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ACADEMY OF ACCOUNTING AND FINANCIAL STUDIES JOURNAL

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LETTER FROM THE EDITORS

Welcome to the *Academy of Accounting and Financial Studies Journal,* an official journal of the Allied Academies, Inc., a non profit association of scholars whose purpose is to encourage and support the advancement and exchange of knowledge, understanding and teaching throughout the world. The *AAFSJ* is a principal vehicle for achieving the objectives of the organization. The editorial mission of this journal is to publish empirical and theoretical manuscripts which advance the disciplines of accounting and finance.

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

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AN EMPIRICAL EVALUATION OF BANKRUPTCY PREDICTION MODELS FOR SMALL FIRMS: AN OVER-THE-COUNTER (OTC) MARKET EXPERIENCE

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ABSTRACT

The focus of this paper is on the bankruptcy prediction of small firms. Specifically, two successful bankruptcy prediction models, Ohlson's model (1980) and Shumway's model (2001), are re-estimated with the data of a sample of firms traded on the over-the-counter (OTC) market in a recent period in the 1990s. While Ohlson's model relies strictly on accounting ratios, Shumway's model combines market measures with the accounting ratios. Both models are then validated by a classification test and a more rigorous prediction test to predict the bankruptcy probability of the holdout samples. The results indicate that both the classification accuracy and the prediction accuracy are impressive with these two models for predicting bankruptcy up to three years before their actual demise, while Shumway's model performs marginally better than Ohlson's model.

INTRODUCTION

Business failures are considered both unfortunate and costly at least by the owners, creditors, employees, suppliers and customers of the failed firms. Even the ardent admirers of the market mechanisms' ability to increase efficiency through its "survival of the fittest" principle find the social and economic consequences of business failures rather unpleasant in the short run. Accordingly, for over thirty years, academic researchers and practitioners in the fields of accounting, economics and finance have shown a strong and determined interest in developing and testing business failure prediction models.

The literature on bankruptcy prediction models is rich and it demonstrates numerous strides made over the years since the pioneering research by Beaver (1966) and Altman (1968). For the most part however, prior research has concentrated on firm samples made up of the largest of the corporations traded on the New York Stock Exchange (NYSE) and/or the American Stock Exchange (AMSE).[1] Yet in reality, the small firms are more vulnerable to business failure than their larger

counterparts.[2] According to the Small Business Administration (SBA, 1999), over 99 percent of business closures are small firms. Moreover, small businesses are the backbone of the U.S. economy. They produce 39 percent of the GNP and make 47 percent of all sales within the U.S. (SBA, 1999). Small firms also account for about half of the private sector employment and create two of every three new jobs. The crucial importance of small firms in the American business frontier provides partial impetus for this study. The relative paucity of studies focusing on small business failure provides additional motivation for the present study.

The objective of the empirical investigation in this study is to examine the effectiveness of two highly successful bankruptcy prediction models, namely, Ohlson's model (1980) and Shumway's model (2001) in predicting bankruptcy of small firms. Specifically, this study applies the two models for predicting bankruptcy of a sample of over-the-counter (OTC) traded firms during a period of the 1990s. While Ohlson's model relies strictly on accounting data, Shumway's model combines market information with the accounting data.

The distinguishing features of this study, which are summarized next, make strong attempts to overcome some of the glaring voids in the literature. First, this study addresses the issue of business failures specifically to the OTC traded small firms. Only firms with assets less than $130 million are considered in this investigation. About 75 percent of the sample firms had assets of less than $50 million one year prior to bankruptcy. Second, this paper analyzes the data from a large sample of 316 OTC firms, consisting of 158 bankrupt firms during the 1990s and 158 matched nonbankrupt firms by size, industry and the timing of the financial reports during the same period. Third, by using all the data, the financial as well as the market data, from the most recent decade, the problem of pooling the data from 2 or 3 decades in the previous studies is mitigated. Fourth, the estimated models are externally validated by a prediction test up to 3 years prior to bankruptcy with the help of a holdout sample. Specifically, the bankruptcy prediction models estimated by using the data of 246 matched firms over the 1990-1996 period are utilized to predict failure for a group of 70 matched firms during 1997 and 1998.

The rest of the paper is organized as follows. A brief review of the literature is the subject of the second section. The methodology and the data adopted in this study are explained in the third section. The empirical results are presented and analyzed in the fourth section. A summary of the paper makes up the final section.

LITERATURE REVIEW

Since the seminal work of Beaver (1966) and Altman (1968), financial ratio analysis has become the favorite approach to investigating the bankruptcy problem (Altman, 1993). Numerous studies have been published through the development of various statistical techniques into ratio analysis to predict bankruptcy over the past thirty years. Table 1 presents the summary of the major studies using financial ratios in discriminating between bankrupt and nonbankrupt firms.

Table 1. Summary of Selected Bankruptcy Prediction Studies

No.	Author (Year) (Note 1)	Primary Sample & Data Sources (Note 2)	Sample Size of Failed Firms	Sample Period	Independent Variables Type
Financial-Ratio Based					
1	Beaver (1966)	MI	79	1954-1964	Financial Ratios
2	Altman (1968)	MI	33	1946-1965	Financial Ratios
3	Deakin (1972)	MI	32	1964-1970	Financial Ratios
4	Edmister (1972)	SBA	21	1954-1969	Financial Ratios
5	Blum (1974)	MI	115	1954-1968	Financial Ratios
6	Ohlson (1980)	WSJ & COMP	105	1970-1976	Financial Ratios
7	Zmijewski (1984)	WSJ & COMP	81	1972-1978	Financial Ratio
8	Zavgren (1985)	COMP	45	1972-1978	Financial Ratios
9	Platt & Platt (1990)	COMP	57	1972-1986	Financial Ratios
10	Gilbert (1990)	COMP	76	1974-1983	Financial Ratios
11	Begley et al. (1996)	COMP	165	1980-1989	Financial Ratios
12	McGurr&DeVaney (1998)	COMP	56	1983-1993	Financial Ratios
Market-Measure Based					
13	Beaver (1968)	MI	79	1954-1964	Market Data
14	Aharony et al. (1980)	COMP & CRSP	45	1970-1978	Market Data
15	Clark & Weinstein (1983)	CRSP	36	1962-1979	Market Data
16	Katz et al. (1985)	COMP & CRSP	101	1968-1976	Market Data
17	Queen & Roll (1987)	CRSP	Unknown	1962-1985	Market Data
18	Zavgren et al. (1988)	CRSP	45	1972-1978	Market Data
19	Simon & Cross (1991)	CRSP	22	1981-1987	Market Data
20	Mossman et al. (1998)	COMP & CRSP	72	1980-1991	Market & Financial
21	Shumway (2001)	WSJ, COMP & CRSP	300	1962-1992	Market & Financial

Table 1. Summary of Selected Bankruptcy Prediction Studies (Continued)

No.	Author (Year)	Statistical Method	Validation Type	Years of Validation
Financial-Ratio Based				
1	Beaver (1966)	Univariate	Cross Validation	Five years before
2	Altman (1968)	Discriminant	Classification & Cross validation	Five years before & One year before
3	Deakin (1972)	Discriminant	Classification & Cross validation	Five years before & Five years before
4	Edmister (1972)	Discriminant	Classification	One year before
5	Blum (1974)	Discriminant	Cross validation	Five years before
6	Ohlson (1980)	Logit	Classification	One year before
7	Zmijewski (1984)	Probit	Classification & Cross validation	One year before
8	Zavgren (1985)	Logit	Classification & Prediction	Five years before & Five years before
9	Platt & Platt (1990)	Logit	Classification & Prediction	One year before &One year before
10	Gilbert (1990)	Logit	Classification & Cross validation	One year before & One year before
11	Begley et al. (1996)	Discriminant & Logit	Classification	One year before
12	McGurr&DeVaney (1998)	Discriminant & Logit	Classification	One year before
Market-Measure Based				
13	Beaver (1968)	Univariate	Classification	Five Years Before
14	Aharony et al. (1980)	Univariate	Classification	Four Years Before
15	Clark & Weinstein (1983)	Univariate	No	No
16	Katz et al. (1985)	Univariate	No	No
17	Queen & Roll (1987)	Univariate & Logit	No	No
18	Zavgren et al. (1988)	Univariate	No	No
19	Simon & Cross (1991)	Univariate	No	No

Table 1. Summary of Selected Bankruptcy Prediction Studies (Continued)

No.	Author (Year)	Statistical Method	Validation Type	Years of Validation
20	Mossman et al. (1998)	Logit	Classification	Two Years Before
21	Shumway (2001)	Multi-Period Logit	Prediction	One Year Before

Notes of Table 1:

1. The studies of Begley et al. (1996) and Mossman et al. (1998) applied previous models to new data in a later period. McGurr & DeVaney (1998) compared prediction performance of several previous bankruptcy models which were applied to the retailing industry. The studies of Clark & Weinstein (1983), Katz et al. (1985), Zavgren et al. (1988), and Simon & Cross (1991) are not considered as the development of bankruptcy prediction models because these works only examined the relationship between stock market behavior and bankruptcy by an event study. Market measures were not used to predict bankruptcy.
2. MI-Moody Industrial Manual; SBA-Small Business Administration; WSJ-Wall Street Journal; COMP-Compustat Files; CRSP-Center for Research into Securities Prices Database.

Empirical research for predicting bankruptcy started with univariate analysis (e.g., Beaver, 1966). Under this method, each individual ratio is examined at a time and the ratios which provide the most accurate prediction are recognized. Multivariate discriminant analysis (MDA) later replaced univariate analysis to develop bankruptcy prediction models (e.g., Altman, 1968; Deakin, 1972; Edmister, 1972; Blum, 1974) because the MDA method can measure a firm's risk of bankruptcy by analyzing several ratios simultaneously. A composite number, such as Z score, from the MDA is used to classify a firm as bankrupt or nonbankrupt. More recent prediction models have been developed using logit analysis, which is in response to the limits of the MDA method (e.g., Ohlson, 1980; Zavgren, 1985; Platt & Platt, 1990) to improve the predictive reliability and accuracy. The most distinctive advantage of the logit analysis over the MDA method, according to Eisenbeis (1977), is that the coefficient of an individual variable in a logit model is interpretable and the significance of a variable can be tested statistically. Thus, each financial ratio in a logit model is examined so that the predictive accuracy of the model can be improved.

Ohlson (1980) is among the first to use logit analysis to develop a bankruptcy prediction model to assess the probability of corporate failure. The variables include financial ratios which measure liquidity, profitability, leverage and solvency. The sample was made up of 105 publicly traded industrial firms that went bankruptcy during the period of 1970 to 1976. The model found that leverage ratio and profitability ratio were consistently significant in discriminating between bankrupt and nonbankrupt firms up to three years prior to bankruptcy. Ohlson also concluded that smaller firms were more prone to bankruptcy. Due to lack of new data beyond 1976, Ohlson examined the validity of his model only by classifying the same sample which was used to estimate the model. The classification test showed that Ohlson's model was able to identify about 88 percent of 105 bankrupt firms accurately one year before bankruptcy.

Table 1 reflects how the research has evolved in conjunction with stock market behavior and further effort to pursue a successful bankruptcy prediction model can be beyond financial ratio analysis. This is because a model relying solely on financial ratios might not capture some firm-specific attributes in time. These idiosyncratic characteristics for bankrupt firms include "unmeasured quality of assets, the creative ability of management, random event, and the courts of law" (Zavgren, 1985). Recently, researchers began to investigate the relationship between market behavior and bankruptcy (e.g., Aharony et al., 1980; Clark & Weinstein, 1983; Katz et al., 1985; Queen & Roll, 1987; Simons & Cross, 1991). Given a semi-strong efficient market, if a firm is experiencing deteriorating solvency, the capital market will assimilate such unfavorable information immediately and promptly impound on the stock price to reflect the increasing insolvency risk well before eventual bankruptcy. A number of studies confirmed that certain market measures had information content related to bankruptcy and had reported strong support for the efficient market paradigm. For example, Aharony et al. (1980) and Clark & Weinstein (1983) found evidence in an event study that a significant negative return for bankrupt firms started about three years before bankruptcy.

Finally, the most recent work of Shumway (2001) shed new light on developing a more dynamic bankruptcy prediction model by combining both financial ratios and market-driven measures. Shumway's sample consisted of 239 bankrupt firms which were traded on the NYSE and the AMSE over the 1962-1992 period. The results indicated that both financial ratios and market measures possessed strong discriminating ability and had lower correlations with each other. When applied to a holdout sample, Shumway's model provided impressive prediction accuracy and outperformed other benchmark models (Altman's model (1968) and Zmijewski's model (1984)), which were based solely on financial ratios. The results support the assertion that financial ratios and market-driven measures should not be regarded as competing predictors. On the contrary, combining both in a multivariate context can help improve prediction ability.

Further efforts are still needed to overcome certain limitations in the past studies in order to improve the usefulness of bankruptcy prediction models. One criticism concerns sample selection bias. As can be seen from Table 1, all research except Edmister's study (1972) collected the bankrupt firms and data primarily from Moody's Industrial Manual, in earlier studies, or the Compustat, in recent work. Since these data sources mainly provide information for the largest firms, any sampling frame drawn from the above sources is weighted heavily toward large firms. Another criticism has to do with the pooling problem. Since only a few large firms declare bankruptcy each year, researchers usually pooled observations over different years to obtain an adequate sample size to permit statistical testing. The majority of studies shown on Table 1 covered a sample period over 10 years, and some (e.g., Altman, 1968; Queen & Roll, 1987; Shumway, 2001) stretched over 20 years. Considering the dramatic change of business environment over the last decades, such pooling data results in nonstationary statistical inferences of the predictive variables

(i.e., means, variances and covariances) for the sample firms during the test periods. Consequently, pooling data from different periods would have confounded empirical results significantly.

Last, due to the limited sample size of large firms, validation of the developed models encounters difficulty. Table 1 shows that different procedures of validating the predictive reliability of the models have been used. Many studies adopted a classification test (e.g., Beaver, 1968; Edmister, 1972; Aharony et al., 1980; Ohlson, 1980; Queen & Roll, 1987), in which the model is evaluated merely according to the accuracy to classify the same sample from which the model was estimated. Some studies used a more powerful cross-validation test (e.g., Beaver, 1966; Altman, 1968; Deakin, 1972; Blum, 1972; Zmijewski, 1984), which splits the sample into two subsamples. One subsample is used to estimate the model, and then the other subsample in the same time period is used to evaluate the predictive accuracy of the model. The most rigorous validation is the prediction test, which is on the ex ante basis, but performed by few studies due to small sample sizes. Under this test, the model is estimated by one sample in an earlier period and then is used to predict another holdout sample in a later period. Only three studies (i.e., Zavgren, 1985; Platt & Platt, 1990; Shumway, 2001) performed the prediction test. Platt & Platt (1990) and Shumway (2001) reported the prediction results for only one year before bankruptcy. Zavgren (1985) reported the results up to five years prior to bankruptcy, though not with much success. In general, the value of a bankruptcy prediction model in decision-making would be much greater if such a model displays superior ability to predict bankruptcy several years prior to actual declaration of bankruptcy.

METHODOLOGY

The objective of this study is to determine whether models that have been used successfully to predict bankruptcy for very large firms can be used effectively to predict bankruptcy for small firms, as well. In this section, we first describe the models used in this research, then discuss the variables in those models, and the data used in our sample.

Models and Variables

To evaluate the effectiveness of bankruptcy prediction models, we have chosen to utilize two successful models: Ohlson's model (1980) and Shumway's model (2001).

Ohlson constructed a logit model in which the dependent variable was a score to determine the probability of bankruptcy. This model was estimated based on a set of independent variables which were financial statement ratios and is defined as follows:

$$Z = 1/ [1 + exp - (a + b_1TLTA + b_2WCTA + b_3CLCA + b_4OENEG + b_5NITA + b_6FUTL + b_7INTWO + b_8CHIN)]$$

Where:

Z = the probability of bankruptcy for a firm
TLTA = Total liabilities/total assets
WCTA = Working capital/total assets
CLCA = Current liabilities/current assets
OENEG = 1, if total liabilities exceeds total assets; zero otherwise
NITA = Net income/total assets
FUTL = Fund provided by operations/total liabilities
INTWO = 1, if net income was negative for the last two years; zero otherwise
CHIN = $(NI_t - NI_{t-1}) / (NI_t + NI_{t-1})$, Where NI_t is net income for the most recent period. The denominator acts as a level indicator. The variable is thus intended to measure changes in net income

Examining these financial ratios more closely, the expected relationship of the ratios with the probability of bankruptcy can be noted. Two of the ratios, TLTA and CLCA, are indicators of increasing liabilities and the signs of the coefficients are predicted to be positive. Whereas, WCTA, NITA, and FUTL, which measure the relationship of working capital, net income and funds provided by operations, respectively, are all expected to decrease as the firm approaches bankruptcy. Therefore, the coefficients for these variables are expected to have negative signs. The variables OENEG and INTWO are indicator variables which are expected to be positively related to the increasing probability of bankruptcy.

Ohlson (1980) applied logit analysis to develop a prediction model using a group of bankrupt firms that were traded on the NYSE and AMSE during the 1970s. Logit analysis weights the independent variables and creates an overall score which can be interpreted as the probability of a firm's bankruptcy. The coefficients measure the effect on the probability of bankruptcy in terms of a unit change in the corresponding variables (Jones, 1987).

It can be argued that Shumway (2001) improved on the basic bankruptcy models by combining market ratios along with the traditional financial ratios. This model is defined as follows:

$$Z = 1/ [1 + exp - (a + b_1NITA + b_2TLTA + b_3ERR + b_4SDR)]$$

Where:

Z = the probability of bankruptcy for a firm
NITA = Net income/total assets
TLTA = Total liabilities/total assets
ERR = Excess rate of return (i.e., a firm's rate of return minus the market's rate of return)

SDR = Standard deviation of residual returns
(Residual return = a firm's realized rate of return - its expected rate of return)

The two accounting ratios measures the return on assets and financial leverage which proxy for the firm's profitability and financial leverage risk, respectively. It is expected that a firm will experience deteriorating profits and increased reliance on borrowed funds as it approaches bankruptcy. Therefore, we predict a negative coefficient for the variable NITA and a positive coefficient for the variable TLTA. The two market variables in the model include the excess rate of return (ERR) which is an indication of the firm's rate of return and the standard deviation of residual returns (SDR) which reflects the market risk of publicly traded firms. It is expected that as a firm approaches bankruptcy, it is riskier than a healthy firm and the risk-averse market will react by downgrading the firm's stock price and thus, we expect that the coefficient for the variable ERR will be negative. Meanwhile, as a firm approaches bankruptcy, it is also expected to be more unstable than other firms and its returns will produce a larger standard deviation. Therefore, the coefficient of the variable SDR is expected to be positive.

Both models originally included a variable to control for firm size. In this study an elaborate pair-matching procedure has been used to control for the size effect and therefore, a variable is not used in the model. This will be discussed further in the following sections.

Sample and Data

The bankrupt sample firms consist of a group of industrial OTC companies that went bankrupt during the period from 1990 to 1998. The list of bankrupt OTC firms and bankruptcy filing dates is initially searched from Moody's OTC Industrial Manual and Moody's OTC Unlisted Manual. Additional bankrupt OTC firms and petition dates are supplemented from the National Stock Summary. Firms falling within the SIC code from 6000 to 6999 (financial firms) are not included. The original sample contained 553 bankrupt OTC industrial firms.

The financial data in Ohlson's and Shumway's models are retrieved from the Compustat Research File, Moody's OTC Industrial Manual and Moody's OTC unlisted Manual. A firm is excluded from the sample whenever required data are missing for the computation of ratios in a given year. The market data in Shumway's model are obtained from Compustat and OTC Daily Stock Prices Record by Standard & Poor. For some firms which were delisted before filing bankruptcy, the latest available trading data are used. The market index for OTC firms is surrogated by the Industrial Index of OTC Market Indicator (before 1993) and the Industrial Index of Nasdaq Market Indicator (after 1993). The Market Index is collected from OTC Daily Stock Prices Record by Standard & Poor and Nasdaq Daily Stock Prices Record by Standard & Poor, respectively. Of the initial 553 bankrupt industrial firms, many firms are deleted due to incomplete financial and

market data, resulting in 222 bankrupt OTC firms with complete financial and market data during the period 1990-1998.

To avoid using adjusted financial statements to exaggerate the predictive accuracy of models, financial data from the last year's financial statements for a bankrupt firm is considered only if the firm filed the petition six months after the last fiscal year end. For example, if a firm with a fiscal year end on December 31 filed bankruptcy in April 1993, the data of one year before bankruptcy should be retrieved from the financial statements ended on December 31 1991. Likewise, for a firm that filed bankruptcy in September 1993, financial data for the December 1992 year end will be used as one year before. Thus, one year before bankruptcy in this study is defined as a firm's most recent fiscal year end at least six months prior to the date of its bankruptcy filing. The second year and third year before bankruptcy are defined accordingly. Similarly, data for market variables are also lagged at least six months before the bankruptcy filing. Although such a lag might lower the predictive power of the models, it adds practical value of prediction for decision makers because predicting bankruptcy within a few months prior to bankruptcy provides little protection to prevent losses.

Matching of Nonbankrupt Firms

Firms are paired by industry according to the SIC code with the same first two-digit number. Each nonbankrupt firm is matched as closely to a bankrupt one in size on the basis of the book value of total assets one year prior to bankruptcy. Size is further controlled by limiting a sample firm to one with total assets less than $130 million one year prior to bankruptcy in order to keep the study focused on relatively small firms. It was also made sure that the fiscal year of a selected nonbankrupt firm falls within three months of the fiscal year of a bankrupt firm to have matched firms report financial statements in the same period. Sources of sample selection and the requirements of data collection for nonbankrupt firms are the same as those for bankrupt firms. To be considered nonbankrupt, a firm must not have filed bankruptcy before the matched period, or have filed for bankruptcy in the following three years after the matching data.

The final paired sample consisted of 158 bankrupt firms and 158 nonbankrupt firms with complete financial and market data from 1990 to 1998. Compared with previous studies summarized earlier, only Begly et al. (1996) collected a slightly larger sample with 165 bankrupt firms which covered a period of 1980 to 1989. Shumway's study (2001) had an impressive 300 bankrupt firms, but those samples extended over a thirty-year period. Table 2 Panel A provides descriptive statistics of bankrupt and nonbankrupt firms matched in total assets at one year before bankruptcy.

Table 2

Panel A - Descriptive Statistics of Assets for the Matched Sample ($000)

	N	Min	Max	Mean	Std.	p-value
Bankrupt firms	158	1278	126926	34230.76	31907.40	
Nonbankrupt firms	158	2463	127295	33320.16	29771.99	
t-test of size difference						0.793

Pane B - Distribution of Matched OTC Firms by Industry

SIC Code (Note)	Frequency	Percent
1000-1999	18	5.7
2000-2999	42	13.3
3000-3999	134	42.4
4000-4999	16	5.1
5000-5999	54	17.1
7000-7999	26	8.2
8000-8999	20	6.3
9000-9999	6	1.9
Total	316	100.0

Note: Financial service firms with SIC code of 6000-6999 are excluded from this study.

