). Fraud is often motivated by auditor incentives (Hogan, Rezaee, Riley, & Velury, 2008). These incentives could be monetary gain or to maintain ego (Anderson & Tirrell, 2004). For example, Bernie Ebbers, the CEO of WorldCom, needed to keep the stock price of WorldCom high to avoid margin calls on his personal holdings (Beresford, Katzenbach, & C.B. Rogers, 2003). Upper management compensation depends on maintaining stock price high, specifically by keeping earnings above analyst expectations (Doyle, Jennings, & Soliman, 2013). On the other

hand, people that commit fraud may be motivated by internal goals or by concerns about what other people think, rather than by a pure financial motivation (Schuchter & Levi, 2015). Either way, management may try to maintain obtain earnings greater than analyst expectations either by over-reporting earnings or by managing analyst forecasts to lower values (Matsumoto, 2002; Perols & Lougee, 2011). Upper management may often have the opportunity to enforce financial statement fraud, especially when internal controls are weak. In fact, weaker controls are associated with fraud (Hogan et al., 2008). Some participants in this study are expected to misstate their performance when given the opportunity. One of the keys to the presence of financial statement fraud is the opportunity to commit the fraud.

Hypothesis 1. People are more likely to falsify an information report when they have the opportunity to conceal their actual performance.

Managers are more likely to misstate their performance when they obtain more financial reward for better performance. They may also misstate performance to maintain their ego (Dorminey, Fleming, Kranacher, & Riley Jr, 2012). In financial reporting, both management compensation and their ego may depend upon their firms meeting analyst expectations and exceeding peer performance.

Hypothesis 2. People are more likely to falsify an information report when they have externally stated expectations of performance to match.

Hypothesis 3. People are more likely to falsify an information report when they know their peers performance.

Of additional interest, white collar crime is overwhelmingly committed by males (Blickle, Schlegel, Fassbender, & Klein, 2006; Gottschalk & Smith, 2015). Females are generally regarded as being more ethical than males (Pierce, 2014). A variety of reasons have been forwarded, such as different childhood experiences (Jaffee & Hyde, 2000) or role self-selection (Wood & Eagly, 2002). Whatever the cause, female managers would be expected to report performance more honestly.

3. Females will falsify their information report less than males.

The following sections of the paper review the experiment used to test the hypotheses and the results of that experiment.

METHOD

Students from an introductory financial accounting class were recruited to participate in the research. They were offered a maximum of $5 and two percent extra credit based on performance in the experimental task. Students were they would earn $1 for each $25 they earned in the simulation. After completion of the task, all participants were given the full amount offered with a disclaimer statement explaining that all participants were given equal remuneration. Participants were directed to report to a room at one of four times, and were assigned to a research group based on the time they participated. Participant demographics are shown in Table 1. Most of the participants were sophomores (indicated with a value of 2 in the Class variable), about twenty years old, business majors, and male. The research groups had a significant difference in gender percentages.

Table 1
DEMOGRAPHICS

	Control	Conceal	Compare	Expectations	Total
N	23	27	19	16	85
Age	20.4	19.7	19.9	19.9	20.0
Gender (Male)	48%	59%	68%	56%	58%
Class	2.1	2.3	2.3	2.4	2.3
Business Majors	76%	69%	68%	67%	70%

Freshmen class = 1, Sophomore class = 2, etc.…

The participants completed a web-based task in which they took thirty turns to maximize income for a business simulation. They first received instructions, after which they used their personal laptops to perform the task. They purchased inventory and set product prices for a simple lemonade stand simulation. The students were assigned to one of four groups:

- Control, in which the student results were checked by a proctor upon completion of the task. Participants in this group were unable to falsify the results of their performance.
- Conceal, in which students self-reported their performance to allow the opportunity to falsify information report.
- Compare, which was identical to the conceal group, except that scores were gathered and the average was reported to the group half-way through the task. This was done to correspond to the incentives corporate managers may feel to match their peers' performance.
- Expect, in which the participants were given an expected outcome of $80 before beginning the exercise. This was done to induce the pressures of meeting analyst expectations.