Panel C - Distribution of Matched OTC Firms by Year of Bankruptcy

Year	Frequency	Percentage
1990	44	13.9
1991	48	15.2
1992	40	12.7
1993	38	12.0
1994	28	8.7
1995	22	7.1
1996	26	8.2
1997	34	10.8
1998	36	11.4
Total	316	100.0

About 75 percent of 316 matched firms have assets less than $50 million at one year preceding bankruptcy. There are only nine paired firms with assets over $100 million but below $130 million, accounting for less than 6 percent of the total sample. The selected sample represents a group of small-sized firms in the capital market. The results of the t-test further show no significant size difference in terms of total assets between bankrupt and nonbankrupt firms when matched one year before bankruptcy. The sample is drawn from a variety of industries in the period of 1990 to 1998. The distributions of the sample across industries and years are presented in Panel B and C of Table 2.

Division of the Matched Sample

To examine the classification and prediction ability of a bankruptcy prediction model, the whole matched sample of 316 firms is split into two subsamples. One subsample consists of 246 matched firms from 1990 to 1996, and another consists of 70 matched firms from 1997 to 1998. The 246 matched firms in the earlier period are used to re-estimate Ohlson' model and Shumway's model, respectively. The classification test of the model is conducted on the subsample of these 246 firms. The second subsample of 70 matched firms in the subsequent period is used as a holdout sample to evaluate external prediction validity of the model on an ex ante basis. Both Ohlson's and Shumway's models are evaluated and compared in terms of classification and prediction accuracy at one, two and three years prior to bankruptcy.

RESULTS AND ANALYSIS

Re-estimation of the Models

Unlike most of the previous studies that performed an empirical comparison of the models, we first re-estimate Ohlson's and Shumway's original models with the updated coefficients by using our new data on small firms. Two hundred-forty-six matched OTC firms from 1990 to 1996 are used to re-estimate the models, and Table 3 and 4 present the results for each model in each of the three years prior to bankruptcy.

The statistical test for the significance of Ohlson's model indicates that all three models are significant at the 0.01 level and exhibit strong discriminating ability to account for the probability of bankruptcy. Further analysis of individual predictive variables in Ohlson's model, however, raises several concerns. First, the signs of the coefficients of several predictors, WCTA, FUTL, CLCA and INTWO, change over the study period. The inconsistency of relationship between these variables and probability of bankruptcy makes the interpretation of results difficult. Of the eight predictive variables in Ohlson's model, only NITA, TLTA, CHIN and OENEG exhibited consistent relationships with the probability of bankruptcy in all three periods. Second, most variables are not

statistically significant, which are underlined in Table 3. NITA and TLTA are the only two variables statistically significant at the 0.01 level for all three years. The lack of significance of the explanatory abilities for the other six variables in Ohlson's model suggests that multicollinearity may exist among variables. The backward stepwise procedure is conducted to test if certain variables can be eliminated without significantly losing the proportion of variance explained by the model at the 0.10 level. The results, which are not presented in the study, indicate that TLTA and NITA are the only two variables remaining in the models for all three years, while other variables can be eliminated from the models without significant loss of variance explanation.

Table 3. Re-estimation of Ohlson's Model and Variable Coefficients (N=246; Period: 1990-1996)

	Coefficient	Standard Error	Chi-square Statistics	p-value
1 Year prior to bankruptcy				
Constant	-4.45	1.14	15.35	.000
NITA	-7.62	3.15	5.84	.016
TLTA	7.19	1.63	19.45	.000
WCTA	-1.17	1.31	0.80	.371
CLCA	-0.22	0.17	1.64	.200
FUTL	0.18	0.41	0.21	.648
CHIN	0.07	0.43	0.02	.880
OENEG	3.42	21.26	0.03	.872
INTWO	2.11	0.71	8.93	.003
Model			222.95	.000
2 Years prior to bankruptcy				
Constant	-1.99	1.10	3.28	.070
NITA	-7.98	2.28	12.26	.000
TLTA	4.85	1.07	20.41	.000
WCTA	-1.75	1.49	1.38	.240
CLCA	-0.39	0.63	0.39	.531
FUTL	-0.08	0.18	0.21	.651
CHIN	0.44	0.31	2.12	.145
OENEG	3.94	19.59	0.04	.841
INTWO	-0.13	0.59	0.05	.827
Model			141.59	.000

Table 3. Re-estimation of Ohlson's Model and Variable Coefficients (N=246; Period: 1990-1996)				
	Coefficient	Standard Error	Chi-square Statistics	p-value
3 Years prior to bankruptcy				
Constant	-3.16	1.01	9.89	.002
NITA	-9.92	2.53	15.40	.000
TLTA	4.42	1.07	17.23	.000
WCTA	1.18	1.25	0.89	.345
CLCA	0.73	0.45	2.68	.101
FUTL	-0.02	0.15	0.01	.906
CHIN	0.12	0.29	0.17	.682
OENEG	4.50	18.11	0.06	.804
INTWO	-0.28	0.54	0.28	.598
Model			124.97	.000

Table 4. Re-estimation of Shumway's Model and Variable Coefficients (N=246; Period: 1990-1996)				
	Coefficient	Standard Error	Chi-square Statistics	p-value
1 Year prior to bankruptcy				
Constant	-5.67	0.96	35.05	.000
NITA	-7.47	2.35	10.09	.001
TLTA	5.05	1.30	15.06	.000
ERR	-2.28	0.58	15.37	.000
SDR	12.42	3.17	15.39	.000
Model			237.02	.000
2 Years prior to bankruptcy				
Constant	-3.87	0.63	38.29	.000
NITA	-5.74	1.42	16.40	.000
TLTA	5.17	0.95	29.74	.000
ERR	-1.21	0.36	11.14	.001
SDR	5.76	1.92	8.96	.003
Model			152.25	.000

Table 4. Re-estimation of Shumway's Model and Variable Coefficients (N=246; Period: 1990-1996)				
	Coefficient	Standard Error	Chi-square Statistics	p-value
3 Years prior to bankruptcy				
Constant	-3.06	0.58	28.21	.000
NITA	-7.29	1.68	18.82	.001
TLTA	4.02	0.81	24.73	.000
ERR	-0.97	0.34	7.98	.005
SDR	5.83	2.21	6.99	.008
Model			125.84	.000

The re-estimated Shumway's model in Table 4 shows statistical significance in distinguishing bankrupt firms from nonbankrupt firms at less than a 0.01 level in each of the three years. Unlike Ohlson's model, the signs of coefficients for each variable in Shumway's model exhibit the expected relationships with the probability of bankruptcy in a consistent fashion during the test period. The chi-square statistics also indicate that each variable in Shumway's model has a statistically significant effect on predicting bankruptcy at the 0.01 level in each of the three years.

Furthermore, to interpret the marginal effect of the coefficients of the predictive variables on the probability of bankruptcy in the logit model, elasticity is computed by the following equation:

Elasticity = B (1 - P) X

Where:

Elasticity = percent change in probability/percent change in predictive variables
B = the coefficient of the variable
P = the mean of the probability estimated in the sample
X = the mean of the predictive variable in the sample

Table 5. Elasticity of Predictive Variables from the Shumway Model (N=246; Period: 1990-1996)				
	Coefficient	Mean	Mean of Probability	Elasticity
1 year prior to bankruptcy				
NITA	-7.47	-0.17	0.5	0.63
TLTA	5.05	0.63	0.5	1.51
ERR	-2.28	-0.08	0.5	0.10
SDR	12.42	0.19	0.5	1.18

Table 5. Elasticity of Predictive Variables from the Shumway Model (N=246; Period: 1990-1996)				
	Coefficient	Mean	Mean of Probability	Elasticity
2 years prior to bankruptcy				
NITA	-5.74	-0.16	0.5	0.45
TLTA	5.17	0.57	0.5	1.47
ERR	-1.21	0.02	0.5	-0.01
SDR	5.76	0.18	0.5	0.51
3 years prior to bankruptcy				
NITA	-7.29	-0.06	0.5	0.22
TLTA	4.02	0.51	0.5	1.03
ERR	-0.97	0.34	0.5	-0.04
SDR	5.83	2.21	0.5	0.52

Table 5 presents the results of the elasticity for Shumway's model to measure the marginal effect of each variable on the probability of bankruptcy. An elasticity value of greater than 1 is known as elastic, which means that the predictive variable has a larger impact on the probability of bankruptcy. An elasticity value of less than 1 is called inelastic and indicates less impact of the predictive variable on the probability of bankruptcy. Table 5 shows that TLTA has the most impact on the probability of bankruptcy, given that its elasticity value is greater than 1 for each of three years. This finding is not surprising because bankruptcy is largely caused by failing to meet creditors' obligation in time, and TLTA measures the level of debt risk. The variable SDR has the second most influence, followed by the variable NITA and ERR, respectively.

Classification Test

The 246 matched firms, which are used to re-estimate the models, are classified by each model. Since both Ohlson's model and Shumway's model are estimated for each of the three years before bankruptcy, consequently, the one-year prior model is used to classify the 246 matched firms with one-year prior data, while the two-year prior model is used to classify the 246 firms with two-year prior data and so on. Table 6 and 7 present the results of accuracy for the classification test for each model for one, two and three years before bankruptcy, in terms of number of firms and classification accuracy rate.

Table 6. Results of Classification (N=246; Period: 1990-1996)

1. Ohlson's Model

	Actual Status (Note)	Total No. of Samples.	Classified Status	
			B	NB
Year 1	B	123	108	15
	NB	123	9	114
Year 2	B	123	98	25
	NB	123	22	101
Year 3	B	123	94	29
	NB	123	25	98

2. Shumway's Model

	Actual Status	Total No. of the Sample	Classified Status	
			B	NB
Year 1	B	123	113	10
	NB	123	10	113
Year 2	B	123	102	21
	NB	123	21	102
Year 3	B	123	98	25
	NB	123	24	99

Note:
1) B-bankrupt firms; NB-nonbankrupt firms
2) Cutoff value = 0.5

The overall accuracy of classification supports a strong internal validity of both Ohlson's model and Shumway's model. Of 246 firms, Ohlson's model is able to classify 90%, 81% and 78% correctly for one, two and three years prior to bankruptcy, respectively. Shumway's model, on the other hand, achieves 92% of overall classification accuracy one year before bankruptcy, and 83% and 80% in two years and three years before bankruptcy, respectively. The results also indicate that as the lead-time from bankruptcy increases, the classification accuracy of the model is decreased. The lower Type I error rates indicate that Shumway's model is able to classify more accurately than

Ohlson's model in the classification test for each of three years, although the differences of classification accuracy between the two models are not significant.

Table 7. Classification Rates of Errors and Overall Accuracy (N=246; Period: 1990-1996)

1. Ohlson's Model			
(Note)	Year 1	Year 2	Year 3
Type I error	12%	20%	24%
Type II error	7%	18%	20%
Total error	10%	19%	22%
Overall accuracy of classification	90%	81%	78%
2. Shumway's Model			
	Year 1	Year 2	Year 3
Type I error	8%	17%	20%
Type II error	8%	17%	20%
Total error	8%	17%	20%
Overall accuracy of classification	92%	83%	80%

Note: 1) Type I error = misclassification of bankrupt firms
2) Type II error= misclassification of nonbankrupt firms.
3) Cutoff value = 0.5

Prediction Test

A bankruptcy prediction model becomes more rigorous and practical when the model is successful in classifying a group of holdout firms, which are not used to develop the model, in a subsequent period. Such a validation procedure is the prediction test because it is conducted on the ex ante basis. To do so, the re-estimated Ohlson's model and Shumway's model are applied to a group of 70 matched firms in the subsequent period of 1997 and 1998 when the bankruptcies were filed. In addition, only the models estimated with one-year prior data are used to classify those 70 firms one, two and three years before bankruptcy. Such a consideration is critical in a practical sense since the timing for a firm to file bankruptcy petition is likely unknown in advance. Thus, it is impossible for decision makers to select an appropriate model estimated from different periods before bankruptcy. Instead, applying a model which captures the most discriminatory ability with

the best accuracy in the classification test is more intuitive and practical in performing a prediction test. The results of the prediction test for Ohlson's and Shumway's model are exhibited in Table 8 and 9.

Table 8. Results of Prediction (N=70; Period: 1997-1998)

1. Ohlson's Model

	Actual Status (Note)	Total No. of the Sample	Classified Status	
			B	NB
Year 1	B	35	29	6
	NB	35	6	29
Year 2	B	35	25	10
	NB	35	7	28
Year 3	B	35	24	11
	NB	35	6	29

2. Shumway's Model

	Actual Status	Total No. of the Sample	Classified Status	
			B	NB
Year 1	B	35	34	1
	NB	35	2	33
Year 2	B	35	22	13
	NB	35	3	32
Year 3	B	35	24	11
	NB	35	7	28

Note:
1) B-bankrupt firms; NB-nonbankrupt firms
2) Cutoff value = 0.5

Table 9. Prediction Rates of Errors and Overall Accuracy (N=70; Period: 1997-1998)			
1. Ohlson's Model			
(Note)	Year 1	Year 2	Year 3
Type I error	17%	19%	31%
Type II error	17%	20%	17%
Total error	17%	24%	24%
Overall accuracy of prediction	83%	76%	76%
2. Shumway's Model			
	Year 1	Year 2	Year 3
Type I error	3%	37%	31%
Type II error	6%	9%	20%
Total error	4%	23%	26%
Overall accuracy of prediction	96%	77%	74%

Note: 1) Type I error = misclassification of bankrupt firms
2) Type II error= misclassification of nonbankrupt firms.
3) Cutoff value = 0.5

Ohlson's model classifies 83% of total 70 holdout samples correctly one year prior to bankruptcy, while the overall prediction accuracy are 76% for both year two and year three prior. When compared to its own results from the classification test in Table 7, Ohlson's model loses the largest margin of accuracy in the prediction test by 7% one year before, and 5% and 2%, respectively, two and three years before bankruptcy. Shumway's model, however, achieves very impressive prediction accuracy one year prior to bankruptcy. Of the total 70 holdout sample firms, Shumway's model is able to classify 67 firms correctly, and to predict 96% of the firms accurately one year preceding bankruptcy. The predictive ability of the model drops as the lead-time before bankruptcy is lengthened. The overall rates of prediction accuracy are 77% at two years before, and 74% at three years before bankruptcy, in comparison to 83% and 80% under classification test in the corresponding periods, respectively. The results of the prediction test display relative stability in the discriminatory ability of Ohlson's model and Shumway's model, and both models maintain strong external validity when applied to a holdout sample in the subsequent period.

SUMMARY

The primary objective of this paper was to estimate and ascertain the ability of two successful models from the bankruptcy prediction literature to predict bankruptcy of small firms. To fulfill this task, this paper utilized the accounting information based model by Ohlson (1980) and the accounting and market information based model by Shumway (2001). The sample was made up of 316 OTC traded small firms from the 1990s. This sample had 158 bankrupt firms and 158 matching but nonbankrupt firms. The matching of the firms was based on the size, industry, as well as, the timing of their financial reports. While the asset size in this investigation was limited to $130 million, about 75 percent of the firms had assets of $50 million or less one year prior to bankruptcy.

Considering the well documented vulnerability of small firms to business failure and yet, ignored for the most part in the bankruptcy prediction literature, this paper has made some important inroads. With the proliferation of OTC traded firms in the 1990s and the accompanying five fold increase in the market values of these firms, the OTC firm sample used in this paper is timely as well. This paper has also contributed in terms of having all the data from the 1990-1998 period. This relatively short period of study has thus avoided the use of data pooled from distinctly different time periods. Moreover, this study has used a holdout sample of 70 OTC traded firms consisting of 35 matching pairs of bankrupt and nonbankrupt firms. The models estimated from the 1990-1996 information of 246 firms are used to predict bankruptcy experience of the holdout sample in later years.

The results indicate that for the sample at hand, Shumway's model (2001) marginally outperforms Ohlson's model (1980) in terms of predicting business failure of small firms. The overall accuracy of classification with Shumway's model was 92 percent, 83 percent, and 80 percent with 1, 2 and 3 years prior to bankruptcy, respectively. The comparable figures with Ohlson's model were 90, 81 and 78 percent. With respect to the holdout sample, Shumway's model achieved overall prediction accuracy levels of 96, 77 and 74 percent with 1, 2 and 3 years prior to bankruptcy, respectively. The comparable figures with Ohlson's model were 83, 76, and 76 percent. It is believed that this empirical investigation has extended the contributions of Shumway (2001), Ohlson (1980) and others, and particularly the efforts of Edmister (1972) in terms of bankruptcy prediction of small firms.

ENDNOTES

1. A study by Edmister (1972) is a notable exception, which solely focused on small firms.

2. Some empirical studies concurred that a firm with smaller size was more likely to fail. For example, in the studies of Ohlson (1980) and Shumway (2001), when size was added as a predictor in logit analysis, the smaller firms were found to have a higher probability of failure than the larger firms.

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ON CORPORATE DEBT POLICY

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ABSTRACT

This essay analyzes the theoretical evidence for the capital structure theory. It discusses the practical implications of a prescriptive theory for corporate debt policy. It compares and contrasts capital structure models that are based on asset structure (complete and incomplete markets) with those models, which employ frictions (such as asymmetric information). A summary table describes the theoretical foundations of this literature.

INTRODUCTION

The mix of securities that a firm issues to finance its operations is known as its capital structure. Modigliani and Miller (1958) in their proposition I (M&M) state that, within a perfect economy, a firm cannot change its total value by varying its capital structure. This proposition allows a value maximizing firm to completely separate its real and its financial decisions. Consequently, when MM's irrelevancy result holds, a firm may maximize its value by focusing exclusively on capital budgeting decisions, without worrying about capital structure. In effect, M&M provide a separation principle belonging to a family of such principles. (Such as the Fisherian separation-paradigm which states that only real economic variables affect a firm's production decisions and output.) Various economic interpretations of M&M's irrelevancy proposition have helped to enrich our understanding of corporate finance. Let us briefly focus on four such interpretations.

1. M&M's irrelevancy result may be viewed as a basic value-additivity principal. In the case of the two securities, debt (D) and equity (E), additivity property of the valuation operator (V) may be written as follows:

$$V(D+E) = V(D) + V(E)$$

This result relies on the following economic intuition: as long as owners of a firm can borrow and lend on the same terms as their firm, they can undo the effects of any change in the firm's capital structure. No matter how the firm splits its cash flows into different streams, investors will not pay a premium for capital structure. Assuming that investors and firms have "equal access" to financial

markets, then securities issued by individual investors and those issued by firms are perfect substitutes (see Fama (1978)).

When investors are not able to issue securities on the same footing as their firm, then they may alternatively use a financial intermediary to avoid paying a premium for capital structure. In this case, Stiglitz (1969, 1974) shows that a financial intermediary with "equal access" may replicate the securities of a firm in order to undo the effects of a change in that firm's capital structure. Assuming this intermediation activity has insignificant cost, the investors' opportunity set can be restructured, so that they do not have to pay a premium for capital structure.

2. Modigliani and Miller's irrelevancy result may also be viewed as a fundamental value preservation principal, providing an economic intuition similar to that of the law of the preservation of energy in physics. Value is preserved so that, as long as there are no trade frictions, a firm cannot generate value solely by varying its financing decision (see Miller (1991)).

3. Similarly, this value preservation principal may be restated in terms of the "no-arbitrage" condition of the asset pricing literature. In a frictionless economy with no arbitrage opportunities and with linear valuation operators, debt/equity ratios are irrelevant (see Duffie (1988)).

The irrelevancy result implicitly assumes that investors unanimously agree on the market value of the cash flows that the firm offers, regardless of individual investors' attitude towards risk. This assumption of "unanimity" ensures that investors do not differ in regard to the return they consider to be commensurate with a given firm's risk. This conditions hold as long as there is a complete market which investors may use to diversify their personal portfolios (see Fama and Miller (1972) and Baron (1979)). That leads us to a fourth implication of M&M.

4. When the asset structure is complete, the firm can concentrate on value maximization without worrying about security holders' diversification needs. Within a complete market economy, a firm cannot capture a monopoly rent accruing from the innovative and unique nature of its securities. In fact, a spanning condition holds, so that the investors may replicate any given security's payoff by using a portfolio of other available securities. Consequently, MM's irrelevancy result may be written as follows: within an economy with a complete asset structure and no trade frictions, a firm cannot generate value solely by varying its financial structure.

Let's move our attention from a firm's total market value to its equity value. Given a fixed total market value, one may inquire whether a firm may use leverage to expropriate wealth from its

bondholders. In other words, one may inquire even if capital structure irrelevancy applies to a firm's total market value does it also apply to its stock value? Fama (1978) shows that the capital structure irrelevancy applies both to maximizing a firm's total value and to maximizing that firm's security holder's wealth, as long as bondholders impose a "me first" rule, or have "rational expectations," so that they fully account for the possibility of wealth expropriation. Given Fama's assertion, let us focus on the implication of the M&M irrelevancy result and its implications for a debt policy that a financial manager should follow.

DEBT POLICY

Financial managers benefit from a prescriptive capital structure theory--a theory that supports and suggests a particular course of action. Consequently, one may inquire what M&M implies regarding the debt policy of a given firm. The following implications can easily be established:

1 A financial manager may not conclude that borrowing makes a firm less safe by adding financial risk to the riskiness of its cash flows. Although the firm may vary the risk of its bonds and stocks, the owners of the firm (both bondholders and stockholders) bear the risk of the firm's future cash flows, as determined by the firm's investment decisions. This cash flow risk depends solely on a firm's choice of real economic factors.

2. A financial manager may not conclude that borrowing allows his firm to undertake a project it could have not afforded without borrowing. If a project has a positive net present value, it should be undertaken. The financial form of ownership (debt or equity) should not matter. After all, the owners may use side bets to modify the contractual sharing rules that debt and equity imposes upon them.

3. A financial manager may not conclude that the (risk-adjusted) cost of debt capital is different from the cost of equity capital. If that were so, investors would engage in financial arbitrage by short selling the more expensive security and buying the cheaper one. In a competitive market debt and equity are valued commensurate with their risk. Furthermore, both debtholders and stockholders demand a return in line with the risk imposed on them. This condition has been formally articulated in MM's proposition II.

Does MM mean that corporate management should not devote resources to adjusting the debt/equity ratio? Recalling that M&M's result applies to a complete and frictionless economy, one quickly concludes that debt policy is only irrelevant in an artificial model economy. In real economies, however, there are various frictions (such as taxes, transaction costs, and asymmetric

information). Furthermore, there are often missing assets, market impediments, and investment restrictions (such as a short sale restriction), which violate our assumption of complete markets. The perfect economy assumption in M&M does not necessarily imply that capital structure is relevant within an imperfect economy. The irrelevancy result may only be rejected after studying the implications of market imperfections and trade impediments on this result.

In fact, MM's groundbreaking research suggests that one needs to link the costs and benefits of leverage to specific market imperfections in order to prescribe corporate debt policy. Managers also have the burden of establishing that the particular market imperfection under consideration is large enough to warrant inclusion in the formulation of a debt policy within a specific real world economy, i.e., a proposed market imperfection, should be of an economically significant size. In addition, it should not suffice to simply articulate an arbitrary friction within an artificial economy. One needs to establish that the assumed imperfection survives a simple competitivity argument. This argument states that financial managers can only exploit those market imperfections, which their firms may remedy more cheaply than other firms and intermediaries. Let us briefly review the finance theory that considers market imperfections.

AN IMPERFECT ECONOMY

Subsequent contributions to the capital structure theory have attempted to enrich the literature by providing more realism and generality than that achieved within M&M's idealized economy. This has been accomplished by modeling frictions such as bankruptcy costs, taxes and asymmetric information, and market impediments such as a no short sale restriction. In these models, capital structure is relevant as long as frictions differentially affect a firm's securities. For example, capital structure may be important when debt and equity are differentially taxed or are traded at different transaction costs.

The theoretical framework for these results is summarized in table 1. The irrelevancy result of M&M (1958), holds in a complete and frictionless economy, as shown in the first row and the first column of table 1. Within the complete market economy of the first column and the second row of table 1, the following three types of market frictions are considered:

1.	Trade frictions caused by differential tax treatments.
2.	Frictions caused by asymmetric information among various claimants to a firm's assets.
3.	Trade frictions due to additional transaction costs associated with a particular security (including the bankruptcy costs of debt).

TRANSACTION COSTS

Costs associated with trading, marketing, and liquidating a security are called transaction costs. These costs include brokers' fees, attorneys' charges, bid-ask spreads, and value lost due to the underpricing of security offerings. Bankruptcy penalties may also be viewed as a potential transaction cost of issuing debt. The differential nature of this transaction cost gives it intuitive appeal as a basis for a capital structure theory.

In general, differential transaction costs among two securities may serve as a source of gain from capital structure. In this case, capital structure is relevant as long as it exploits the lower relative transaction costs of a given security. In addition, uniformly large transaction costs may impede trade and enable a firm to benefit from its leverage decision. In particular, Baumol and Malkiel (1967) show that transaction costs of arbitrage may lead to capital structure relevancy. Consequently, a firm may not be leverage-indifferent when its investors face transaction costs on their arbitrage activities.

Kraus and Litzenberger (1973) introduce an optimal capital structure theory based on a trade off between bankruptcy penalties and the corporate tax subsidy benefit of debt. Of course, the idea that capital structure is relevant since bankruptcy matters predates M&M (1958). However, the old articulation of this idea focuses on the reduction in corporate value when financial risk is added to a firm's real production risks.

The modern approach of Kraus and Litzenberger and numerous other researchers emphasizes two types of bankruptcy penalties: 1) the out-of-pocket charges paid as attorneys' fees, court costs, etc., 2) costs associated with the interruption of business. As bankruptcy becomes more likely, various stake holders such as the suppliers, workers, managers, and customers jump ship (terminating their normal business relationship), or overcharge to pass on the expected business interruption costs of bankruptcy. This imposes additional costs on the firm.

According to Miller's famous horse and rabbit stew analogy, these bankruptcy penalties are not large enough to be considered as a counter balance for the tax subsidy benefits of debt within a tradeoff optimal capital structure theory. The implication of this is that the bankruptcy-based models, which solely trade off the benefit of the tax-deductibility of debt against its bankruptcy penalty, predict an optimal capital structure close to an all debt corner solution.

To test this assertion, various researchers have attempted to measure bankruptcy costs. For example, in a study of eleven railroad bankruptcies Warner (1977) estimates that direct bankruptcy costs were only 1.4 percent of the firms' value five years prior to bankruptcy. These costs rose to 5.3% just prior to the bankruptcy filing date. Both figures support Miller's view, since over the relevant financial history of the U.S., the corporate sector has enjoyed a large debt tax-benefit compared to the above bankruptcy cost of debt.

Altman (1984) estimates both the direct and indirect costs of bankruptcy. From a sample of 19 retail and industrial bankruptcies, he estimates total bankruptcy costs at 12.1% of firm value at

three years prior to bankruptcy; and at 16.7% at the bankruptcy date. Note that, 3 years prior to bankruptcy, for a firm which faces a 0.1 probability of bankruptcy, the expected future cost is only 1.21% of the firm's total value.

In addition, in the bankruptcy tradeoff models, the corporate tax-subsidy benefit of debt increases with leverage. However, Castanias (1983) shows that a firm's leverage is not positively correlated with its probability of default. Therefore, the bankruptcy costs of debt do not necessarily grow together with the corporate tax-benefit of debt.

In addition to the above empirical findings, one may put a limit on bankruptcy costs based on theoretical considerations. Haugen and Senbet (1978) reason that buying out both bondholders' and the stockholders' interest enables one to avoid bankruptcy costs. A no-arbitrage argument establishes that, within a competitive market, bankruptcy costs are bounded by the transaction costs of this scheme for avoiding bankruptcy. Haugen and Senbet also argue that, after accounting for the liquidation costs, it may be optimal to liquidate a firm when its value as a going concern falls below its liquidation value. They conclude that in empirical studies, these liquidation costs are often confused with the bankruptcy costs.

Table 1: The Foundation of the Capital Structure Theory

	Asset Structure	
Market Structure	Complete	Incomplete
		Linear Payoffs: Duffie '88
Frictionless Markets	M&M '58	*Non-Linear Payoffs*: Gottardi '91
		Differential Risk Preferences: Rubinstein '73
	Taxes: DeAngelo & Masulis '80	*Tax-clienteles:* Miller '77
Market Frictions	*Asymmetric Information:* Ross '77	*Signaling a change in risk-aversion:* Krainer '92
	Transaction Costs: Baumol & Malkiel '67	*Differential Issuing Costs:* Allen & Gale '88
	Bankruptcy Penalties: Kraus & Litzenberger '73	*Differential Marketing Costs:* Madan & Soubra '91

Kim, Lewellen, and McConnell (1979) suggest that bankruptcy costs may be viewed as a form of an agency cost. This cost arises due to the conflict of interest between bondholders and stockholders, under asymmetric information. Bondholders benefit from exercising the liquidation option earlier than is consistent with stockholders' interest. Williamson (1988) shows that, even though bankruptcy rules provide the bondholders with an option to force liquidation when that action increases firm value, a firm is liquidated often when it is optimal to operate as a going concern. That is, bankruptcy imposes a cost by leading to liquidation sub-optimally when there is asymmetric information.

CAPITAL STRUCTURE IRRELEVANCY IN INCOMPLETE MARKETS

Results obtained by DeMarzo (1988) and Duffie (1988) indicate that within an incomplete and frictionless economy (of the first row and the second column of table 1, above), M&M's capital structure irrelevancy holds, as long as there are no derivative securities. To obtain the irrelevancy result, these papers rely on a no-arbitrage argument and the linearity of the asset valuation operator.

Within DeMarzo's economy, there are no transaction costs, no short-sales restrictions, no limited liability constraints, and the agents are endowed with rational expectations. Consequently, with competitive and linear security markets of their model economy, trading by firms and individuals are perfect substitutes.

A central issue in establishing the irrelevancy result within an incomplete market is that a firm may affect other firms' share prices and dividend stream valuation. DeMarzo's theoretical contribution lies in establishing that firms may maximize their initial share values based on information made available by the market. Then, it is shown that in equilibrium the firms have identical conjectures about the effect of their security trading on other firms' prices. In addition, it is established that a firm has no incentive to further trade on these expectations. The capital structure irrelevancy result is thus maintained.

Gottardi (1991) extends the above model by demonstrating that the capital structure irrelevancy result no longer holds when there are derivative securities within an incomplete and frictionless economy. Gottardi relies on the observation that the payoff of the derivative securities varies in a non linear way as a firm's capital structure is adjusted. This non-linearity of the asset valuation operator leads to capital structure relevancy.

Earlier work by Rubinstein (1973) shows that debt financing brings about a valuation cost when security markets are partially segmented, so that debt is traded in a separate market where the traders are more risk averse than equity traders. With tax subsidy for debt payments at the corporate level, this framework generates an optimal interior capital structure solution.

Krainer (1992) also uses segmented markets for debt and equity to suggest that Tobin's q for debt may be greater than unity, while at the same time Tobin's q for equity is lower than unity (and

vice versa). In Krainer's model, corporate capital structure is relevant since it emerges as a response to a signal from two segmented capital markets regarding the investor's risk preferences.

There are a number of other incomplete market theories which also rely on market frictions (see the second row and the second column of table 1, above). The following two models focus on security design by relaxing an implicit assumption of the capital structure literature that the form of the securities, which a firm issues, is fixed.

Allen and Gale (1988) use differential transaction costs (an additional component cost for each additional security) to show that a sharing rule which splits a firm's payoff is optimal when all the payoff in each state is allocated to the security holder that values it most. This model exploits the differences in individual state prices for deriving an optimal sharing contract.

Madan and Soubra (1991) follow a path established by Ross's (1989) presidential address and extend the Allen and Gale model by introducing marketing costs. These costs depend both on the number of securities a firm issues (a similar structure to Allen and Gale's), and on the issue price. Madan and Soubra demonstrate that, in simple cases, debt, equity, and warrants emerge as optimal contracts. However, a portfolio of option type primary securities is generally optimal. In their model, capital structure may generate value by appealing to a wider set of investors and by sharing a firm's cash flows, in a manner, which achieves a reduction in marketing costs.

THE EMPIRICAL EVIDENCE

The capital structure empirical studies may be categorized into two groups: (1) those which attempt to identify the general trends, the stylized facts, and the historical practice of choosing leverage; and (2) those which are designed to directly test a particular capital structure theory. In this section, let us consider the first group. Some discussion of the second category of empirical studies has been incorporated in the earlier sections of this paper in the course of reviewing the relevant theories. In addition, note that so far there is no statistically satisfactory empirical test of M&M's value-invariance proposition available. M&M (1966) provide a pioneering attempt (see Miller 1966).

The empirical studies have uncovered evidence that suggests that the following stylized facts and trends exist:

1. A firm's value increases with leverage, ceteris paribus. Specifically, leverage increasing transactions result in stock price increases (and vice versa), as shown Israel, Ofer, and Siegel (1991) and a number of other researchers.

2. Taggart (1985) shows that leverage has steadily increased since the Second World War. However, current debt levels may not be considered high in comparison to pre World-War-II levels.

3. According to Marsh (1982), firms seem to have target debt ratios, and they appear to time their debt issue with market conditions, such as how well their stock is doing and how much debt other firms issue.

4. There are industry specific debt/equity ratios and these ratios are maintained over time. Furthermore, these ratios are tied to firm-specific characteristics (such as the growth rate, asset uniqueness, non debt tax shields, size, tangible assets, and being regulated). See Kester (1986) amongst other researchers.

CONCLUSION

Focusing on the theoretical basis of the capital structure theory, this essay concludes the following practical implications of a prescriptive theory for corporate debt policy:

1. A financial manager may not conclude that borrowing makes a firm less safe by adding financial risk to the riskiness of its cash flows

2. A financial manager may not conclude that borrowing allows his firm to undertake a project it could have not afforded without borrowing.

3. A financial manager may not conclude that the (risk-adjusted) cost of debt capital is different from the cost of equity capital.

In addition by comparing and contrasting the capital structure models that are based on asset structure (complete and incomplete markets) with those models, which employ frictions (such as asymmetric information), this essay described the theoretical foundations of capital structure literature.

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THE BOOK-TO-MARKET EFFECT BEFORE AND AFTER THE MARKET DECLINE OF 2000

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ABSTRACT

Fama and French (1992) and others document and describe an extensive book-to-market (BEME) ratio effect in stock returns. Trecartin's (2000) results, however, question the pervasiveness of this finding across time periods. Thus, we reexamine the inter-temporal stability of the BEME effect by examining the months prior to and following the market decline of 2000. In general, we find that the BEME effect is much stronger during the bear market period, but it appears that much of the BEME effect during this period is driven by firms in the technology sectors.

INTRODUCTION

It is now commonly accepted that high book value of equity to market value of equity (BEME) portfolios outperform low BEME portfolios in stock-price return. Fama and French (1992) were the first to document this relationship, and since that time many articles have examined the persistence of this relationship across time (e.g., Davis 1994 and Ciccone 2003) and across international boundaries (Lakonishok 1991).

The finance literature is also concerned with explaining the dominance of high BEME portfolios since this result is contrary to the risk-return relationship forecasted by the traditional capital asset pricing model (CAPM). Fama and French (1992, 1993) attribute the BEME effect to a risk factor not captured by the CAPM. According to Tai (2003), BEME is a risk factor that varies across time. However, the literature also indicates that the BEME effect may be the result of other factors. Loughran (1997) suggests that the dominance of high BEME portfolios is due to the January effect, but Best, Best, and Yoder (2000) use tests of stochastic dominance to show that the BEME effect is not driven by the January effect. The BEME effect is also shown by Griffin and Lemmon (2002) to result from the mispricing of distressed firms.

Lakonishok, Shleifer, and Vishny (1994) and Haugen and Baker (1996) attribute the BEME effect to irrational investors and inefficient markets. If the BEME effect is indeed the result of irrationality, it is likely to change as market perceptions change. In this paper, we investigate further the inter-temporal persistence of the BEME effect. Trecartin (2000) shows that BEME is positively and significantly related to stock-price return in only 43% of monthly regressions from July 1963

to December 1997. Trecartin's (2000) results suggest that the use of BEME in forming short-term portfolios is not necessarily appropriate. We continue Tracartin's (2000) work by examining the use of the BEME in forming short-term portfolios leading up to and following the market downturn in the late spring and summer of 2000. Because aggregate stock returns during this period are heavily influenced by internet and technology oriented firms, we also investigate the use of a BEME strategy for firms outside of these market sectors during the bull and bear markets covered in our analysis.

DATA AND METHODOLOGY

We collect data for the firms used in this study using Research Insight and the Center for Research in Security Prices (CRSP) databases. Our analysis period includes July 1997 through December 2002. As in Fama and French (1992), the book value of equity is taken from the fiscal year-end of the year prior to portfolio formation. Using Trecartin's (2000) approach, we collect the market value of equity at the end of June in the year of portfolio formation and compound daily returns to compute monthly returns for each month from July of one year through June of the following year. In all cases in which we cannot match Research Insight data firms to CRSP data firms, we delete those observations. We then examine the monthly returns for 10 equally-sized (i.e., decile) portfolios ranging from a high to low BEME portfolios. Because we cannot match all firms across Research Insight and CRSP, our sample has various-sized portfolios across the sample period (ranging from a low of 181 firms per decile portfolio to a high of 257 firms per decile portfolio when all available firms are included in the sample).

To ascertain the impact of the recent bull and bear market on the BEME strategy, we break the sample into two distinct time periods–July 1997 through June 2000, and July 2000 through December 2002. Over these time periods (and in aggregate), we calculate the compounded monthly return on each of the decile BEME portfolios. We then compare the return on the lowest decile rank portfolio (labeled "High BEME" and which includes the firms with the highest BEME ratio) to the highest decile rank portfolio (labeled "Low BEME"). This comparison also facilitates the use of a difference in means t-test to determine whether any differences in portfolio returns are statistically significant.

Finally, the BEME effect as documented in previous studies implies that returns should increase monotonically from low BEME portfolios to high BEME portfolios. Because our statistical tests revolve around the "extreme" decile portfolios (high BEME versus low BEME), which may mask underlying variations in returns on the decile portfolios, we also ascertain which portfolio (among the ten deciles) has the highest return for the given month. Although we do not perform statistical tests on these returns, this examination allows us to determine the stability of the BEME effect across rank portfolios in addition to time-specific variations in the BEME effect.

For each of our statistical tests and time period comparisons, we report results in which all available firms are included and the results once technology-oriented firms are excluded. We

consider firms with 3-digit SIC codes of 2830, 3570, 3660, 3670, 3690, 7370 and 4800-4890 to be high-tech firms. Thus, we can determine the impact of the "technology bubble" on the BEME effect. Our decile portfolio sizes range from 147 firms per portfolio to 198 firms per portfolio across time periods when we exclude technology firms.

RESULTS

Although we calculate returns on all decile portfolios and conduct statistical tests for each of the 66 months in our sample, we report only summarized data in the interest of space (month by month results can be obtained from the authors upon request). Our first analysis is included in Table 1, which lists the number of months in which the High BEME portfolio return is greater than the Low BEME portfolio and vice-versa. Again, to help us determine the impact of technology-oriented firms on the BEME effect over our analysis period, we report two sample results–"All" firms in Panel A of Table 1 and "Non-tech" firms in Panel B.

Table 1: Frequency of Returns on High BEME Portfolio versus Low BEME Portfolio

Panel A: All Firms				
Time Period	High BEME>Low BEME	% of Months	Low BEME > High BEME	% of Months
07/97-12/02	43	65.2%	23	34.8%
07/97-06/00	18	50.0%	18	50.0%
07/00-12/02	25	83.3%	5	16.7%
Panel B: Non-tech Firms				
Time Period	High BEME>Low BEME	% of Months	Low BEME > High BEME	% of Months
07/97-12/02	43	65.2%	23	34.8%
07/97-06/00	20	55.6%	16	44.4%
07/00-12/02	19	63.3%	11	36.7%

For all firms over the entire sample period, we find that in 43 of the 66 months (65.2%), the High BEME portfolio has a higher return than the Low BEME portfolio. The frequency for the non-tech sample is exactly the same over the entire sample period. Although this is greater than the frequency predicted by chance (50%), in real terms the frequency is small enough for us to begin to question the economic significance of the BEME effect. When we divide the sample into the pre- and post-market decline periods (July 1997-June 2000 and July 2000-December 2002), we find something striking in the all firms sample. The High BEME portfolio return exceeds the Low

BEME portfolio return in exactly 50% of the months (and vice-versa) during the pre-market decline period–exactly as predicted by chance. In the post market decline period, the High BEME portfolio return is higher than the Low BEME return 83.3% of the months. Thus, there appears to be a shift in the BEME effect that occurs around the time of the market decline of 2000. This strong BEME effect, however, appears to be driven by technology-oriented firms as indicated in the sub-sample periods of Panel B. The relative frequencies for the non-tech firms are similar across time periods and are close to the full sample period relative frequencies.

To put these results in better perspective, and to shed greater light on the economic significance of our results, we identify those return differences (High BEME portfolio return minus Low BEME portfolio return) that are statistically significant. In Table 2, we report the number of occurrences in which these return differences are statistically different (using a 10% significance level). As indicated in Table 1, there are a number of occurrences in which the Low BEME portfolio has a higher return than the High BEME portfolio (contrary to expectations derived from previous studies). Thus, we divide the results in Table 2 into whether the return difference (High BEME - Low BEME) is positive (i.e., the return on the High BEME portfolio is highest) or negative. We also report the results for the pre- and post-market-decline periods.

Table 2: Frequency High BEME Return - Low BEME Return Is Statistically Significant

Panel A: All Firms				
	Number of Months:			
Time Period	High-Low is Positive	% of Months	High-Low is Negative	% of Months
07/97-12/02	26	39.4%	8	12.1%
07/97-06/00	8	22.2%	7	19.4%
07/00-12/02	18	60.0%	1	3.3%
Panel B: Non-Tech Firms				
	Number of Months:			
Time Period	High-Low is Positive	% of Months	High-Low is Negative	% of Months
07/97-12/02	18	27.3%	3	4.5%
07/97-06/00	5	13.9%	2	5.6%
07/00-12/02	13	43.3%	1	3.3%

As shown for the entire sample period and all firms in Panel A, only 39.4% of all (66) months have a High BEME portfolio return that is statistically greater than the Low BEME portfolio return. Additionally, 12.1% of all months have a High BEME portfolio return that is statistically

lower than the Low BEME portfolio return. Thus, our full sample findings appear to be consistent with Tracartin (2000). As the anecdotal evidence from Table 1 suggests, the BEME effect is stronger in the post-market decline period. During this period, 60% of all months have a High BEME return that is statistically greater than the Low BEME portfolio return, while only 1 month (3.3%) has a greater Low BEME return than High BEME return. Again, however, these results appear more pervasive for technology firms. As Panel B shows for the non-tech firms, only 43.3% of the post-market decline months have a High BEME portfolio return that is statistically greater than the Low BEME portfolio return. Thus, given the results in Tables 1 and 2, we cannot support the universality of the BEME effect. This effect appears to be concentrated in certain time periods and certain sectors.

Next, we report the number of times that a particular decile portfolio has the highest return in a given month. The frequencies (divided by all firms and non-technology firms only) for the entire sample time period appear in Table 3. Portfolio 1 represents the decile portfolio with the highest BEME firms and Portfolio 10 represents the portfolio with the lowest BEME firms. Although we provide no statistical tests on these frequencies, we should see a large frequency associated with Portfolio 1 and little or no frequencies among the other portfolios if the BEME effect described initially by Fama and French (1992) is pervasive.

Table 3: Number of Months in which Each Decile Portfolio Has Highest Return

	All Firms		Non-Tech Firms	
Portfolio	Frequency	% of Months	Frequency	% of Months
1	7	10.6%	13	19.7%
2	15	22.7%	8	12.1%
3	8	12.1%	6	9.1%
4	3	4.5%	6	9.1%
5	6	9.1%	9	9.1%
6	3	4.5%	2	3.0%
7	0	0.0%	1	1.5%
8	1	1.5%	1	1.5%
9	7	10.6%	10	15.2%
10	16	24.2%	10	15.2%

Table 4: Number of Months in which Each Decile Portfolio Has Highest Return by Time Periods				
Panel A: July 1997 - June 2000				
	All Firms		Non-Tech Firms	
Portfolio	Frequency	% of Months	Frequency	% of Months
1	4	11.1%	11	30.6%
2	8	22.2%	4	11.1%
3	3	8.3%	3	8.3%
4	0	0.0%	0	0.0%
5	0	0.0%	0	0.0%
6	2	5.6%	1	2.8%
7	0	0.0%	1	2.8%
8	1	2.8%	1	2.8%
9	6	16.7%	10	27.8%
10	12	33.3%	5	13.9%
Panel B: July 2000 - December 2002				
	All Firms		Non-Tech Firms	
Portfolio	Frequency	% of Months	Frequency	% of Months
1	3	10.0%	2	6.7%
2	7	23.3%	4	13.3%
3	5	16.7%	3	10.0%
4	3	10.0%	6	20.0%
5	6	20.0%	9	30.0%
6	1	3.3%	1	3.3%
7	0	0.0%	0	0.0%
8	0	0.0%	0	0.0%
9	1	3.3%	0	0.0%
10	4	13.3%	5	16.7%

Surprisingly, for all firms, the most frequent portfolio with the highest return is the lowest BEME portfolio. In 16 months (24.2%) out of the entire sample period, this portfolio has the highest return. Further, although the two portfolios with the highest BEME have the higher returns 33.3% of the time, the two portfolios with the lowest BEME have the higher returns 34.2% of the time. The relative frequencies for the non-tech firms only are similar. The two highest BEME portfolios have the higher return 31.8% of the months, while the two lowest BEME portfolios have the higher return 30.4% of the months during the full sample period. Thus, we must seriously question the extensiveness of the BEME effect as documented by previous studies.

Finally, to highlight the inter-temporal variation in the BEME effect, we divide the frequencies from Table 3 into our two sample periods–July 1997 - June 2000 and July 2000 - December 2002. These results are in Table 4. In Panel A, which includes frequencies for the pre-market-decline period, the relative frequencies are similar to, if not stronger than, the results from Table 3. The results from the post-market decline period in Panel B, however, reveal a pattern. As was evident from our previous evidence, it appears that the BEME effect becomes stronger in this latter period. The portfolios with the higher BEME (that is, portfolios 1-5), overwhelmingly have the higher returns during this period. Although this is true for all firms and for the non-tech firms, it is apparent that the results are stronger among the tech firms. Thus, we are left with our initial conclusion–the BEME effect is largely time and sector dependent.