The compare group was structured to test whether the participants would be motivated by a desire to outperform other students in addition to the monetary award. The expectations group was structured to model the effect of financial analyst expectations on financial reporting. It is often supposed that corporations are motivated to meet or exceed financial analyst expectations of their performance. The Control, Conceal, and Expect groups were all told that reimbursement for participating in the experiment depended upon being a high performer. Participants in the Expectations group were told that their reimbursement depended upon matching or exceeding the expected performance.Upon completion of the task, participants were noted on a roll. They were later reimbursed with the promised maximum reimbursement and extra credit, regardless of their performance. They were also given a debriefing form that explained the reimbursement deception.

The expected results are that Conceal, Compare, and Expect participants would report higher earnings than the Control participants, and that the Compare and Expect participants would report higher earnings than the Conceal participants.

RESULTS

Task performance by experimental condition was tested using regression with various demographic factors entered as control variables (Table 2). The three experimental groups combined (shown in Table 2 as Experimental Group) reported higher earnings than the control

group. Thus, at least some of those students that had the opportunity to conceal their actual performance overstated their earnings.

Table 2
REGRESSION RESULTS

Independent Variable: Money Earned in simulation

	B	Significance
Constant	$130.11	<.01
Gender	(26.14)	<.01
Class	(14.14)	<.05
Major		ns
Age		ns
GPA		ns
Experimental Group	.147	<.01

However, as shown in Table 3, although the group means are all in the expected direction, the Compare and Expect groups do not report significantly higher performance than the Conceal group. Thus on the face of it, it appears that the opportunity to misstate earnings led to falsifying results, but not the pressure of overstate earnings. Hypotheses 2 and 3a re not supported.

Finally, overall females reported less earnings than males. Thus Hypothesis 3 is supported. However, there are some interesting dynamics. Women report less earnings then men in all of the groups, but the biggest difference is in the control group, in which no concealment is possible. Separating the group performance by group, females are responsible for the significant increase in the three experimental groups over the control group. Thus we have the unexpected results that female performance is much lower than male performance in the control group, but that unlike the males, their reported results are significantly higher in the experimental group than in the control group. In other words, there actual behavior was the opposite of what was expected. It appears that females were more likely to misstate their earnings than males.

Table 3
RESULTS BY GENDER – DIFFERENCE FROM CONTROL

Means

Experimental Group	Male	Female	*p*	Total	*p*
Control	58.81	35.91		45.12	
Conceal	63.25	58.25	<.05	60.96	<.10
Compare	77.13	50.95		68.4	
Expect	72.19	50.3		63.07	
Total non-Control	69.96	54.62	<.10	63.64	<.05
Total	67.39	48.58		58.24	

p values are from t-test differences from control group

DISCUSSION

To summarize the results, a) participants overstated their earnings when they were able to conceal their actual performance, b) increased incentives through earnings expectations and peer performance did not affect the extent of over-reporting, and c) overall female performance was lower than male performance (as expected), but women were more likely to overstate earnings than men (unexpected).

Overall, participants that could overstate their earnings did so. By overstating their earnings, they believed that they increased their chances for reimbursement.Knowledge of performance expectations did not significantly change results, although the direction of earnings increase is as expected. It is possible that the sample size was too small or the experimental manipulation was not strong enough.

The gender effect is puzzling. Although women are generally thought to be more ethical than men, the evidence is not conclusive and the reasons for the gender differences have not been thoroughly determined (Pierce, 2014). It could be that the females did not perform as well in the control group as the males because they were less competitive because of lower competitiveness or less willingness to take risks (Bönte & Piegeler, 2013). Women can be less willing to take risks in competitive situations than men, resulting in poorer performance (Pekkarinen, 2015). The results of this paper are reminiscent of another study that found that women entering an ethics course were more ethical than the men in the class, but do not increase in ethicalness during the class, whereas the men did improve (Wang & Calvano, 2015). Further research may investigate the causes of the difference in gender behavior found in this study.

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