CONCLUSION

Fama and French (1992) and others document and describe an extensive book-to-market (BEME) ratio effect in stock returns. Trecartin's (2000) results, however, question the pervasiveness of this finding across time periods. Thus, we reexamine the inter-temporal stability of the BEME effect by examining the months prior to and following the market decline of 2000. This time period allows us to contribute to the literature on the BEME effect in two ways.

First, we are able to determine the impact of the BEME effect in a bull and bear market. In general, we find that the BEME effect is much stronger during the bear market period. Second, because the bull market of the late 1990s was driven primarily by technology-oriented stocks, we are able to subdivide our sample to determine whether the tech sector has a large influence on the BEME effect. Here, we find that BEME effect is generally non-existent in the pre-market decline even among tech stocks. In the post-market decline, however, much of the BEME effect we document can be attributed to the tech firm sectors.

Thus, given our findings, we are left to question the extent of the BEME effect. Although the BEME ratio may be systematically related to the returns of some firms during certain time periods, it seems difficult to expect that a typical investor could consistently profit from forming portfolios on this basis.

We leave for future research two items unexplored in our analysis. First, are there systematic seasonalities in our findings? Although the results of Best, Best and Yoder (2000) would suggest otherwise, we find much different results than in that research. Second, although we do not report this finding previously in this paper, we note that there appears to be a "momentum" effect within the decile portfolios that we form. That is, when a particular decile portfolio has the highest return in a given month, that same rank portfolio tends to repeat as the highest return portfolio in subsequent months. Thus, there may be fruitful trading strategies based on a BEME and momentum effect.

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THE INTEGRATION OF CAPITAL MARKETS: CORRELATION ANALYSES OF THE MARKET INDEXES IN GREATER CHINA ECONOMIES

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ABSTRACT

This paper investigates whether the stock price movements in Shanghai, Hong Kong and Taiwan reflect the increasing economic integration among the three economies. The results indicate that the degree of correlation between the returns of the market indexes in Hong Kong and Taiwan is comparable to that of economic integration between the two economies. But, there is no evidence of similar degree of correlation between the Shanghai market and the Hong Kong and Taiwan markets, despite the increasing economic integration. Further, there is no evidence to suggest that the returns of the Shanghai market have become more integrated with Hong Kong and Taiwan markets over the testing period. The paper provides a possible explanation for the results and discusses several policy implications.

INTRODUCTION

There has been an increasing economic integration in the Greater China region in recent years. China, Hong Kong, and Taiwan are major trading partners and are becoming more economically interdependent. According to China Statistic Yearbook 2000, in 1999, Taiwan's export to Hong Kong was almost $25 billion, significantly more than its export to any other country or region, except for the U.S ($29 billion). At the same time, Hong Kong's import from China reached 606 billion HK dollars in 1999, or 43% of its total import, almost four times as much as its imports from Japan, which was a distant second. Hong Kong's export to China accounted for 30% of its total export, making China its second largest export destination, with the total volume slightly less than that to the U.S. Meanwhile, 47% of the foreign direct investment in China in 1999 came from Hong Kong and Taiwan. According to Wei (1995) between 1984 and 1990, over 50 percent of overseas direct investment in China was from Hong Kong due to linguistic and cultural ties. In 1998, the total overseas direct investment in China amounted to 45. 6 billion U.S. dollars (4.71% of the GDP) of which 69% originated in Asia. Hong Kong and Taiwan remained the two most important sources of direct investment in china. The economic and finance literature (see Agmon (1972), Ibbotson, Carr, and Robinson (1982), and Ripley (1973)) has long documented the existence of significant stock price co-movements among economies with geographical proximity,

partnerships in trade, and cultural similarity. The purpose of this paper is to determine whether the stock price movements in the three (Shanghai, Hong Kong, and Taiwan) exchanges exhibit correlation that reflects the increasing trade and investment activities in recent years. The author is not aware of any previous study on these issues and the results should be helpful in assessing the degree of integration among the three economies.

The indexes used in this study are Shanghai Composite, Heng Seng and Taiwan Weighted, from July 1997 to December 2001. Daily, weekly, monthly, and yearly returns of each index are calculated and are used to calculate the correlation coefficients.

The results of the study provide evidence that the degree of correlation between the returns of the market indexes in Hong Kong and Taiwan is comparable to that of economic integration between the two economies. On the other hand, there is no evidence of similar degree of correlation between Shanghai market and the other two markets: Hong Kong and Taiwan, despite the increasing economic integration. Further, there is no evidence to suggest that the returns of the Shanghai market have become more integrated with Hong Kong and Taiwan markets over the testing period. In fact, the test results indicate that the Chinese economy is much more correlated with the Hong Kong and Taiwan economies than the stock market data would suggest. A possible explanation for the low stock market correlation is offered. The findings of this study have significant policy implications.

The rest of the paper is organized as follows. In Section 1, I provide a literature review on market co-movements. Section 2 presents the data, methodology and the results. Section 3 summarizes the study and provides a conclusion.

LITERATURE REVIEW

Johnson and Soenen (2002) study the equity market integration between the Japanese stock market and the other twelve equity markets in Asia. They find that the equity markets of Australia, China, Hong Kong, Malaysia, New Zealand, and Singapore are highly integrated with the stock market in Japan. They also find evidence that these Asian markets are becoming more integrated over time and that a higher import share as well as a greater differential in inflation rates, real interest rates, and GDP growth rates have negative effects on stock market co-movements between country pairs. Using data from seven major European countries from 1970 to 1990, Longin and Solnik (1995) find that cross-country stock market correlations increase over time. Karolyi and Stulz (1996) study the daily return co-movements between the Japanese and U.S. stocks from 1988 to 1992 and find evidence that correlations are high when there are significant markets movements. Masih and Masih (1999) find high level of interdependence among markets in Thailand, Malaysia, the U.S., Japan, Hong Kong, and Singapore from 1992 to 1997. Palac-McMiken (1997) uses the monthly ASEAN market indices (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) between 1987 and 1995 and finds that with the exception of Indonesia, all the markets are linked

with each other and that these markets are not collectively efficient. He suggests that there is still room for diversification across these markets despite evidence of interdependence among ASEAN stock markets. Ng (2002) also examines the linkage among the same five countries in the 1990s. The results of his study indicate that there is no evidence of co-integrating relationship across the ASEAN stock markets, although individual countries do show a trend toward stronger linkage with each other. For instance, Thailand does show a trend toward stronger linkage with Singapore. Chowdhury (1994) studies the relationships among 4 Newly Industrialized Economies (NIEs), Japan and the U.S., using daily data from 1986 to 1990. He finds that the U.S. market leads the four markets (Hong Kong, S. Korea, Singapore, and Taiwan) and that there is significant link between the stock markets of Hong Kong and Singapore and those of Japan and the United States. He also finds that the U.S. market is not influenced by the four Asian markets. Naughton (1996) investigates whether the returns in selected Asian and developed equity markets are related and finds generally low correlation between Asian emerging markets and these markets and the developed market group. Christofi and Pericli (1999) investigate the short turn dynamics between five major Latin American stock markets (Argentina, Brazil, Chile, Columbia, and Mexico) from 1992 to 1997. They find significant first and second moment time dependencies. Phylaktis(1995) studies the extent to which financial markets in the Pacific Basin Region have become more integrated. He finds that there has been an increase in capital market integration with both the U.S. and Japan. Market integration is found to be greater in Singapore, Hong Kong and Taiwan. Kasa (1995) uses the monthly stock return data from the U.S., Japan, and Great Britain for the period from 1980 to 1993 and finds that the conclusion of market integration depends sensitively on the assumed variation of the (unobserved) common world discount rate. Markets are more likely to be integrated the more volatile is the discount rate. Ripley (1973) and Ibbotson et al (1982) find significant price co-movements of stock prices within Europe, Asia, and markets in English-speaking countries. They suggest that the significant price co-movements could be related to geographical proximity, partnerships in trade, and cultural similarity, among others.

DATA, METHODOLOGY AND RESULTS

The indices used in this study are Shanghai Composite, Hong Kong Heng Seng and Taiwan Weighted, from July 1997 to December 2001. In order to determine whether there is any linkage among the returns of the three markets, daily, weekly, and monthly returns of each index are calculated. Tables 1.1, 1.2 and 1.3 provide descriptive data on the daily, weekly, and monthly returns. Returns are defined as:

$$\text{Return} = (\text{Index}_{t} - \text{Index}_{t-1}) / \text{Index}_{t-1}$$

Table 1.1: Summary Statistics for the Daily Returns of Shanghai Composite, Hong Kong Heng Seng and Taiwan Weighted from July 1, 1997 to December 31, 2001

	Shanghai	Hong Kong	Taiwan
Mean	0.041%	0.0007%	-0.025%
Median	0.046%	0.0038%	-0.149%
Days with return > 1%	216 (19.9%)	314 (28.3%)	287 (26.2%)
Days with return < 1%	190 (17.5%)	321 (28.9%)	299 (27.3%)
Standard Deviation	1.522%	2.28%	1.932%
Range	18.215%	32.5%	18.525%
Minimum	-8.358%	-13.7%	-9.631%
Maximum	9.857%	18.8%	8.893%
# of Observations	1083	1108	1095

Table 1.2: Summary Statistics for the Weekly Returns of Shanghai Composite, Hong Kong Heng Seng and Taiwan Weighted from July 1, 1997 to December 31, 2001

	Shanghai	Hong Kong	Taiwan
Mean	0.20%	-0.0034%	-0.118%
Median	0.31%	0.037%	-0.186%
Weeks with return > 1%	82 (36.9%)	96 (40.8%)	89 (39.0%)
Weeks with return < 1%	69 (31.1%)	98 (41.7%)	97 (42.5%)
Standard Deviation	3.96%	4.641%	4.542%
Range	19.08%	32.99%	36.61%
Minimum	-8.107%	-18.06%	-16.51%
Maximum	10.98%	14.93%	20.10%
# of Observations	222	235	228

Among the three indexes, Shanghai Composite has the highest average daily return and Taiwan Weighted has the lowest. Due to different market holidays, the number of trading days varies from exchange to exchange and therefore, the number of daily returns varies as well. In general, Heng Seng is more volatile than both the Shanghai and Taiwan indices and it has the

highest standard deviation (2.28%). It also has both the highest and the lowest one-day return (18.8%; -13.7%) and the widest range (32.5%). In addition, there are more significant daily changes (plus or minus 1% return) in Hong Kong. On 314 trading days, (28.3%) the index increased more than 1 %, compared to 216 (19.9%) and 286 (26.2%) trading days in Shanghai and Taiwan. On 321 trading days (28.9%), the Heng Seng index declined by more than 1%, as compared to 190 (17.5%) and 299 (27.3%) trading days in Shanghai and Taiwan respectively.

Table 1.3: Summary Statistics for the Monthly Returns of Shanghai Composite, Hong Kong Heng Seng and Taiwan Weighted from July 1, 1997 to December 31, 2001

	Shanghai	Hong Kong	Taiwan
Mean	0.868%	-0.132%	-0.644%
Median	0.303%	-0.912%	-1.243%
Months with return > 1%	26 (49.1%)	24 (45.2%)	23 (43.4%)
Months with return < -1%	22 (41.5%)	26 (49.1%)	28 (52.8%)
Standard Deviation	7.40%	10.59%	9.90%
Range	45.48%	58.22%	44.48%
Minimum	-13.42%	-29.41%	-19.34%
Maximum	30.06%	28.81%	25.13%
# of Observations	53	53	53

Table 1.2 presents a summary of the weekly return data. Once again, Heng Shen has the highest standard deviation among the three indices but Taiwan has the widest range in terms of monthly returns. Shanghai has the highest average weekly returns and both Hong Kong and Taiwan have negative average weekly returns. Number of weeks with returns greater than 1% or less than -1% are also reported.

Table 1.3 presents a summary of the monthly return data. Only Shanghai Composite has a positive mean return. Once again, Heng Shen has the highest standard deviation and the widest range. In 26 months, the monthly return for Shanghai was greater than 1 percent and in 28 months, the monthly return for Taiwan was lower than -1%.

Table 2 provides a summary statistics of the three indices during the testing period. Shanghai reached its high (2242) during the testing period on June 13, 2001. Both Hong Kong and Taiwan reached their highs in early 2001. Honk Kong reached 18301 on March 28, 2001 and

Taiwan index reached 10202 on February 17, 2001). The lowest points were:1055 on September 23, 1997 (Shanghai), 6660 on August 31, 1998 (Hong Kong) and 3466 on October 3, 2001 (Taiwan). It is interesting to note that the indices in Hong Kong and Taiwan both reached their highs during the testing period in early 2001, only two months apart.

Table 2: Summary Statistics for the Daily Indices of Shanghai Composite, Hong Kong Heng Seng and Taiwan Weighted from July 1, 1997 to December 31, 2001

	Shanghai	Hong Kong	Taiwan
Mean	1563	12751	7187
Median	1499	12945	-0.149%
Maximum	2242 (6-13-2001)	18301 (03-28-2000)	10202 (02-17-2000)
Minimum	1055 (9-23-1997)	6660(08-31-1998)	3446 (10-03-2001)
Standard Deviation	358	2777	1611
Range	1187	11641	6755
# of Observations	1084	1109	1096

Correlation coefficients based on daily, weekly, monthly, and yearly returns are calculated for the entire period as well as for each year (1998 - 2001).

Test results based on the whole testing period data are reported in table 3. The results do not provide any evidence that the daily, weekly and monthly returns of Shanghai Composite are correlated with those of Hong Kong and Taiwan. These results are inconsistent with previous studies that suggest the existence of significant co-movements among economies with geographical proximity, partnerships in trade, and cultural similarities. On the other hand, the result does show that the Hong Kong and Taiwan indices are correlated. The correlation coefficients for daily, weekly and monthly returns are 0.26, 0.38, and 0.46 respectively. It seems that longer-term returns are more highly correlated.

In order to determine whether there is any trend of growing integration over the years, daily and weekly return correlation coefficients are calculated for 1998, 1999, 2000, and 2001 respectively. The results are reported in Table 4. With the exception of the daily returns of the Shanghai and Hong Kong indices that do seem to be getting more integrated during the testing period, there is no clear evidence that the markets are getting more or less integrated.

Table 3: Correlation Coefficients for Daily, Weekly, Monthly, and Yearly Returns July 1997 - Dec. 2001

	Shanghai Composite	Hong Kong Heng Seng
Hong Kong Heng Seng	Daily Return 0.09 Weekly Return -0.03 Monthly Return -0.01 Yearly Return 0.24	
Taiwan Weighted	Daily Return 0.06 Weekly Return 0.09 Monthly Return 0.26 Yearly Return -0.53	Daily Return 0.26 Weekly Return 0.38 Monthly Return 0.46 Yearly Return 0.57

Table 4: Daily and Weekly Return Correlation Coefficients by Year 1998 - 2001

	Shanghai Composite	Hong Kong Heng Seng
Hong Kong Heng Seng	Daily Returns Weekly Returns 1998 0.02 -0.20 1999 0.10 0.17 2000 0.09 -0.09 2001 0.19 0.09	
Taiwan Weighted	Daily Returns Weekly Returns 1998 0.11 0.05 1999 0.16 0.32 2000 0.09 0.13 2001 -0.05 -0.07	Daily Returns Weekly Returns 1998 0.44 0.44 1999 0.17 0.32 2000 0.18 0.27 2001 0.35 0.57

The annul GDP growth rates for China, Hong Kong and Taiwan are reported in Table 5.1 The correlation coefficients of the GDP growth rates of the three economies are reported in Table 5.2. Based on the numbers reported in these two tables, it seems that the level of economic integration between Hong Kong and Taiwan is comparable to the stock market correlation coefficients reported in the previous tables. While China's GDP growth rates over the 4 years were correlated to those of Hong Kong and Taiwan, there is very little correlation in stock market returns. One possible reason for the lack of integration between Shanghai/Hong Kong and Shanghai/Taiwan markets is that the Shanghai market was very much a "policy" market. According to a study conducted in China, over 50% of the significant market movements were caused by changes in trading rules or changes in policies concerning stock markets in China (Jin, 2001). There are reasons

to believe that there is a disconnect between the changes in stock prices and the real economic growth in China. For instance, the annual return for the Shanghai composite was a negative 4% in 1998 while the GDP growth rate for that year was a healthy 7.8%. The annual return for the stock index in 2000 was a staggering 52%, largely because of a policy shift that was viewed as favorable to the stock market even though the GDP growth for that year was a much lower 8%. In 2001, the GDP was 7.3% but the return of the index swung to a negative 21%, mainly because of the government's plan to sell huge number of state-owned shares in the secondary market. Another possible reason is the speculative nature of the Shanghai market. Stock prices often do not really reflect the fundamentals of the issuing firms and the overall economic condition.

Table 5.1: Real GDP Growth Rates (in %) from 1997 t0 2001

	Hong Kong	China	Taiwan
1997	5.0	8.8	6.7
1998	-5.3	7.8	4.6
1999	3.0	7.1	5.4
2000	10.4	8.0	5.9
2001	0.2	7.3	-2.1

China: http://www.stats.gov.cn
HongKong www.info.gov.hk
Taiwan: http://www.stat.gov.tw

The results of this study have several policy implications. The fact that Shanghai stock index is not correlated with that of Taiwan and Hong Kong could have negative impact on further economic integration of the three economies. The "policy market" in China and the "disconnect" between the stock performance and the economic fundamentals have not only weakened the investor confidence in the market but have also hindered the government's efforts to attract more international investments by opening the domestic "A Share" market to international investors. It fosters speculative mentality among the investors as they do not focus on the economic fundamentals of the listed firms and the overall economic condition. Rather, they constantly speculate on the next major policy move by the government. This significantly weakens the market scrutiny of the operational aspects of the firms and, to a certain extent, removes the market pressure on the firms to improve financial performance. A possible solution to this problem is to establish a more open market trading system and avoid undue government intervention in the stock markets. While it is inevitable that the stock market will always be affected by the changes in monetary policy or fiscal

policy, the government should do its best to let the market rule itself. The results of this study seem to suggest that minimizing government influence on the stock market may result in further economic integration with Taiwan and Hong Kong and help the Chinese economy.

Table 5.2: GPD Correlation Coefficients 1997 - 2001

GDP Correlation	China	Hong Kong
Hong Kong	0.31	
Taiwan	0.54	0.38

CONCLUSION

The economies of China, Hong Kong, and Taiwan have become increasingly integrated with growing trade and direct investments. The purpose of this study is to see whether growing economic integration is reflected in the stock price movements in the three markets as predicted by the finance literature. The results of the study indicate that Hong Kong and Taiwan stock markets are about as correlated as the two economies. On the other hand, Shanghai stock market index is not at all correlated with either the Hong Kong or Taiwan markets, despite the fact that the Chinese economy has become integrated with the two economies. A possible reason for this lack of correlation may be due to the fact that the stock price movements in the Shanghai market are driven more by policy or regulatory changes than by changes in fundamental economic factors. The policy implication of our results is that the Chinese government should take steps to avoid further interference in the stock market and let the invisible hand rule the market.

One important practical implication of the study is that the lack of correlation between Shanghai and Hong Kong and Taiwan provides investors with an excellent opportunity to diversify their portfolio by investing simultaneously in Shanghai and Hong Kong or Shanghai and Taiwan markets.

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WEALTH EFFECTS OF DOTCOM ACQUISITIONS

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ABSTRACT

The dotcom phenomenon was associated with an extraordinary amount of wealth creation in the late nineties. This study adds to the extant literature on mergers and acquisitions by estimating the wealth effects of dotcom acquisitions for acquiring and target firms. The study also investigates whether the acquisitions of dotcom firms produced greater announcement period gains than other acquisitions of the same period. The announcement period gains from dotcom acquisitions appear to be much larger than those reported for other time periods but do not appear to be different from the other acquisitions in the same time period. Further, both types of acquirers earn substantial, negative abnormal returns in the post-acquisition period, suggesting an upward bias in the announcement period gains due to the prevailing Internet-driven euphoria of the above period.

INTRODUCTION

Numerous studies have documented the effect of merger announcements on the stock prices of acquiring and target firms. There is consensus that mergers create value and that target firms appropriate almost all of this value (Brunner, 2002). This study estimates the wealth effects of dotcom acquisitions and also investigates whether the wealth effects of dotcom acquisitions are different from those of other acquisitions in the 1999-2001 period.

The late nineties witnessed a spectacular surge in stock prices fueled mainly by investors' lofty expectations concerning Internet-related commerce. According to Cooper et al. (2001), at the height of this Internet mania, when firms changed their names to Internet-related dotcom names, the stockholders earned an average abnormal return of 74 percent in the ten-day period surrounding the name change announcement. In this study, we examine the characteristics of dotcom acquisitions and also determine if the Internet mania affected the dotcom acquisitions of this period. In particular, we ask the question: Did the acquisitions of dotcom firms create more wealth for participating shareholders than other acquisitions? Employing a sample of dotcom acquisitions and a random sample of other acquisitions, we find that the wealth effects of the two are statistically indistinguishable. It is possible, however, that dotcom mergers were overvalued due to the prevailing Internet mania, leading to adjustments in the post-acquisition period. We estimate one-year post-acquisition returns for the two groups of acquirers and find that both earn significant, negative abnormal returns. There is, however, no significant difference between the returns to the

two groups. Thus, we do not find evidence that the Internet mania particularly affected the dotcom acquisitions, although our findings would be consistent with the notion that the mania affected all mergers of this period.

PRIOR RESEARCH AND MOTIVATION

As previously noted, mergers, in general, are reported to be wealth enhancing. Estimates of wealth gains for target firms range from 8.56 percent (Dennis and McConnell, 1986) to 40.30 percent (Lang, Stulz, and Walkling, 1991). Estimates for acquiring firms, on the other hand, vary from a loss of 7.20 percent (Asquith, 1983) to a gain of 4.30 percent (Bradley, 1980). In a more recent study covering mergers in the 1973-1998 period, Andrade et al. (2001) report a combined abnormal gain of 1.8 percent, with targets gaining 16 percent and acquiring firms neither gaining nor losing.

As to the sources of gains in mergers, evidence suggests expected synergies to be the main determinant of wealth creation. For example, Houston et al, (2001) report a significant relation between the announcement period returns and the present value of expected cost savings and revenue enhancements due to mergers. There is further evidence that stock-based deals are less wealth enhancing than cash deals, supporting the signaling argument that acquiring managers pay with stock when they believe the stock is overvalued (Huang and Walkling, 1987).

The 1995-1999 period was an exceptional period for U.S. equity markets. The S&P 500 Index rose from 470 in January 1995 to well over 1,400 by early 2000, due mainly to the euphoria surrounding Internet commerce. Some recent studies have addressed the issue of high firm values of this period in general and of Internet firms in particular. Hand (2000), for example, observes a positive relationship between losses suffered by Internet firms and their market values, which would be consistent with the argument that the market was capitalizing the firms' marketing/research and development expenses. Evidence provided by Trueman et al. (2000) suggests that investors valued Internet stocks based on measures of Internet usage, such as the number of visitors to a firm's Web site. Schultz and Zaman's (2001) findings do not suggest that stock prices of Internet firms were irrationally high. Schultz and Zaman study the behavior of the individuals and institutions closest to the firms that went public - managers, underwriters, and venture capitalists. They find that managers of Internet firms sold fewer primary shares in the IPOs than managers of other firms and that venture capitalists and investment banks with the most valuable reputations backed the Internet firms' IPOs. Schultz and Zaman conclude that the Internet firms went public at a furious pace not because the managers wanted to take advantage of irrationally high prices but because they needed capital to grab market share to benefit from economies of scale.

Cooper et al. (2001) and some other studies, however, provide evidence that suggests that the late nineties was a period of speculative mania similar to the mania for the railroad stocks in the U.S. in the 1850s. Everything related to the Internet was considered invaluable in the late nineties,

even the Internet-based stock recommendations, which investors followed in a "herd-like" fashion (Hirschey et al. 2000).

Did this speculative mania affect mergers involving dotcom firms? Schultz and Zaman (2001), in their study of Internet IPOs, report significant, positive abnormal returns to Internet firms announcing takeovers of private firms. However, the authors do not study the combined wealth effects or the effects for target firms; nor do they address the question of whether the gains from dotcom acquisitions are different from those of other acquisitions of this period. In this study, we estimate the wealth effects of dotcom acquisitions and compare our findings with those for a random sample of non-dotcom acquisitions from the same time period. Our findings show that:

1.	In general, the combined wealth effects of dotcom acquisitions, as well as the distribution of the gains between acquiring and target firms, are similar to those for other acquisitions. Consistent with earlier findings, target firms appropriate all takeover gains in both samples. Although acquirers of dotcom firms do not lose and acquirers in the matching sample earn significant, negative abnormal returns on day 0, the two returns are statistically indistinguishable.
2.	We find weak evidence that dotcom takeovers produce more wealth than other takeovers when acquirers use cash as the medium of payment.
3.	We do not find evidence that synergies determine merger gains for either type of acquisition.
4.	Both types of acquirers earn significant, negative abnormal returns in the one-year post acquisition period. However, we do not find any statistical difference between the two returns.

SAMPLE AND METHODOLOGY

We compile a sample by identifying Internet-related companies that were acquired and therefore deleted from Compustat. At the end of 2001, Compustat listed 37 such firms that were deleted due to acquisition. Lexus-Nexus is used to identify the acquiring firms and the first news concerning the acquisitions. The first dotcom acquisition occurred in 1999. Of the 37 acquisitions, stock price data are unavailable for 7 target firms and 14 acquiring firms. Thus, a sample of 30 target firms and 23 acquiring firms is used to estimate the wealth effects of dotcom acquisitions. Of the 23 acquiring firms, only six were identified as Internet firms. A random matching sample of non-Internet acquisitions is compiled from the list of 1,822 acquisitions reported by Compustat in the 1999-2001 period. A firm is excluded if its name indicates an Internet-related business (e.g. dot-com or dot-net) or if it is determined that the firm is primarily an Internet business. The random selection process is continued until the sample contains 30 target firms with available stock price data on CRSP. The matching sample contains 30 target firms and 27 acquiring firms.

Standard event study methodology based on the market model is employed to estimate event period abnormal returns (Brown and Warner, 1985). Day 0 is defined as the earliest day wire

services report the takeover news. Abnormal returns are estimated for three windows, [0], [-1, 0], and [-1, +1].

FINDINGS

Table 1 contains descriptive statistics on the dotcom and matching samples. Target firms in the two samples are quite similar in terms of market value but not book value of assets. Further, dotcom targets have significantly higher one-year sales growth rate but lower profitability (EBIT/Market Value) and leverage (long-term Debt/Total Capital) ratios than other targets. In general, dotcom firms fit the profile of new, fast growing firms with low levels of debt. The two groups of acquiring firms are similar in size. However, acquirers of dotcom firms are significantly faster growing and less profitable than other acquiring firms.

Table 1: Characteristics of Dotcom and Matching Samples

The dotcom sample contains 30 dotcom targets and 23 acquirers. The matching sample contains 30 targets and 27 acquirers. The two samples of acquisitions are from the 1999-2001 period. Market value (in millions of dollars) represents value one month before the acquisition. All other values are for the fiscal year preceding the year of acquisition.

Variable	$Target_{dot}$ [2]	$Target_{other}$ [3]	t-Statistic [2]-[3]	$Acquirer_{dot}$ [5]	$Acquirer_{other}$ [6]	t-Statistic [5]-[6]
Assets	$129.47	$479.25	-2.19**	$15,991	$17,475	-0.12
Market Value	$407.72	$428.54	-0.09	$22,337	$19,684	0.23
Sales/Market Value	1.23	1.18	0.12	0.69	0.50	0.74
EBIT/Market Value	-1.33	-.015	-2.77***	-0.11	0.062	-3.28***
I Year Sales Growth Rate	496.77%	26.17%	1.88*	202.25%	25.04%	2.15**
L.T. Debt/Total Capital	4.47%	33.67%	-2.55**	17.83%	28.19%	-0.92

*Statistical significance at 0.10 or greater

**Statistical significance at 0.05 or greater

***Statistical significant at 0.01 or greater

Our findings on wealth effects of mergers are consistent with those of prior studies (See Table 2). Both dotcom and other mergers are value enhancing but target firms appropriate all of this value. While shareholders earn a 17.23 percent ($p <= 0.01$) abnormal return in dotcom acquisitions

in the three-day announcement window, shareholders in other acquisitions earn a 12.90 percent ($p <= 0.01$) return. However, we cannot reject the null hypothesis of no difference between the two returns at conventional confidence levels. Further, dotcom and other targets earn 30.64 percent and 26.00 percent returns, respectively - both values being highly significant but not significantly different from each other. Although acquirers of non-dotcom firms earn a significant, negative return of 2.40 percent on day zero, neither kind of merger appears to materially affect the acquirers' wealth over the three-day window.

Table 2: Announcement Period Abnormal Returns in Dotcom and Other Acquisitions in 1999-2001

The dotcom sample contains 30 targets and 23 acquirers and the matching sample contains 30 targets and 27 acquirers.

Abnormal ReturnEstimation Period	$Target_{dot}$ [2]	$Target_{other}$ [3]	t-Statistic [2]-[3]	$Acquirer_{dot}$ [5]	$Acquirer_{other}$ [6]	t-Statistic [5]-[6]	$Combined_{dot}$ [8]	$Combined_{other}$ [9]	t-Statistic [8]-[9]
Day 0	18.69%***	18.54%***	0.02	-0.70%	-2.40%***	0.64	10.27%***	8.62%***	0.33
[-1,0]	23.69%***	19.45%***	0.48	-2.80%	-1.60%	-0.56	11.99%***	9.48%***	0.46
[-1,+1]	30.64%***	26.00%***	0.50	-0.28%	-1.70%	0.19	17.23%***	12.90%***	0.71

**Statistical significance at 0.05 or greater
***Statistical significant at 0.01 or greater

In light of prior evidence that the medium of payment and the related/unrelated nature of the merging firms' industries significantly affect shareholder wealth, we segment the two samples accordingly to further investigate the differences in wealth effects for the two samples. As Table 3 shows, in general cash mergers create significantly more wealth than stock mergers. Dotcom mergers using cash produce a 51.77 percent combined abnormal return versus a 21.89 percent return for other mergers, the difference being significant at the 0.10 confidence level. Further, dotcom targets earn significantly higher returns in cash mergers as opposed to stock-based mergers. However, dotcom targets do not earn significantly more than other targets in either cash or stock mergers. Furthermore, there is no significant difference between the acquiring firms' returns for the two samples for either payment method.

Table 3: Medium of Payment and Abnormal Returns

Abnormal returns are calculated over a three-day [_1, +1] period. Cash is used as the medium of payment in eight dotcom acquisitions and ten other acquisitions.

Method/t-Statistic	$Target_{dot}$ [2]	$Target_{other}$ [3]	t-Statistic [2]-[3]	$Acquirer_{dot}$ [5]	$Acquirer_{other}$ [6]	t-Statistic [5]-[6]	$Combined_{dot}$ [8]	$Combined_{other}$ [9]	t-Statistic [8]-[9]
Cash	65.69%***	35.38%***	1.11	-3.90%	2.61%	-1.40	51.77%***	21.89%***	1.75*
Stock	17.90%***	21.31%***	-0.61	0.07%	-3.20%**	0.61	9.19%***	9.08%***	0.02
t-Statistic	2.84***	1.60		-0.25	1.43***		3.34	2.00**	

*Statistical significance at 0.10 or greater
**Statistical significance at 0.05 or greater
***Statistical significant at 0.01 or greater

To investigate whether synergies drive the gains in dotcom acquisitions, we define a synergistic merger as one in which the acquirer and the target have the same three-digit SIC code. As Table 4 shows, it appears that, in the 1999-2001 period, synergies do not determine either the combined merger gains or the gains to target shareholders for either sample. Acquiring firms in the matching sample, however, earn a significant -3.40 percent return in synergistic mergers. Further, there is no significant difference between the wealth effects of dotcom and other acquisitions based on the above segregation criterion[1].

Next, we perform regressions to test the above hypotheses in multivariate settings. In the first model, the three-day cumulative abnormal returns earned by target firms are regressed on four independent variables, namely, SYNERGY (a dummy variable with a value of 1 if the target and acquiring firms have the same three-digit SIC code and 0, otherwise), CASH (a dummy variable with a value of 1 if the acquisition is cash based and 0, otherwise), DOT (a dummy variable with a value of 1 if the target is a dotcom firm and 0, otherwise), and TIME (a dummy variable with a value of 1 if the acquisition occurs in 2001 and 0 if it occurs in 1999 or 2000). It is conceivable that dotcom acquisitions of 2001 were less wealth enhancing than the earlier acquisitions because the dotcom bubble began to deflate in 2001. The variable TIME is included in the regressions to test for this difference. The second model employs abnormal returns to the acquiring firms as the dependent variable. The regression results, reported in Table 5, confirm the t-test results.

Table 4: Synergies and Abnormal Gains

A merger is defined as synergistic if the acquiring and target firms have the same three-digit SIC code. Seven dotcom acquisitions and thirteen other acquisitions are classified as synergistic.

	$Target_{dot}$ [1]	$Target_{other}$ [2]	t-Statistic [1]-[2]	$Acquirer_{dot}$ [3]	$Acquirer_{other}$ 4]	t-Statistic [3]-[4]	$Combined_{dot}$ [5]	$Combined_{other}$ [6]	t-Statistic [5]-[6]
Synergy	34.18%***	21.03%***	1.32	-5.80%	-3.40%**	-0.45	15.72%***	7.93%***	1.03
No Synergy	29.57%***	29.81%***	0.02	1.68%	0.54%	0.16	17.71%***	17.70%***	0.00
t-Statistic	0.23	-1.03		-0.22	-1.10		-0.16	-1.65	

*Statistical significance at 0.10 or greater
**Statistical significance at 0.05 or greater
***Statistical significant at 0.01 or greater

Table 5: Multivariate Regressions of Abnormal Returns on Merger Characteristics

Column 1 reports results for target firms and column 2 for acquirers. The dependent variable is the three-day [-1,+1] abnormal return. The independent variables are TIME (a dummy variable with a value of 1 if the acquisition occurs in 2001 and 0, otherwise), SYNERGY (a dummy variable with a value of 1 if the bidder and target have the same three-digit SIC code and 0, otherwise), CASH (a dummy variable with a value of 1 if the bidder uses cash and 0, otherwise), and DOT (a dummy variable with a value of 1 if the bidder/target is a dotcom firm and 0, otherwise).

Variable Name	Regression Coefficients (t-Statistic) Dependent Variable: Gains to dotcom and other targets, N=60	Regression Coefficients (t-Statistic) Dependent Variable: Gains to dotcom and other acquirers, N=50
INTERCEPT	0.1320 (1.45)	-0.0246 (-0.99)
TIME	-0.0661 (-0.68)	0.0559 (2.12**)
SYNERGY	0.0735 (0.73)	-0.0258 (-1.00)
CASH	0.3348 (3.25***)	-0.0063 (-0.19)
DOT	0.0966 (1.04)	0.0287 (0.11)
R^2	0.17	0.12
F	2.75**	1.60

**Statistical significance at 0.05 or greater
***Statistical significant at 0.01 or greater

The target firms' abnormal returns are significantly higher when acquiring managers use cash (as opposed to stock) to acquire targets. Neither the dotcom status of the target nor the relatedness of the merging firms' industries affects the target firms' returns in mergers (column 1). Although the wealth effects for target shareholders are similar across time, acquiring shareholders appear to lose less in acquisitions occurring in 2001 (column 2).

Our findings that both dotcom and other mergers are equally wealth enhancing do not rule out the possibility that, due to the Internet mania, the wealth effects of dotcom acquisitions are overstated. If acquiring firms overpaid for dotcom targets in 1999-2001, then one might expect downward adjustments in expected returns in the post-acquisition period. Several studies have documented a negative drift in acquiring firm stock prices (see Loughran and Vijh, 1997, and Rau and Vermaelen, 1998)[2]. We find that, in the post-acquisition one-year period, acquirers of dotcom targets earn a negative 49.84 percent abnormal return, while other acquirers earn a negative 45.07 percent return3. Both of these values are significant at the 0.01 confidence level. However, we are unable to reject the null hypothesis of no difference between the two returns at conventional confidence levels.

SUMMARY AND CONCLUSIONS

Some recent studies have documented the Internet mania and how it affected valuations in the late nineties. In this study we estimate the wealth effects of dotcom acquisitions and also investigate whether the acquisitions of dotcom firms created more wealth for participating shareholders than other acquisitions in the 1999-2001 period. We find that dotcom acquisitions produced substantial gains but that these gains were not materially different from gains from other acquisitions. We find weak evidence that dotcom takeovers produce more wealth than other takeovers when acquirers use cash as the medium of payment, but we find no evidence that synergies affect the value created by the acquisitions of this period. Finally, although both types of acquirers earn significant, negative abnormal returns in the post-acquisition period, suggesting downward revisions of announcement period gains, we do not find any difference between the two returns. Thus, our findings indicate that although the stock market bubble was inspired by the Internet revolution, the resulting euphoria appears to have similarly affected both dotcom and other acquisitions. The substantial negative returns to acquiring shareholders in both kinds of acquisitions indicate that the announcement period gains were likely overstated.

ENDNOTES

1 Only one acquirer in the dotcom sample has a dotcom name, while five more acquirers are identified as Internet businesses. The subgroup of acquisitions in which both targets and acquirers are Internet businesses is segregated to determine any differences in wealth effects. No significant differences for either targets or acquirers are detected.

2 While some argue that this negative drift is statistically strong and offsets the announcement period wealth gains, others point out a number of methodological concerns with long-term event studies (Mitchell and Stafford, 2000).

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THE EFFECTS OF EXCHANGE RATE VOLATILITY ON EXPORT PRICING DECISIONS: EVIDENCE FROM TAIWAN INDUSTRIES (1993-2003)

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ABSTRACT

Export pricing decisions are more complicated than domestic pricing decisions. Exchange rate volatility can have major effects on export pricing decisions. Export pricing decisions and exchange rate risk have dominant and immediate impact on exporters' profitability and competitiveness. Exporters often have to compromise their profit margins in setting export prices in response to exchange rate changes. This study presents a conceptual framework of export pricing decision making from internal/external factors and export pricing methods, and examined the relationship between export pricing of international trade and exchange rate volatility in an empirical study.

INTRODUCTION

Export pricing decisions are more complicated than domestic price decisions. There are many of variables involved in this issue: customer orientation, market competition, negotiation power, supply and demand position, exchange rate volatility, risk attitude, etc., (Katsikeas, Leonidou & Morgan, 2000; Reid, 1983).Even though pricing strategies and exchange rate risk have a dominant and immediate effect on exporters' profitability and competitiveness, the relationship between export pricing and exchange rate volatility for international trade is still a neglected research area.

Exchange rates can have a major effect on export pricing strategies. Currency appreciation (depreciation) can reduce (increase) exporters' competitiveness and profitability by changing margins causing firms to change prices in response to exchange rate changes. The consequence of exporters' reactions to exchange rate changes is the notion of exchange rate pass-through - the extent to which exporters pass along exchange rate-induced margin increases (decreases) by lowering (raising) prices in export market currency terms (Clark, Kotabe & Rajaratnam, 1999).

The objective of this paper is twofold: (1) to present conceptual framework of export pricing decisions making based on internal/external environment and export pricing methods, (2) to examine

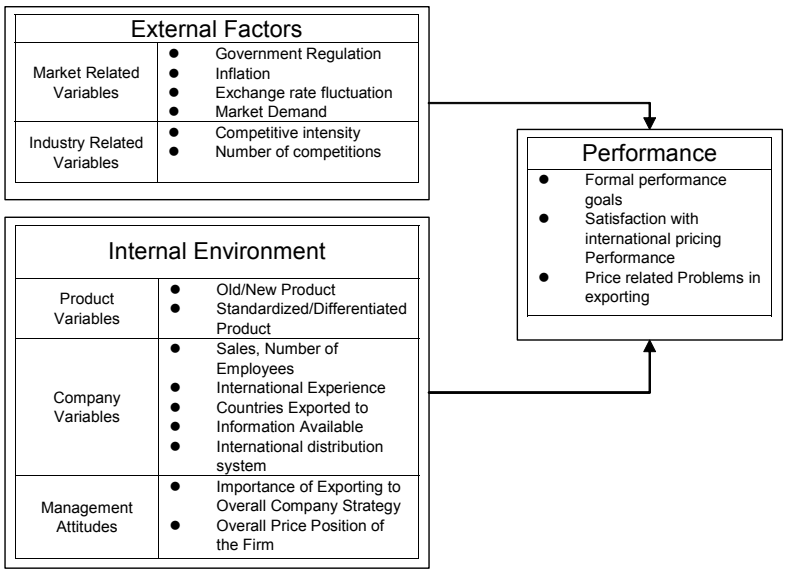
the relationship between export pricing of international trade and exchange rate volatility using an the empirical study.

LITERATURE REVIEW

Because of market integration, trade barriers cutback, technology innovation and globalization, exporters need to devote more emphasis on pricing decisions (Kublin, 1990). Existing studies, however, on export pricing were unbalanced because researchers emphasized domestic customer reaction to different pricing practices (Aulakh & Kotabe, 1993; Cavusgil, 1990; Cavusgil & Myers, 2000; Johanson & Arunthanes, 1995). Only a few empirical studies focused on export pricing strategy (Cavusgil, 1988; 1996; Nicholas & Bello, 1992; Stottinger, 2001; Tzokas, Hart, Argouslidis & Saren, 2000; Yang, 1996).

Studies on export pricing issues can be broadly divided into three basic dimensions. The first dimension includes internal factors, such as product variables, company variables and management attitudes. The second dimension includes, external factors, such as market related variables and industry related variables (Ahtiala & Orgler, 1995; Akintoye & Skitmore, 1992; Piercy, 1981; Thach & Axinn, 1991). FIGURE 1 presents a classification of these factors and variables.

FIGURE 1
A Conceptual Model of Export Pricing
PRICINGPricing



Source: Stottinger, Barbara (2001), "Strategic Export Pricing: A Long and Winding Road," *Journal of International Marketing*, 9, (1), 40-63.

The third dimension includes export pricing methods. Six pricing methods are suggested by Cannon and Morgan (1990), target-profit, cost-plus, perceived-value, going-rate, sealed-bid, and negotiated pricing. Cannon and Morgan (1990) presented a pricing strategy structure which conceptualizes pricing outcomes as a function of pricing strategies constrained by environmental factors. The framework was derived from the pricing literatures to explain and enhance pricing decisions making. A summary of six pricing methods is presented in the Table 1.

Table 1: Six Pricing Methods Approaches

Pricing Methods	Definition	Supportive Literature
Target-Profit	Pricing with full cost and add a target rate of return on capital employed	Rich (1983)
Cost-Plus	Pricing with standard mark-up on unit costs, base on company or industry norms.	Monroe (1978)
Perceived-Value	Pricing with trial and error method to set the final price by customer's reaction	Curry and Riesz (1988); Levin and Johnson (1984)
Going-Rate	Pricing with the same price as main competitors, depending on market strength	Kotler(1984); Porter (1985)
Sealed-Bid	Pricing with the expectations from buyer's bidding.	Monroe(1979)
Negotiated	Pricing with negotiation with an individual customer.	Schill (1985)

The extent to which exchange rate changes were reflected in the import/export prices has been termed "exchange rate pass-through". Empirical studies on exchange rate pass through are mixed, some studies show partial pass-through (Mann, 1986; Feenstra, 1987; Fisher, 1989; Kadiyali, 1997), others full pass-through (Rockerbie, 1992; Gagnon & knitter, 1995), and some opposite pass-through (Feenstra, 1989; Gross & Schmitt, 2000). Importantly, the degree of exchange rate pass-through can differ due to differences in model and methodology.

METHODOLOGY

This study focused on the effects of exchange rate volatility on export pricing decisions with a two-stage estimation process. In the first stage, the exchange rate volatility is measured by using a moving sample standard deviation of growth rate as suggested by Chowdhury (1993) and Arize, Osang and Slottje (2000).

$$EXRV_t = \left[(\frac{1}{m}) \sum_{i=1}^{m} (\log EXR_{t+i-1} - \log EXR_{t+i-2})^2 \right]^{\frac{1}{2}}$$ Formula (1)

where EXR_t was the historical exchange rate. This time varying measure accounts for periods of high and low exchange rate uncertainty. In the second stage, Yang's (1996) regression model is modified by changing one of its dependent variable, the exchange rate, to the exchange rate volatility $EXRV_t$ from equation (1). The modified model in equation (2) shows a simple, standard long-run relationship among export price, exchange rate volatility and domestic price.

$$\Delta \ln EXP_t^k = \alpha_1 \Delta \ln EXRV_t + \alpha_2 \Delta \ln DP_t^k + \alpha_3 \Delta \ln EXRV_{t-1} + \varepsilon_t^k$$ Formula (2)

where EXP_t was the export price for industry k, $EXRV_t$ the exchange rate volatility, DP_t the matching domestic price for industry k, $EXRV_{t-1}$ the lagged exchange rate volatility, and et the disturbance term. To estimate the exchange rate pass-through of export price, the export price was regressed against the exchange rate volatility, matching domestic price, and lagged exchange rate volatility. The domestic price was used to cover domestic market conditions. The lagged exchange rate volatility was used to capture time lag between price setting date and actual payment date.

DATA AND ESTIMATE RESULTS

The data used in this study were obtained from Taiwan Statistic Data Book (The Council of Economic Planning and Development in Taiwan) and database from DGBAS (Directorate-General of Budget, Accounting and Statistics in Taiwan). Monthly data for the sample periods from 1993/10 to 2003/10 was used in this estimation. All the data were divided into two periods, before and after Asian financial crisis October 1997. The export price and domestic price were approximated by the export price index and the consumer price index within six main categories (S.I.T.C. Code), which were most used in previous studies. There are several reasons to test the validity of exchange rate and export price for Taiwan market and two partitions for before and after Asian financial crisis.

First, Taiwan is a heavily export-dependent entity with the proportion of Export volumes in GDP at almost 50%. US dollar is the main quoting currency which dominated the Taiwan export industry. Second, during the Asian financial crisis, the exchange rate of Taiwan dollar underwent increased expectations of depreciation. In October 1997, Taiwan's central bank adopted a clean floating foreign exchange regime, leaving exchange rates to be determined by market forces. The Taiwan exchange rate was immediately depreciated to 30.5 against USD, compared to the previous level of approximately 28.62 under foreign exchange intervention. These unique characteristics might shade other noise variables which are not included in the above model and could improve the estimate accuracy and validity.

The estimation for before and after Asian financial crisis for each category, with t-stat in parentheses, are shown in Table 2 and Table 3.

Table 2: Regression Result by S.I.T.C. category Before Oct 1997

Category	$EXRV_t$	DP	$EXRV_{t-1}$	R^2	DW
1	1.340519 (2.477016)*	0.581152 (6.476851)*	0.24153 (0.42541)**	0.610845	0.354414
2	0.835167 (5.040386)*	0.703813 (16.70284)*	0.04105 (0.24232)**	0.936074	0.552606
3	1.433980 (5.550698)*	0.688103 (23.13267)*	0.02906 (0.142857)**	0.933202	0.952842
4	0.348279 (2.340192)*	1.248061 (36.41185)*	0.24019 (1.6646)	0.982556	0.812064
5	0.517424 (1.243576)	0.221006 (1.771237)*	0.4385 (1.0009)*	0.121817	0.167128
6	0.191857 (1.23451)*	1.157075 (33.86772)*	0.2386 (0.94472)*	0.985605	1.10497

Notes: Figures in parentheses are the t-statistics. * means Significant at the 5 per cent level. ** means Significant at the 10 per cent level.
DW (Durbin-Watson Statistic) tests first order residual autocorrelation
Category 1-6: Agricultural Products, , Base Metal and Metal Products, Rubber and Plastic Products, Textile Products, Electrical Products, General Goods.

Table 3: Regression Result by S.I.T.C. category After Oct 1997

Category (S.I.T.C.	$EXRV_t$	DP	$EXRV_{t-1}$	R^2	DW
1	0.946648 (1.758875)*	1.65018 (13.85246)*	1.51281 (3.08353)*	0.775258	0.89005
2	0.635931 (5.213115)*	0.854392 (23.99777)*	0.45313 (4.18919)*	0.933221	0.243653
3	0.81165 (6.336519)*	0.544679 (14.45097)*	0.47921 (4.05655)*	0.833062	0.415439
4	0.770469 (6.194107)*	0.922925 (13.51783)*	0.38606 (3.24005)*	0.83173	0.307215
5	0.64187 (3.4711)*	3.457081 (38.62676)*	0.191739 (1.083064)*	0.966572	0.768667
6	0.882684 (6.992196)*	0.78229 (5.58062)*	1.2248 (5.01721)*	0.536106	0.668153

Notes: Figures in parentheses are the t-statistics. * means Significant at the 5 per cent level. ** means Significant at the 10 per cent level.
DW (Durbin-Watson Statistic) tests first order residual autocorrelation
Category 1-6: Agricultural Products, , Base Metal and Metal Products, Rubber and Plastic Products, Textile Products, Electrical Products, General Goods.

The x_1 reports the exchange rate's elasticity to the export prices. The export prices are positively and statistically significant related to exchange rate in both before and after Asian

Financial crisis, except for category 5, Electrical Products, before October 1997. Theoretically, the expected value of x_1 was between one and zero; when exchange rate depreciated (appreciated), the exporters decreased (increased) their export price with different proportion of coefficient in each category. When x_1 approached to 0, the exporters tended to reducing profit margins and absorb the unfavorable exchange rate loss. For example, Category 4, Textile Products, and category 6, general goods, showed low x_1 about 0.35 and 0.19 before October 1997. These two industries were the price takers within the buyers market. When x_1 approached to 1, the exporters tended to pass-through the exchange rate difference to export price. The quoting price might fluctuate depending on exchange rate's volatility. Like Category 2, Base Metal, before October 1997, and Category 1, Agricultural Products, and Category 6, General Goods, after October 1997, the exporters became the price makers in sellers market.

In this study, however, there were two categories, Category 1 Agricultural Products and Category 3 Rubber and Plastic Products, with x_1 larger than 1 before October 1997. The reason might be that the profit margins in these two industries were so low that exporters needed to achieve a greater mark-up under exchange rate uncertainty.

The domestic price, x_2, had positive and statistical significant relationship with export price in every category. In category 5, x_2 Electrical Products, increased from 0.22 to 1.45 after October 1997 which denoted that domestic market conditions became a major factor in export pricing. The lagged exchange rate, x_3, also had positive significant relationship to export price, except category 1,2,3,4, before October 1997. In category 6, the coefficient of lagged exchange rate volatility was larger than the matched exchange rate volatility in two different periods; 0.24 to 0.19 before October 1997 and 1.22 to 0.88 after October 1997. These results partially support the hypothesis that time lag had positive effects on export price. Furthermore, in a particular industry such as category 6, if the exchange rates were different in price setting and actual payment, time lagged exchange rate might have a higher coefficient than time matched exchange rate.

This modified model provides the evidences of the relationships between the export price, exchange rate volatility, domestic price, and time lagged exchange rate volatility. Generally, different industries had different pricing strategies, i.e., absorb, reflect or mark-up exchange rate pass-through to export price. Therefore, different pricing strategies against exchange rate volatility might keep on recurring due to the internal/external factors and pricing methods discussed above.

CONCLUSIONS AND IMPLICATIONS

This study outlined three dimensions of export pricing issues that can affect exporters' pricing strategy: internal factors, external factors and six pricing methods. FIGURE 1 and Table 1 provide the insight of pricing decisions process and the concern of pricing methods from the literature review. The effects of exchange rate volatility on the export pricing in Taiwan's export market during the past decade showed that exchange rate volatility had a positive effect on export

price. Using separate export price data in six main categories(by S.T.I.C code), this paper found that the exchange rate elasticity of export price fell within the range from 0.19 to 1.43, different from the theoretical model predicted value, between zero and one. There are several factors might cause this difference. For example, when products stand for very low profit margins, very strong seller's market, and very long payment terms, their exchange rate elasticity could higher than 1.

Overall, this study provided useful guidelines for both the theoretical framework and the empirical examination of the export pricing and exchange rate pass-through. However, further research in cross-countries and cross-industry are needed to provide a grater understanding on this field. As businesses contrive to globalize, the practicer must be aware of and deal with exchange rate pass-through since the ability to pass-through rate change increase can adversely affect profit margins.

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THE EFFECT OF AN INTERNAL AUDIT FUNCTION ON AUDIT EFFORT

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ABSTRACT

This study utilizes workpaper evidence from a Big 4 firm to examine how the degree of reliance placed on an internal audit function influences the nature, timing and extent of external audit effort. After controlling for assessed misstatement risk, the degree of reliance is found to significantly influence the timing, but not nature and extent of evidential effort. When the degree of reliance is assessed as high, the external auditor shifts effort from year-end procedures to interim procedures. Because tests of controls are conventionally performed at interim, and substantive tests at year-end, this shift seems to suggest that a "reliance approach" to auditing is followed in the presence of a reliable internal audit function.

INTRODUCTION

The Public Oversight Board Panel on Audit Effectiveness was established in recognition that the effectiveness of external audits is an important issue in the operation of capital markets (AICPA, 2000). One means of increasing the effectiveness of audits would be for the external auditor to make better use of the internal audit function (IAF). Felix, Gramling and Maletta (2001) find that internal audit characteristics have a significant influence on external audit fees, indicating that external auditors utilize the IAF in compiling evidential evidence. Where Felix et al. (2001) examines the influence of IAF characteristics on external audit fees, the objective of this paper is to provide evidence on the effect of the IAF on audit effort decisions. Specifically, we examine how the degree of reliance placed on the IAF, by the external auditor, impacts the nature, timing and extent of audit evidence gathered. The evidence used in this study is unique in that it is obtained from documented utilization of the IAF from the external auditor's working papers.

The recent proposal by the New York Stock Exchange requiring firms to employ an IAF illustrates the importance an IAF plays in corporate governance (IIA, 2003). If the external auditor deems the IAF reliable, it can have an affect on the external financial statement audit. Extant literature has provided primarily indirect evidence on the influence an IAF can have on a financial statement audit due to the lack of availability of audit workpapers. This evidence includes surveys

and experimental studies (e.g., Whittington and Margheim, 1993). In contrast with these prior studies, this paper uses data from working papers to provide evidence on the degree to which an IAF affects evidential requirements in the financial statement audit.

SAS 65 (1991) provides the external auditor with guidelines concerning the assessment of the competence and objectivity of the IAF and the subsequent use of internal audit reports and personnel during the audit. In accordance with this guidance, the data-granting firm requires their auditors to assess and document a level of reliance on the IAF. We hypothesize that the level of reliance placed on the IAF will influence evidential planning decisions either indirectly through preliminary risk assessments, and/or directly through the use of prior and concurrent procedures conducted by the IAF. Different levels of reliance on the IAF should result in differences in the nature, timing and extent of audit evidence collected.

This study examines the direct affect of the reliance on an IAF on these three evidential planning characteristics independently within the revenue cycle audit program, while controlling for potential trade-offs between nature, timing and extent decisions. Our findings indicate that reliance on an IAF significantly impacts the timing decision (i.e., as the external auditor's reliance on the IAF increased, evidential effort shifted from year-end to interim period testing.)

This study contributes to the extant literature in several ways. Prior literature has provided mixed results using field-based evidence to examine the expected relationship between risk assessments and evidence plans (Bedard, Mock & Wright, 1999). This study also uses a unique external auditor assessment of an auditee characteristic (level of reliance on the IAF), and examines its influence on external auditor effort decisions.

The next section discusses prior literature and develops pertinent hypotheses. Research design and data is discussed in the next section followed by the results, and then the conclusions.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

The Audit Process and the IAF

SAS 47 (1983), SAS 65 (1991), and the data-granting audit firm's guidance, suggest that an IAF can influence the financial statement audit in two ways. First, the existence of a reliable IAF could affect preliminary risk assessments, indirectly affecting evidential effort. Second, prior and concurrent IAF work could be used as a substitute for audit procedures directly influencing evidential effort. We expect that the extent to which the IAF affects the audit depends upon the degree of reliance the external auditor places on it.

When planning and performing compliance and substantive tests, the external auditor may utilize audit-relevant activities performed by the IAF. If the external auditor decides this use of the IAF would be efficient, the auditor should assess the competence, work performance, and objectivity of the personnel, and determine how their work might affect the nature, timing and extent of audit

procedures (SAS 65). While acknowledging that the evidential process is iterative, the data-granting firm's guidance indicates that a general degree of reliance on the IAF must be established and documented *before* substantive examination. Characteristics relating to the competence and work performance of the IAF include education, experience, and quality of documentation. When assessing objectivity, the external auditor considers organizational factors influencing the effectiveness of the IAF. These factors include whether the IAF reports to the audit committee or management, and whether the IAF has the autonomy to plan an investigation without prior management authorization. Prior literature has found that these IAF characteristics significantly contribute to the reliance assessment (i.e., Brown, 1983; Schneider, 1984, 1985; Margheim, 1986; Messier & Schneider, 1988; Edge & Farley, 1991; Maletta, 1993). These studies attempt to rank the importance of these characteristics, however, the findings are inconsistent (Krishnamoorthy, 2002). The relative weight the external auditor places on these factors is beyond the scope of this paper.

The Indirect Affect of Risk Assessments

The opinion formulation process is a dynamic, complex sequence of events. Certain pre-planning analyses are conducted to gather necessary information to plan an effective and efficient audit program, including the preliminary assessment of inherent and control risks. The Audit Risk Model (ARM) (SAS 47) does not precisely define auditee risk factors or the manner in which they map into inherent and control risk (i.e., Fellingham and Newman, 1985; Waller, 1993; AICPA, 2000).[1] Audit firm guidance on the depth of knowledge, activities, or procedures necessary to assess these risks is also broad and varied (i.e., Joyce and Libby, 1982; Houghton and Fogerty, 1991).

The external auditor may consider the IAF in the assessment of inherent risk. SAS 47 and SAS 53 (1988) illustrate client and engagement attributes that should be considered in the assessment of inherent risk. These factors summarize the client's economic environment, management characteristics, operating characteristics, and audit engagement characteristics. The external auditor may view a firm with an IAF as having a higher degree of management control consciousness than a firm without an IAF. The existence of an IAF alone does not necessarily warrant consideration by the external auditor. However, the existence of a reliable IAF, and thoughtful use of the IAF's recommendations, may demonstrate management's willingness to invest in oversight and experienced, diligent accounting personnel. This may potentially lead to a lower inherent risk assessment, decreasing evidential requirements.

The external auditor may consider the IAF in the assessment of control risk. The control risk assessment is the external auditor's perception of the likelihood that a material misstatement will not be prevented or detected by the entity's internal controls. Internal control consists of five interrelated components for which management is responsible: the control environment, risk

assessment, control activities, information and communication, and monitoring (SAS 78, 1995). The control environment sets the tone of an organization, influencing the control consciousness of the entity's employees, and is the foundation for all other components of internal control (AICPA, 2000). In many companies, the primary role of an IAF is to address these other components (e.g., internal risk assessment, developing and testing control activities, information and communication, and monitoring). The presence of a reliable IAF is likely to result in a stronger control structure, potentially leading to a lower control risk assessment. This may lead to the external auditor requiring less persuasive evidence (nature), more interim evidence (timing), and less overall evidence (extent) to achieve audit objectives.

The external auditor's assessment of the risk of material misstatements is used to develop the evidential plan. Misstatement risk is a combination of the inherent and control risk assessments. It may be viewed as the external auditor-assessed likelihood that a material error will flow through to the financial statements. We use misstatement risk, calculated as the multiplicative combination of inherent and control risk, in our analysis to represent an important external auditor assessment that may be influenced by the IAF, and subsequently affect evidential planning decisions.

The Effect of the IAF on Evidential Effort Choices

In developing the audit plan the external auditor intends to efficiently and effectively obtain sufficient, competent evidence to support an audit opinion. The external auditor may consider the use of certain audit-relevant work performed by the IAF which may change the nature, timing and extent of audit procedures necessary to meet this objective. The audit relevant work may speak to the need for more persuasive evidence, the need for more interim controls testing, and result in reduced external auditor effort.

SAS 31 relates the nature of audit evidence to persuasiveness and independence. If the IAF is considered reliable and objective, the external auditor may consider the financial information provided by management to be more credible, potentially reducing the demand for more persuasive (independent) verification. Because more persuasive information can be more costly, the perceived need for less independent information can improve the efficiency of the audit. Based on the potential for reliance on the IAF provided in both GAAS and IIA Standards , we hypothesize as follows:

H1:	The higher the degree of reliance on an IAF, the less persuasive the evidence required by the external auditor.

The timing of audit procedures refers to the distribution of audit effort between interim procedures and year-end procedures (AICPA, 2000). Tests of controls are conventionally performed at interim, and substantive tests are typically performed at year-end. The external auditor may opt

to decrease substantive procedures if reliance on internal controls appears to be warranted. In circumstances where controls are in operation, pertain to the assertion at issue, and are likely to prevent and detect material misstatements, the external auditor may choose to test and rely on those controls as a means to reduce substantive testing. The Institute of Internal Auditor's Professional Practice Standards state that internal audit work should examine and evaluate the adequacy and effectiveness of the system of internal controls, and the quality of performance in carrying out assigned control responsibilities.[2] Thus, procedures performed by the IAF may provide the external auditor with valuable information on whether relevant internal controls are in place and operating effectively.[3] Therefore, when the IAF is deemed to be reliable, we hypothesize that the external auditor will conduct more interim period work. This leads to Hypothesis 2:

H2:	The higher the degree of reliance on an IAF, the greater portion of audit effort committed to interim testing.

The extent of audit effort is the amount of work performed by the external auditor. While the IAF may not significantly affect the planned audit effort, the utilization of prior and concurrent work performed by the IAF may reduce the number of external auditor hours necessary to achieve the audit objectives. For example, the IAF may observe inventories at various locations throughout the year. If the IAF is deemed reliable, the external auditor may utilize this substantive evidence, reducing the number locations to which the external auditor must travel. This leads to Hypothesis 3:

H3:	The higher the degree of reliance on an IAF, the fewer the total number of audit testing hours required by the external auditor.

PROPRIETARY DATA, VARIABLE MEASUREMENT AND MODEL SPECIFICATION

Proprietary Data

The audit documentation used in this study is acquired from a Big 4 firm. The firm granted access to its archived audit working papers for a given practice office. Using a random number generator, sample audits were selected from the list of archived engagements containing audit files from 1996 to 1999. The firm provided audit data for 78 audit engagements all from different auditees. Within the sample, 66 auditees are publicly traded and 21 employ an IAF. The audit firm has been auditing these clients for an average of 7 years. The data set does not contain any first-year

audits. All sampled engagements received unqualified opinions, and there has been no restatement or known allegation of audit failure for two years following the most recent observation date. The firm assisted in the coding of variables used in this study, and provided a subsequent multi-level review to facilitate consistent coding of the data.[4] Each of the 78 firm-year audit observations include the external auditor's documented revenue cycle inherent and control risk assessments, as well as the auditor's assessed level of reliance on the IAF, if one exists. Each observation includes an audit program for the entire year's engagement.

Measurements for the nature, timing and extent of audit procedures, as well as risk assessments used in this paper are taken from the revenue portion of the audit program. The data-granting firm considers revenue to be a "significant account."[5] Partners of the data-granting firm perceive the revenue portion of the audit to be a more risky audit area, warranting a higher degree of scrutiny. This perception is corroborated by the fact that 70% of recent Security Exchange Commission Accounting and Auditing Enforcement Releases reviewed surrounded revenue recognition issues (AICPA, 2000). Given these characteristics, revenue is a primary area in which risk assessment and related audit testing may be varied, and therefore provides a more powerful setting to study audit-planning decisions.

Model Specification and Variable Measurement

The external auditor may address specific auditee characteristics by adjusting the evidential plan. This can be accomplished by altering the nature of evidence collected, the timing of evidence collection, and the extent of audit procedures conducted.[6] To test Hypothesis 1-3, we examine the impact of an IAF on nature, timing and extent independently by employing the following equations:

$NATURE_i = \beta_{0i} + \beta_1 IA_i + \beta_2 MR_i + \beta_3 TIMING_i + \beta_4 EXTENT_i + \beta_5 REV_i + \beta_6 YA_i + \beta_7 PUB_i + \beta_8 IND_i + e_i$	[1]
$TIMING_i = \beta_{0i} + \beta_1 IA_i + \beta_2 MR_i + \beta_3 NATURE_i + \beta_4 EXTENT_i + \beta_5 REV_i + \beta_6 YA_i + \beta_7 PUB_i + \beta_8 IND_i + e_i$	[2]
$EXTENT_i = \beta_{0i} + \beta_1 IA_i + \beta_2 MR_i + \beta_3 NATURE_i + \beta_4 TIMING_i + \beta_5 REV_i + \beta_6 YA_i + \beta_7 PUB_i + \beta_8 IND_i + e_i$	[3]

NATURE is measured by categorizing evidence as outside, outside/inside, and inside. Using these categories, we weight audit procedures listed in the revenue cycle of the audit program using a three-point scale (outside evidence equals 3, outside/inside equals 2, and inside equals 1). "Outside" evidence is obtained, inspected, or observed completely independent of management.

This is considered to be the most persuasive form of evidence. An example of outside evidence is an accounts receivable confirmation sent directly from a client's customer to the auditor. "Outside/inside" evidence originated from a third party outside of the influence of management but has the potential to be manipulated by management. An example of outside/inside evidence is a customer purchase order sent by the customer to the client. This purchase order originated from the customer but passed through the hands of the auditee, and thus had some potential to be manipulated by the auditee. "Inside" evidence is obtained directly from the auditee. An example is a copy of a sales invoice prepared by the auditee. NATURE is the sum of the persuasiveness rankings for all procedures listed in the revenue cycle audit program. The higher the value of the variable, the more persuasive (independent) the total evidence collected. We acknowledge this metric is an approximation of this characterization of nature. Prior literature has measured the nature of audit evidence by looking at the use of specific tests and the total number of audit tests performed (e.g., Messier and Plumlee, 1987; Bedard and Wright, 1994; Mock and Wright, 1993, 1999). We believe the metric used in this study is likely to be a more effective measurement for capturing the nature characteristic since it reflects a measure of the variation in evidence strength. Where NATURE is the dependent variable, we expect the coefficient on IA to obtain a negative value, indicating the external auditor requires less persuasive evidence when reliance on the IAF is higher.

The dependent variable TIMING equals the proportion of revenue testing hours conducted at the auditee's fiscal year-end relative to total revenue testing hours.[7] If, for a given audit, 60 percent of audit hours are conducted at the auditee's fiscal year-end, and 40 percent during interim work, then the observation receives a TIMING score of 60. When TIMING is the dependent variable we expect the coefficient on IA to obtain a negative value, indicating the external auditor conducts more interim testing when reliance on the IAF is higher.

The dependent variable EXTENT equals total revenue cycle audit hours. When EXTENT is the dependent variable we expect the coefficient on IA to obtain a negative value, indicating the external auditor requires less evidential effort when reliance on the IAF is higher.

IA is our experimental variable, and represents an aggregated reliance assessment made by the auditor and is taken directly from the working papers. IA is a summary of the external auditor's assessment of the competence, work performance and objectivity of the IAF measured on a continuous scale from 0 to 100.[8]

We include misstatement risk (MR) as a control for firm characteristics captured in preliminary risk assessments. According to SAS 47, risk assessments should influence EP decisions. As discussed above, the IAF may indirectly affect EP decisions via MR. The inclusion of this variable may bias us away from finding significant results on our test variable, IA. MR is the multiplicative combination of ranked external auditor-assessed inherent and control risks (SAS 47). The data-granting firm measures and documents inherent and control risk assessments as "low," "medium," or "high." The risks are coded 1 for low, 2 for medium, or 3 for high, resulting in MR

values of 1, 2, 3, 4, 6, and 9. We expect higher levels of assessed risk to be associated with more persuasive, year-end, overall evidence.

To control for auditee size, we include the natural log of total auditee revenue (REV) for the year under audit. Prior literature has shown that the relationship between auditor effort and client size is nonlinear (O'Keefe, Simunic & Stein, 1994). For this reason, we utilize the natural log of revenue. While larger firms may have greater oversight, leading to potentially lower misstatement risk assessments and audit effort, they may have more complex control structures and greater decentralization, potentially increasing assessed risk and effort. It is unclear how these effects will aggregate and affect the relationship between evidential effort and REV. Accordingly, we do not have an expectation of the sign on REV.

Prior literature has noted that the length of the auditor-auditee relationship may affect risk assessments and audit effort due to learning over time (O'Keefe et al., 1994; Ashton, 1991). We control for this effect by including the number of years the external auditor has been auditing the auditee (YA). As the relationship between the external auditor and auditee continues over time (higher values of YA), we expect the external auditor to require less persuasive evidence, more effort at interim, and less overall evidence.

Prior research suggests the external auditor is more likely to be sued if the auditee is publicly held (e.g., St. Pierre and Anderson, 1982). Additionally, incentives to overstate financial standing and results of operations are suggested to be greater for managers of public firms due to market driven compensation packages (O'Keefe et al., 1994). We control for these two factors by including an indicator variable (PUB), which we expect to exhibit a positive association with audit effort. To control for potential systematic differences in the manner in which audits are conducted between industry groups as identified by the data-granting firm we include IND. IND is an indicator variable representing the two industry categories in our sample (biotech and high-tech). Because we do not have any evidence concerning major changes in audit approach by the data-granting firm between industry groups, there is no expectation for the coefficient on IND.

To address the potential tradeoffs between nature, timing and extent decisions, we include the other evidential planning decisions as control variables (i.e., when NATURE is the dependent variable, TIMING and EXTENT are independent variables). The residuals from Equations 1-3 may be correlated due to the possibility that omitted variables may simultaneously influence nature, timing and extent decisions. In light of this, we use SUR analysis to improve the efficiency of the coefficient estimation.[9]

RESULTS

Table 1 presents descriptive statistics for the dependent and independent variables used to test Hypotheses 1 through 3.

Table 2 presents the results from the Seemingly Unrelated Regression analysis (Equations 1-3).

These results indicate that IA is significantly related to TIMING (-0.2154, p=0.0687) but not NATURE (0.0101, p=0.4433)[10] and EXTENT (0.2295, p=0.4300). The significant, negative coefficient on IA in Equation 2 provides evidence to support Hypothesis 2, inferring that when the IAF is relied upon, more interim work is conducted. The adjusted R^2 of over seventy percent indicates that this equation explains a significant amount of the variation in TIMING. By using SUR analysis, and including the other evidential planning decisions as control variables, these results appear to be robust to the effects of possible trade-offs between the three evidential effort decisions.[11]

Table 1: Descriptive Statistics
N=78

			Quartiles		
	MEAN	STD DEV	3	2	1
IA Reliance (IA)	4.67949	9.44360	5	0	0
IA Existence (IA2)	0.26923	0.44643	1	0	0
Misstatement Risk (IR*CR=MR)	2.51282	2.23167	4	1	1
Misstatement Risk (MR2)	1.94872	1.26796	3	1	1
NATURE	12.27057	6.25237	14.7	10.65	7.5
TIMING	83.50000	14.35790	98	85	70
EXTENT	74.83333	112.29696	62	31.5	20

Variable Definitions:

IA	equals the external auditor-documented general level of reliance on the IAF.
IA2	is an indicator variable that takes on the value of 1 for a firm that has an IAF, and zero otherwise.
MR	equals Inherent Risk * Control Risk for the revenue cycle.
MR2	is based on an inherent and control risk combination heuristic resulting in values ranging from 1 to 5.
NATURE	is the sum of the persuasiveness rankings for all procedures listed in the revenue cycle audit program. Persuasiveness is ranked using a three level scale: 3 for outside information, 2 for outside/inside information, and 1 for inside information.
TIMING	is the percentage of audit testing conducted at the end of the fiscal year of the client.
EXTENT	is the total hours spent performing test of controls and substantive testing in the revenue cycle during the audit.

Table 2: SUR Regression Analysis
N=78

Test of H1:	$NATURE_i = IA_i + MR_i + TIMING_i + EXTENT_i + REV_i + YA_i + PUB_i + IND_i + e_i$					[1]
Test of H2:	$TIMING_i = IA_i + MR_i + NATURE_i + EXTENT_i + REV_i + YA_i + PUBi + IND_i + e_i$					[2]
Test of H3:	$EXTENT_i = IA_i + MR_i + NATURE_i + TIMING_i + REV_i + YA_i + PUB_i + IND_i + e_i$					[3]
		Dependent Variables				
Independent Variables and Expected Signs		NATURE		TIMING		EXTENT
Intercept		**-20.7969**		**105.0482**		233.3340
		0.0088		**<0.0001**		0.1151
IA Reliance (IA)	-	0.0101	-	**-0.2154**	-	0.2295
		0.4433		**0.0687**		0.4300
Misstatement Risk (MR)	+	-0.2874	+	**1.7880**	+	6.1805
		0.1719		**0.0037**		0.1340
NATURE	?			**1.0427**	?	**17.1595**
				<0.0001		**<0.0001**
TIMING	?	**0.2440**			?	**-3.5834**
		<0.0001				**0.0009**
EXTENT	?	**0.0506**	?	**-0.0451**		
		<0.0001		**0.0009**		
Revenue (REV)	?	0.3806	-	**-1.5559**	+	-1.9355
		0.1140		**0.0110**		0.3705
Years as Auditor (YA)	-	0.1889	-	**-0.8724**	-	-3.5010
		0.1155		**0.0031**		0.1132
Public/Private (PUB)	+	1.4808	+	-2.3198	+	-24.5385
		0.1286		0.1958		0.1545
Industry (IND)	?	1.3539	?	-1.7497	?	-20.9996
		0.1712		0.3973		0.2529
Adjusted R squared		63.66%†		70.56%†		61.81%†

Table 2: SUR Regression Analysis
N=78

Variable Definitions:

NATURE	is the sum of the persuasiveness rankings for all procedures listed in the revenue cycle audit program. Persuasiveness is ranked using a three level scale: 3 for outside information, 2 for outside/inside information, and 1 for inside information.
TIMING	is the percentage of audit testing conducted at the end of the fiscal year of the client.
EXTENT	is the total hours spent performing test of controls and substantive testing in the revenue cycle during the audit.
IA	equals the external auditor-documented general level of reliance on the IAF.
MR	equals Inherent Risk * Control Risk for the revenue cycle.

The control variables include: the natural log of revenue (REV), Years as Auditor (YA), public or private ownership (PUB), and industry categorization (IND).
Coefficients with p-values less than .10 are shown in bold.
† Adjusted R-squared is based on OLS regression, as opposed to the SUR weighted R-squared.

When considering the findings for H2 and H3 in conjunction, the indication is that evidential effort is shifted from year-end to interim periods. This supposition is drawn because there is a significant change in the *timing* of evidence collection without a change in the overall *extent* of audit effort. In Table 3 we examine the apparent shift of audit effort by partitioning EXTENT into year-end hours and interim hours.

This partitioning is accomplished by interacting TIMING and EXTENT. Specifically, we calculate TIMING*EXTENT to obtain a metric for the extent of year-end audit testing (YEAREND), and EXTENT - (TIMING*EXTENT) for interim testing (INTERIM). These two variables (INTERIM and YEAREND) are used as dependent variables in the following equations:

$INTERIM_i = \beta_{0i} + \beta_1 IA_i + \beta_2 MR_i + \beta_3 NATURE_i + \beta_4 REV_i + \beta_5 YA_i + \beta_6 PUB_i + \beta_7 IND_i + e_i$	[4]
$YEAREND_i = \beta_{0i} + \beta_1 IA_i + \beta_2 MR_i + \beta_3 NATURE_i + \beta_4 REV_i + \beta_5 YA_i + \beta_6 PUB_i + \beta_7 IND_i + e_i$	[5]

Equation 4 (INTERIM) shown in Table 4 obtains a positive coefficient on IA (2.6873, p=0.0555) while Equation 5 (YEAREND) obtains a negative coefficient on IA (-1.3241, p=0.0035), indicating a greater reliance on the IAF is associated with a shift in effort from year-end to interim periods. NATURE is included as a control variable because TIMING and EXTENT are interacted to obtain the dependent variable. These results strengthen the notion that the external auditor increases interim audit effort and decreases year-end effort as reliance on the IAF becomes stronger.

Table 3: OLS Analysis of Interim vs. Year End Effort
N=78

	$INTERIM_i = IA_i + MR_i + NATURE_i + REV_i + YA_i + PUB_i + IND_i + e_i$	[4]
	$YEAREND_i = IA_i + MR_i + NATURE_i + REV_i + YA_i + PUB_i + IND_i + e_i$	[5]

		Dependent Variables		
Independent Variables and Expected Signs		INTERIM		YEAREND
Intercept		**-289.0890**		51.3744
		0.0192		0.1418
IA Reliance (IA)	+	**2.6873**	-	**-1.3241**
		0.0555		**0.0035**
Misstatement Risk (MR)	+	3.6775	+	0.8897
		0.2991		0.3282
NATURE	?	**14.6272**	?	**-2.5142**
		<.0001		**<.0001**
Revenue (REV)	?	**12.9380**	?	-2.5512
		0.0916		0.2433
Years as Auditor (YA)	-	-2.6386	-	0.7330
		0.2329		0.2398
Public/Private (PUB)	+	-20.3460	+	6.1770
		0.5199		0.2578
Industry (IND)	?	-11.2482	?	1.7635
		0.6413		0.7988
Adjusted R squared		59.60%		46.61%

Variable Definitions:

INTERIM is the total hours spent performing test of controls and substantive testing for the revenue cycle prior to the balance sheet date.

YEAREND is the total hours spent performing test of controls and substantive testing for the revenue cycle after the balance sheet date.

IA equals the external auditor-documented general level of reliance on the IAF.

MR equals Inherent Risk * Control Risk for the revenue cycle.

NATURE is the sum of the persuasiveness rankings for all procedures listed in the revenue cycle audit program. Persuasiveness is ranked using a three level scale: 3 for outside information, 2 for outside/inside information, and 1 for inside information.

The control variables include: the natural log of revenue (REV), Years as Auditor (YA), public or private ownership (PUB), and industry categorization (IND).

Coefficients with p-values less than .10 are shown in bold.

Table 4: Sensitivity Analysis Using MR2
N=78

Test of H1 (SUR):	$NATURE_i = IA_i + MR2_i + TIMING_i + EXTENT_i + REV_i + YA_i + PUB_i + IND_i + e_i$	[6]
Test of H2 (SUR):	$TIMING_i = IA_i + MR2_i + NATURE_i + EXTENT_i + REV_i + YA_i + PUB_i + IND_i + e_i$	[7]
Test of H3 (SUR):	$EXTENT_i = IA_i + MR2_i + NATURE_i + TIMING_i + REV_i + YA_i + PUB_i + IND_i + e_i$	[8]

		Dependent Variables				
Independent Variables and Expected Signs		NATURE		TIMING		EXTENT
Intercept		**-18.2559**		**94.3081**		**245.8053**
		0.0204		**<0.0001**		**0.0971**
IA Reliance (IA)	-	-0.0009	-	**-0.2171**	-	0.2567
		0.4946		**0.0579**		0.4215
Misstatement Risk (MR2)	+	-0.2303	+	**4.2996**	+	10.7146
		0.3480		**0.0001**		0.1658
NATURE	?		?	**0.8393**	?	**17.1946**
				0.0005		**<0.0001**
TIMING	?	**0.2101**	?		?	**-3.7139**
		0.0005				**0.0010**
EXTENT	?	**0.0496**	?	**-0.0428**	?	
		<0.0001		**0.0010**		
Revenue (REV)	?	0.4055	-	-1.0488	+	-2.3855
		0.1991		0.1161		0.6891
Years as Auditor (YA)	-	0.1575	-	-0.8949	-	-3.6903
		0.1567		0.0016		0.1014
Public?Private (PUB)	+	1.4117	+	-1.7232	+	-23.5787
		0.1367		0.2527		0.1638
Industry (IND)	?	1.3168	?	-1.2688	?	-20.2362
		0.1768		0.5200		0.2692
Adjusted R squared		64.50%†		73.11%†		61.86%†

Table 4: Sensitivity Analysis Using MR2
N=78

Variable Definitions:

NATURE	is the sum of the persuasiveness rankings for all procedures listed in the revenue cycle audit program. Persuasiveness is ranked using a three level scale: 3 for outside information, 2 for outside/inside information, and 1 for inside information.
TIMING	is the percentage of audit testing conducted at the end of the fiscal year of the client.
EXTENT	is the total hours spent performing test of controls and substantive testing in the revenue cycle during the audit.
IA	equals the external auditor-documented general level of reliance on the IAF.
MR2	is based on an inherent and control risk combination heuristic resulting in values ranging from 1 to 5.

The control variables include: the natural log of revenue (REV), Years as Auditor (YA), public or private ownership (PUB), and industry categorization (IND).
Coefficients with p-values less than .10 are shown in bold.
† Adjusted R-squared

Sensitivity Analysis

Due to the ordinal, categorical nature of the MR measurement, we utilize a different measurement for misstatement risk to test the robustness of our results. The following exhibit documents the ranking scheme employed.

		IR		
		Low	Medium	High
	Low	1	2	3
CR	Medium	2	3	4
	High	3	4	5

The results of this scheme provide a measurement of misstatement risk (MR2) that include values of 1, 2, 3, 4 and 5. Table 4 presents the results from replication of Equations 1-3 using the new risk measure.

The results shown indicate the previous tests are robust to a different measure of the risk control variable. Similar sensitivity analyses were conducted by including measures for profitability and the year of observation as control variables. The results remained unchanged. Results are also robust to the use of the log of total client assets as the control variable for size.

CONCLUSIONS

This study extends earlier evidential planning research by examining the influence of an IAF on the nature, timing and extent of audit effort. Prior literature has documented that the IAF has a significant affect on the external auditor, but has been limited in its ability to examine the influence the IAF has on the evidential mix (i.e., Felix, Gramling and Maletta, 2001). Our analysis utilizes data taken directly from the revenue cycle audit program workpapers, including direct measures of the persuasiveness of audit evidence and timing of audit procedures previously unavailable due to the proprietary nature of audit documentation. The degree of reliance placed on the IAF by the external auditor was found to significantly influence the timing of audit procedures after controlling for assessed misstatement risk. Further examination revealed this change in timing represented a shift of effort from year-end procedures to interim procedures. The results in this study are robust to different measurements of persuasiveness and misstatement risk, and provide controls for potential trade-offs between nature, timing and extent decisions.

It is important to recognize the potential limitations in the generalizability of these findings. The data utilized in this study comes from a single Big 4 practice office. While the single source may limit generalizability, it also reduces noise which could be introduced from inter-firm and intra-industry observations. While the focus on one cycle of the audit program may bias us away from finding results, it reinforces the significance of finding an effect for timing.

The results of this study have implications to future research regarding the relationship between auditee characteristics and audit effort. The results of this study may indicate that auditee characteristics are not sufficiently captured in preliminary risk assessments as they are used in evidential planning decisions. In the face of a reliable IAF a "reliance approach" to auditing seems to be followed (i.e., relying on controls and thus, performing fewer substantive tests). This approach would seem to allow the auditor to contend with typical year-end human resource constraint issues. Future research should consider the importance of an IAF in the revisions of the Audit Risk Model.

ENDNOTES

1 The ARM is an audit planning metaphor for a risk-focused approach to evidential planning that assists auditors in the implementation of the opinion formulation process.

2 Standards for the Professional Practice of Internal Auditing (Altamonte Springs, FL: Institute of Internal Auditors, 1980, pp. 3-4).

3 SAS's 55 and 78 direct the external auditor to obtain an understanding of the design of internal controls relevant to the financial statements, and, when reliance on controls is planned, determine whether these controls are operating effectively via compliance tests.

4 We did not perform any tests for inter-coder reliability. Instead we relied on the firm's assistance in coding the variables to insure they measure accurately the constructs we examine.

5 The data-granting firm considers an account or cycle to be significant if it is critical to the prevention of audit failure, or if its examination will significantly decrease audit firm risk. Several sources corroborate the perceived higher risk of errors and irregularities within the revenue cycle of the audit (e.g., COSO Report, 1999).

6 A forth variable ['staffing'] may also be affected [see Bedard, Mock and Wright, 1999].

7 The data set does not contain audits that changed the proximity of the year-end engagement relative to the auditee's fiscal year-end. The proprietary nature of audit documentation especially limits the analysis of the timing of audit procedures in the extant literature (e.g., Srinidhi & Vasarhelyi, 1986).

8 Extant literature normally considers auditor risk judgment in a categorical setting (i.e., "low," "medium," and "high"), which may not require a high degree of accuracy (Waller, 1993).

9 For a description of this approach, see Zellner (1962).

10 These findings are robust to the use of a different measure of nature. When the number of audit procedures is used as a proxy for nature (Mock and Wright, 1993, 1999) we obtain similar results.

11 These findings do not support H1 and H3, however the authors acknowledge that potential limitations of the data (a focus on the revenue cycle, a comparatively small sample size as well as a sample drawn from one firm) preclude us from drawing a significant conclusion from the lack of statistical results found in Equations 1 and 3. Considering these limitations, the authors feel the findings in Equation 2 are all the more significant as they have not been shown in previous field based studies.

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TAX PRACTITIONERS AND THE ELECTRONIC FILING SYSTEM: AN EMPIRICAL ANALYSIS

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ABSTRACT

Globally, the tax environment is changing rapidly. The advancement of information and communication technology (ICT) is challenging the operation of the tax revenue system. Tax authorities are being challenged to maintain a modernized and responsive tax administration system. Since the 1990s, several tax authorities; particularly those from the developed countries and Asia-pacific regions have progressively harnessed the power of ICT by embracing an electronic tax filing (e-filing) system. Most recently, the Malaysian Inland Revenue Board has been streamlining the tax administrative policies to embrace an e-filing system. This paper examines the usage intentions, attitudes, perceptions and compliance considerations of Malaysian tax practitioners towards the e-filing system. Mail survey was administered on 600 tax practitioners throughout Malaysia. The results report that the respondents have strong usage intentions; nonetheless, they are wary of the security of the e-filing system. The quest for 'speedy tax refunds' ranked as the most important incentive for the respondents to embrace the e-filing system. At the same time, lack of confidence in the electronic administrative capabilities of the tax authority appears to discourage take-up of the e-filing system. Overall, empirical evidence provides useful insights for the tax authority to build better "user accepted" system.

INTRODUCTION

An e-filing system encompasses the use of the Internet technology, the worldwide web and tax preparation software for a wide range of tax administration and compliance purposes (FTA, 2001). The chief advantage of an e-filing system is that it integrates tax preparation, tax filing and tax payment. With the e-filing system, taxpayers and tax practitioners can file income tax returns electronically via the enabling technologies, rather than through mail or physically visiting the tax office. This may eventually make the art of tax filing and tax payment as easy as possible.

Prior studies found that tax practitioners are important third party in tax compliance setting, as a great number of taxpayers deal with tax authorities through tax practitioners (Erard, 1993; Newsberry, Reckers & Wyndelts, 1993). Erard (1993) asserted that tax practitioners are in a capacity

to exercise strong and direct influence on the tax compliance and administration process. Notably, the tax authorities in the US, UK and Australia are counting on tax practitioners to promote the e-filing system (Kahan, 1999; NAO, 2002). Thus, in a similar vein, the IRB is also counting on Malaysian tax practitioners to promote the e-filing system. As such, there is a practical need for the e-filing system to be acceptable to the tax practitioners.

However, to date, there have been little published empirical studies on the reactions of tax practitioners towards e-filing system worldwide.[1] Therefore, in considering that e-filing is the direction global tax authorities is taking, this study has emerged to find out how tax practitioners in developing nation response to e-filing endeavor to address a research void, in order to fill up a knowledge gap. This study aimed (i) to assess the usage intentions, attitudes and perceptions of Malaysian tax practitioners towards the e-filing system, (ii) to examine the importance of various incentives that will motivate take-up (iii) to explore tax practitioners' compliance considerations and reactions towards the implementation of the e-filing system.

LITERATURE REVIEW

The theory of reasoned action (TRA) states that an individual's beliefs influence attitude, which in turn affects intention, and subsequently guides actual behavior (Fishbein & Ajzen, 1975). Theoretically, it is assumed that users generally intend to act before they act. Adapting from the TRA, Davis (1989) hypothesized that user acceptance of an information system/information technology (IS/IT) can be measured from his/her usage intention of a particular IS/IT. He indicated that people's computer use could be predicted reasonably well from their intention. Specifically, in the technology acceptance model, Davis (1989) stated that usage intention is predicted by both attitudes towards using and perceived usefulness of the IS/IT. Attitudes towards using an IS/IT are jointly determined by perceived usefulness and perceived ease of use of the IS/IT (Davis, 1989). Davis (1989, p.320) defined 'perceived usefulness' and 'perceived ease of use', as "the degree to which a person believes that using a particular system would enhance his or her job performance" and "the degree to which a person believes that using a particular system would be free of effort" respectively.

Extant study by Walsh and White (2000) found that in the United States, the non-mandatory technology adoption of an e-filing system follows a diffusion process advocated by Roger (1995), and the use of a new tax filing technology has a different appeal for various groups. Walsh and White (2000, p.410) explained this phenomenon as "because each group adopts the new technology based on a cost benefit trade-off specific to that cohort". They noted that generally, the cost burdens of an e-filing system to the tax administrator include both the upstream (i.e., form development and distribution) and down-stream costs (i.e., taxpayer contacts and compliance, electronic tax training and tax practitioner support). Earlier, Skillman (1998) opined that although it is widely claimed that the e-filing system is cost saving in terms of processing electronic return forms; but given the

hardware, software, marketing, training and other electronic administrative costs, no one knows the true savings.

Prior studies found that the main reasons for taxpayers to use electronic filing were the speed of getting refunds, speed in the filing process, convenience and the accuracy of the e-filing system (James & Wallschutzky, 1993; Kana, 2001) Empirical studies of US taxpayers found that tax users varied widely in their attitudes, acceptance and usage of e-filing technologies (IRS, 1998a; 1999). Several studies reported that tax users' resistance was partly due to the misconception of the e-filing system, cost of compliance, concern over data integrity, perceived lack of security of the e-filing system, lack of computing resources and incentives to encourage take up (Accounting Web, 2003; ETAAC, 2002).

In tax practice, it is undoubted that an e-filing system could only work effectively with the assistance and cooperation of tax practitioners. However, Skillman (1998) found that tax practitioners as a group apparently do not see that the conversion to electronic filing offers much to them in terms of return on their investment, considering the cost of software and hardware needed to adopt the e-filing technology. Although many tax practitioners do perceive that electronic filing is an important and improved service; they do not view it as vital in gaining competitive advantage (ACCA, 2002; Kana, 2001). A random survey of US tax professionals shows that tax practitioners vary in their willingness to automate, and a large number of accounting firms remain unconvinced of the usability of e-filing technology in increasing their competitiveness (ETAAC, 2002). Similarly, an ACCA survey (2002) found that UK accountants showed no confidence in the e-filing system. It was reported that perceived lack of security of the e-filing system stopped UK tax practitioners from filing income tax returns online (AccountingWeb, 2003).

Learning from the experiences of overseas counterparts, it is noted that some form of financial and in kind incentives are needed to "kick start" the Malaysian e-filing process amongst its taxpayers and tax practitioners. In the UK, for example, the tax department offered a £10 discount to individual taxpayers who filed their tax return electronically (NAO, 2002). Similarly, the Inland Revenue Authority of Singapore (IRAS) opted to give cash prizes to individual taxpayers in the e-filing lucky draw contest for those taxpayers who e-file their tax returns (IRAS, 2003). In Australia, tax practitioners were granted one extra month to file tax returns as an incentive to adopt the electronic lodgment service at an early stage of implementation to encourage take-up (James & Wallschutzky, 1993).

Conversely, some evidence indicates that the best way to go about boosting the take up rate of an e-filing system is simply to make it mandatory at some point in time (FTA, 2000). In particular, in the US, it was reported that certain aspects of business taxes, such as the payroll tax, were already mandated to be filed electronically; in particular, the state of Indiana has enacted legislation mandating certain electronic fund transfer payments in 1987 (FTA, 2000). It was reported that the US Congress has restructured tax law to get 80 percent of tax returns to be filed electronically by 2007 (IRS, 1998b). Willis (2002) reported that since July 15, 2001, in France,

businesses with an annual turnover of 15 million Euros have been mandated by law to file and pay their corporate taxes electronically. He also stated that in Spain, electronic filing of tax return is mandatory for all companies with an annual turnover of more than 6 million Euros. In turn, the UK government also envisaged mandating electronic filing by stages (Willis, 2002). The experiences of overseas counterparts have shown that mandating the e-filing system is necessary to reach the desired level of participation.

On the other hand, Burnette (1998) pointed out that in handling an e-filing system, one of the most important constraints is the administrative capacity of the tax authorities. Even in a developed country such as the US, Skillman (1998, p.14) reported that "though the US tax officers are pre-eminent in tax administration they are not pre-eminent in information technology"; and notably, the tax authorities lacked the necessary critical mass of experienced and qualified IT management staff to effectively partner with the private sector in modernizing the tax administration system. Bird and Oldman (2000) found that the success of Inland Revenue Authority of Singapore rested heavily on the fact that Singapore citizens basically trusted the electronic administrative capabilities of the government.

RESEARCH METHOD

Generally, surveys on tax matters are usually considered personal and confidential. Specifically, Gardner and Stewart (1993, p.8) asserted that in relation to tax research techniques, questionnaire survey based on carefully selected statistical samples is deemed appropriate for attitudinal and/or preferential studies. Accordingly, a mail survey method was used.

Multiple items/questions were used to measure usage intentions, perceived usefulness and perceived ease of use of e-filing system. These questions were adapted and modified from studies of Davis (1989). Four items/questions were used to measure 'attitude towards using the e-filing system' and 'perceived insecurity', they were adapted from Taylor and Todd (1995) and Parasuraman and Rockbridge Associates, Inc (1999) respectively. Other questions in the questionnaire were purposefully developed for this study. An extract of the questionnaire is provided in Appendix I. The questionnaire was subjected to two pre-tests. We pre-tested the questionnaire with 8 professionals, and the pilot study was carried out on 35 tax practitioners. The subjects for the pilot study were the tax partners or tax managers who worked in the registered audit firms that had participated in the International Islamic University Malaysia's 'Accounting students' industrial training program' in May/June 2002. Preliminary assessment of the instrument found that all measurements demonstrated satisfactory reliability and validity.

We conducted the survey in mid August 2002. The sample was limited to those tax practitioners who were professional accountants authorized by or under written by law to be an auditor or person in authority such as the tax partner, tax director or tax manager working in audit firms registered with the Malaysian Institute of Accountants (MIA) as at 31 July 2002 (Note: Under

Section 153 of the Malaysian Income Tax Act, 1967, an auditor of companies is also a registered tax agent). The questionnaire was posted to 600 tax practitioners throughout Malaysia. 28 survey forms were returned as the respondents had shifted. 192 usable questionnaires were received, thus the effective response rate is 33.6% (192/572). In order to test for the potential non-response bias, the mean score for the research variables for the first 30 early respondents and the last 30 respondents was compared (Armstrong & Overton, 1997), the result shows no significant differences and it is therefore concluded that non-response bias is not a serious problem in this study.

SURVEY ANALYSIS

At the outset, an assessment of construct reliability and validity was performed, by examining the Cronbach's alpha coefficient and the inter-items correlations between study variables. The results as presented in Appendix II reported that the Cronbach's alpha for the research variables that were measured using multiple items/questions ranged from 0.79 to 0.97, thus indicating satisfactory item reliability and internal consistency of measurement scale (Nunnally, 1978). Furthermore, the inter-items correlations among the same variable were higher than for different variables, thus indicating discriminant validity (see Appendix II). The next section presents the respondents' profiles.

The Respondents' Profiles

As Table 1 indicates, the respondents comprised of 154 tax proprietors/tax partners (80.2%), 10 tax directors (5.2%), and 28 tax managers (14.6%); this information suggested that the respondents were either the tax proprietor/tax partners or person in authority in the registered audit firms. Notably, a substantial majority of the respondents were Chinese (87%) and male (86%). The dominant proportion of Chinese males in the respondents group reflects the reality in Malaysia that Chinese males are the major players in accounting and tax practice. Approximately 22% of the respondents were aged below 35 and the rest were above 35 years (78%). The highest levels of education attained by the respondents were professional qualification (75%), Master's degree (6.3 %), Bachelor's degree (17.7%) and Diploma (1%). More than 91% of the respondents indicated that they were members of local professional bodies such as MIA, Malaysian Institute of Certified Public Accountants (MICPA) and Malaysian Institute of Chartered Secretary and Administrators (MAICSA). Approximately 48% of them were members of Malaysian Institute of Taxation (MIT). In addition to being a member of the local professional accounting bodies, more than 36% of the respondents were also members of foreign professional accounting bodies in the United Kingdom, Canada, Australia and New Zealand.

Table 1: The Respondents' Profiles			
		Frequency	Percentage (%)
Job Position	Tax Proprietor/Tax Partner	154	80.2
	Tax Director	10	5.2
	Tax Manager	28	14.6
Gender	Male	165	85.9
	Female	27	14.1
Age	25-34 years old	42	21.9
	35-44 years old	67	34.9
	45-54 years old	63	32.8
	55 and above	20	10.4
Ethnicity	Chinese	166	86.5
	Indian	12	6.3
	Malay	10	5.2
	Others	4	2.1
Academic Background	Professional Qualifications	144	75.0
	Bachelor's degree	34	17.7
	Masters' degree	12	6.3
	Diploma	2	1.0
Professional Membership	MIA/MICPA/MAICSA	174	91.1
	MIT	92	47.9
	Foreign professional bodies	70	36.4
	None	3	1.6

Usage Intentions, Attitudes and Perceptions of the E-Filing System

The respondents were asked to indicate their usage intentions, attitudes and perceptions of the e-filing system. A multiple items scale was used to measure each construct and the summated scale was used to calculate the mean value. Table 2 presents the summarized statistics.

Table 2 reports that the survey respondents indicated a strong usage intention of the e-filing system, with mean score of 4.04 on a 5-point scale, significant at $p<0.001$. The result also suggests that the respondents had positive attitudes towards using the e-filing system and perceived that an e-filing system was useful and easy to use. Nonetheless, the result indicates that the respondents

were ambivalent towards the security of an e-filing system with a mean score of 3.26 on a 5-point scale, significant at p<0.001.

Table 2: The Summarized Statistics

Variable	Mean*	Standard deviation
Usage intentions	4.038	0.764
Attitudes toward using	4.025	0.859
Perceived usefulness	3.859	0.864
Perceived ease of use	3.598	0.884
Perceived insecurity	3.258	0.969

* All variables were measured based on a scale of 1 (strongly disagree) to 5 (strongly agree), and all mean values were significant at p<0.001

Incentives to Embrace An E-Filing System

The respondents were asked to rate the five types of incentives that they believe would motivate them to use an electronic filing system. As Table 3 indicates, 'Speedy tax refund' ranked as the most important incentive that would motivate take-up with a mean value of 4.70 on a 5-point scale (standard deviation = 0.79, p<0.001). The standard deviation was small, less than 1; thus indicating that there was general consensus among the respondents in this rating.

Table 3: Types of Incentives that Will Motivate the Use of An E-filing System

Types of Incentives	Mean	Standard deviation	Rank
Speedy tax refund	4.70**	0.79	1
Priority service for tax practitioner who use e-filing	4.35**	1.06	2
Extension of filing deadline for those who opt for e-filing	4.29**	1.17	3
Cash rebate	3.86**	1.41	4
Incentive in kind	3.34*	1.53	5

Respondents evaluated the importance of the above incentives on a scale of 1 (not important) to 5 (Important). * Significant at p<0.01 ** Significant at p<0.001

Other Compliance Considerations and Reactions

Single item questions were used to ascertain respondents' compliance considerations and reactions towards the implementation of the e-filing system. The respondents were asked to indicate their opinions of the e-filing system in terms of: whether e-filing system should be mandatory; their willingness to pay service fees in exchange for the e-filing service; confidence in the electronic administrative capabilities of the IRB; and perceived long-term benefit of the e-filing service. Table 4 presents the findings.

Table 4: Other Compliance Considerations and Reactions

Description	Mean	Standard deviation
I believe using the e-filing system is time saving in the long term	4.066**	0.911
I believe using the e-filing system is cost saving in the long term	3.999**	0.928
I believe using the e-filing system facilitates tax communication and compliance	3.367*	1.164
I believe using the e-filing system will reduce error rate in tax preparation	2.809**	1.190
I am willing to pay a small fee in exchange for e-filing services	2.619**	1.294
I have confidence in the IRB in managing the electronic tax administration successfully	2.519**	1.205
The use of e-filing system should be mandatory	2.441**	1.140

Based on the 5-point Likert scale, anchored on 1 (strongly disagree) to 5 (strongly agree). * $p<0.05$, ** $p<0.001$

Table 4 reports that the respondents perceived using an e-filing system would save costs and time in the long run as well as facilitate tax compliance (note that all mean values were significant at $p<0.05$ or better). Nonetheless, the findings indicated that the respondents had low confidence in the electronic administrative capability of the IRB in managing an electronic filing system successfully, with a mean score of 2.52 on a 5-point scale (significant at $p<0.001$). At the same time, the respondents were less willing to pay a fee in exchange for e-filing services and as expected, the respondents were of the opinion that electronic filing should not be mandatory.

DISCUSSION

The result in Table 2 reports that the respondents have strong intention to use the e-filing system; nonetheless, it may not be a precise measure and could be over reported, as it is a self-reported measure. At best, Legris et al., (2003) indicated that self reported usage intention should serve as a relative indicator. They illustrated the following as an example of the difficulty with self reported measures (La Presse Montreal, Tuesday, 17 October 2000, cited in Legris et al., 2003, p.202):

> *"Observers in public washrooms in New Orleans, New York, Atlanta, Chicago and San Francisco noted that only 67% of the persons washed their hands after visiting the toilet cabinet. When 1,201 Americans, in a telephone survey, were asked if they washed their hands after going to the bathroom, 95% answered yes."*

As Table 2 reports, the respondents perceived that an e-filing system is useful and easy to use. Thus indicating that tax practitioners as a group, appear to be pragmatic in their technology evaluation and decision-making; they focus on practical usability and ease of use of the tax technology in enhancing their job performance rather than on technological novelty. Presumably, tax practitioners are likely to accept a technology that is easy to use and can enhance their job performance in providing tax service to clients. In turn, the findings in Table 2 also indicate that the respondents are wary of the security of e-filing technology. This concern is consistent with a survey conducted by ACCA (2002) and ETAAC (2002) that the fear of Internet security has stopped many tax practitioners in the UK and the US from filing tax returns online.

Table 3 shows that 'Speedy tax refund' ranked as the most important incentive that would motivate take-up, as accorded in the survey. This result is consistent with Fogarty (2002) who reports that faster tax refund offers incentives to motivate US taxpayers and tax practitioners to file online. In practice, the tax authorities in the US, Australia, the UK and Singapore use "Speedy tax refund" as a kind of promise to encourage take-up of the e-filing technology. It is therefore, not surprising to find that "Speedy tax refund" is the most desired benefit that Malaysian tax practitioners sought to get out of the e-filing system on behalf of their clients for cash flow benefit. In addition, Table 3 reports that providing "Priority service for tax practitioners who use e-filing" is ranked second. The result indicates that if those tax practitioners who opted to file their clients' tax returns online would subsequently enjoy priority treatment over non-users, using electronic filing rather than traditional paper filing would then be seen as a competitive advantage and rewarding.

As expected, the respondents believe that usage of the e-filing system should not be mandatory (see Table 4). This result is in contrast with the phenomenon in the United States, where some tax accountants asserted that the only way their tax clients would want to use e-filing is if the usage of the e-filing system were mandated, and proposed mandate as the impetus to increase e-filing (Skillman, 1998). The survey results suggest that mandating electronic filing too early will

attract much resistance and criticism in view of the inequality of Malaysian citizens in terms of the digital divide, income level and age factor. The traditional channels will still need to be retained for the need of social ties, human contact and for personalization.

As Table 4 indicates, the respondents have low confidence in the administrative capabilities of the tax authority to manage the e-filing system successfully (mean=2.52, $p<0.001$). This result is not surprising as it is widely believed that in respect of IT manpower resources, the tax authority is generally suffering from a shortage of the IT workforce (IRB, 2000; 2001). In the Malaysian Inland Revenue's 2001 annual report (i.e., IRB, 2001, p.114), it is found that the percentage of workforce distributed for IT tasks was merely 2.1 %. And in practice, the tax officers do not widely use electronic communication internally and externally. At the time of the study, the use of electronic communication was not widespread between tax officers and the tax practitioners. As a matter of fact, the tax officers did not even have an email address for tax practitioners to communicate with them electronically for technical assistance, support or tax enquiries.

Related to the cost of compliance, the results indicate that the respondents are less willing to pay a fee for using the e-filing service, in addition to the cost of the hardware and software needed to comply (mean=2.62 on a 5-point scale, significant at $p<0.001$). It is worth noting here that some of the respondents specifically stated that the e-filing service should be provided free by the tax authority via its website. In their opinion, it is to the interests and benefits of the tax authority to implement the e-filing system, as tax authority gains substantially in terms of cost saving as fewer staff is needed, and time saving as tax returns processing work is now done electronically.

IMPLICATIONS TO TAX PRACTICE

The survey findings provide some implications to tax policy makers and tax practice. Overall, the findings report that tax practitioners have strong intentions to use the e-filing system and they also perceived that an e-filing system is useful and easy to use. Nonetheless, they are concerned over the security of an e-filing system. In this respect, the findings suggest that tax policy makers ought to acknowledge that concerns over security of online tax transactions constitute a tremendous barrier to technology adoption. Given the non-mandatory nature of the e-filing project, the government and tax authority cannot prevent tax practitioners from filing with paper forms. Hence, the fundamental risks and uncertainty associated with an e-filing system need to be properly addressed by the tax authority first. Preventive and corrective measures need to be taken to overcome potential barriers early, and substantive efforts need to be undertaken to ensure an extra level of protection, in order to secure tax users' trust and confidence over online tax transactions.

In addition, the findings imply that if an e-filing system that does not enhance practitioners' job performance and is not easy to use, it is unlikely to be used. Thus, suggesting that the tax authority work closely with the system and software developers to ensure that the e-filing system demonstrates sufficient utilities in enhancing practitioners in tax preparation work, speeding up tax

filing process as well as improving tax service quality. Pragmatically, it is important that the tax authority conduct user acceptance testing. In the user acceptance testing programs, the usefulness, and ease of use as well as security of the e-filing system need to be fully tested and documented. If possible, the tax authority should get some tax practitioners' involvement in the development and installation of the system. This is because the largest volumes of business returns are from small business filers, and small and medium sized accounting firms have unique needs and challenges. Hence, the input and feedback of tax practitioners from the small and medium sized accounting firms are of paramount importance. Full and proper consultations with tax practitioners are the surest way to build a more 'user-accepted' e-filing system.

Predominantly, there is a practical need for tax authority to encourage voluntary compliance through knowledge. Tax authority could cultivate knowledge through marketing, education and training programs, by effectively disseminating and share information to improve compliance via its websites, mass media and professional accounting bodies. For example, user testing results could be publicly communicated to tax practitioners via mass media, professional dialogues and circulars, to proactively inculcate favorable attitude, perceived usefulness, perceived ease of use and perceived security of the e-filing system amongst tax practitioners. For maximum effectiveness, the tax authority needs to provide free hands-on training courses to educate tax practitioners and to provide courteous technical supports (over the phone, online and physical help desk) to assist them. Fundamentally, the tax authority ought to simplify e-tax forms in order to save time in tax preparation and filing, and to provide the e-filing service free of charge or at minimal cost to encourage early compliance.

In turn, the findings provide insight that the tax authority should offer "speedy tax refunds' and "priority service for tax practitioners who use e-filing" as incentives to encourage voluntary compliance. Such a move can eventually make the adoption of e-filing a competitive advantage over non-users. In addition, the tax authority could also identify those tax practitioners who embrace the e-filing system early. Not only should the authority devise incentives (monetary and non-monetary) to reward the pioneers, they should also publish the names of the pioneers in the mass media and on the tax authority's website, and use these pioneers as the change agent to accelerate the diffusion of the e-filing technology.

Furthermore, the survey reports that the respondents' had low confidence in the electronic administrative capabilities of the tax authority in managing the e-filing system successfully. The respondents perceived that the tax officers lack the required skill, experience, competency as well as the ability in handling disaster recovery and technological crisis. Bird and Oldman (2000) found that favorable attitude and trust in the tax authorities in managing electronic tax administration system has lead to a high-level of usage of the e-filing system in Singapore. Hence, there is a practical need for the tax authority to develop and equip its manpower with good ICT skills before implementation. This is in view that an electronic tax administration system requires skilful staff to operate and maintain; thus, upgrading tax officers' electronic communication skills may increase tax

practitioners' confidence in the competency of the tax authority in managing the e-filing system successfully.

CONCLUSION

Globally, tax authorities are leveraging on the e-filing endeavor to achieve greater tax administrative compliance efficiency as well as to enhance interactions with taxpayers (and their representatives) at both domestic and international levels. Notably, tax practitioners' resistance and under-utilization of the e-filing technology remain the greatest concern and these two issues still plague the tax agencies that have embraced the e-filing system (AccountingWeb, 2002b; ETAAC, 2002). The greatest challenge faced by tax authorities is how to persuade intended tax users; particularly the tax practitioners group to embrace the new tax technology. This study can provide indicators for action in this respect. The findings not only provide useful data for Malaysian tax authorities on how tax practitioners in a developing nation respond to e-filing; but also provide important insights for the tax authorities in other developing countries in building a better "user accepted" e-filing system.

This study carries the merits of conducting a study in a real world, i.e., the pragmatic tax compliance setting. Nonetheless, it only provides a snapshot of the empirical evidence collected from one major segment of the intended users of e-filing system (i.e., the tax practitioners group). Future research could be conducted on other intended tax user populations (such as individual taxpayers and corporate taxpayers) to provide further insights on tax users' acceptance and compliance considerations of the e-filing system. In addition, comparative studies could also be conducted to examine the reactions and adoption behavior of tax practitioners within the Asia-pacific regions and throughout the world.

ENDNOTES

1 Though in 2000, Australian Tax Office (ATO) has published a "tax agent survey", it was a management consulting report. Similarly, in 2001 and 2003, the Internal Revenue Service (IRS) of the United States has commissioned Russell Marketing Research (RMR) to conduct the "Practitioners Attitudinal Tracking Study' and the 'e-file Taxpayer and Preparer Satisfaction Research' (see RMR, 2003a; 2003b). Nonetheless, these studies were not scholarly research, they were reports specifically prepared for the IRS.

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APPENDIX I

EXTRACT OF QUESTIONNAIRE ITEMS

Usage Intentions [Adapted and modified from Davis (1989)]
Assuming I have access to the electronic filing system, I intend to use it.
Assuming I have access to the electronic filing system, I predict I would use it.

Attitudes Toward Using [Adapted and modified from Taylor and Todd (1995)
Using the e-filing system is a wise idea
Using the e-filing system is beneficial
Using the e-filing system is an innovative approach
Using the e-filing system is a bad idea (reverse score)

Perceived Usefulness [Adapted and modified from Davis (1989)]
Using the e-filing system will improve my job performance
Using the e-filing system will increase my job productivity
Using the e-filing system will enable me to do my job more quickly
Using the e-filing system will provide information that is useful to me

Perceived Ease of Use [Adapted and modified from Davis (1989)]
I believe the e-filing system will be easy to learn
I believe the e-filing system will be easy to operate
I believe the e-filing system will be easy to master
I believe the e-filing system will be easy to use

Perceived Insecurity [Adapted from Parasuraman & Rockbridge Associates Inc (1999)]
I do not consider it safe to do tax filing online
I do not consider it safe to do tax enquiry online
I do not consider it safe to give out bank account numbers over a computer
I do not consider it safe to do tax transactions electronically without confirmation by respective tax officers later.

APPENDIX II

ANALYSIS OF INTER-ITEMS CORRELATIONS

	UI1	UI2	ATT1	ATT2	ATT3	ATT4	PU1	PU2	PU3	PU4	PE1	PE2	PE3	PE4	PI1	PI2	PI3	PI4	Cronbach Alpha
UI1	**1.00**																		0.90
UI2	**0.87**	**1.00**																	
ATT1	0.68	0.61	**1.00**																0.92
ATT2	0.68	0.64	**0.92**	**1.00**															
ATT3	0.53	0.56	**0.72**	**0.73**	**1.00**														
ATT4	0.66	0.59	**0.77**	**0.82**	**0.64**	**1.00**													
PU1	0.65	0.59	0.71	0.72	0.58	0.68	**1.00**												0.89
PU2	0.61	0.59	0.72	0.71	0.63	0.63	**0.82**	**1.00**											
PU3	0.61	0.55	0.63	0.65	0.55	0.57	**0.74**	**0.80**	**1.00**										
PU4	0.52	0.46	0.54	0.48	0.49	0.43	**0.62**	**0.60**	**0.65**	**1.00**									
PE1	0.58	0.49	0.59	0.58	0.47	0.53	0.60	0.51	0.49	0.42	**1.00**								0.97
PE2	0.56	0.47	0.60	0.58	0.45	0.51	0.61	0.50	0.48	0.45	**0.92**	**1.00**							
PE3	0.60	0.49	0.60	0.59	0.45	0.50	0.58	0.49	0.47	0.41	**0.92**	**0.91**	**1.00**						
PE4	0.60	0.51	0.63	0.62	0.50	0.51	0.62	0.52	0.52	0.46	**0.91**	**0.96**	**0.93**	**1.00**					
PI1	-0.35	-0.31	-0.32	-0.32	-0.19	-0.37	-0.26	-0.22	-0.20	-0.19	-0.28	-0.29	-0.26	-0.26	**1.00**				0.79
PI2	-0.32	-0.28	-0.37	-0.35	-0.29	-0.33	-0.26	-0.24	-0.19	-0.22	-0.30	-0.30	-0.24	-0.26	**0.74**	**1.00**			
PI3	-0.18	-0.09	-0.21	-0.16	-0.07	-0.18	-0.17	-0.10	-0.10	-0.13	-0.18	-0.25	-0.23	-0.23	**0.43**	**0.37**	**1.00**		
PI4	-0.12	-0.07	-0.18	-0.15	-0.05	-0.18	-0.23	-0.13	-0.15	-0.16	-0.18	-0.20	-0.19	-0.18	**0.37**	**0.29**	**0.61**	**1.00**	

Legend: BI=Usage Intentions, ATT=Attitude towards using, PU=Perceived Usefulness, PE=Perceived ease of use, PI=Perceived Insecurity
Note: All items were correlated in the expected direction and mostly significant at $p<0.05$ or better (2-tailed).

ACCOUNTING FOR QUALITY: RETURN ON INVESTMENTS IN QUALITY ASSURANCE PROGRAMS

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ABSTRACT

Much has been written in the management literature about the strategic necessity of quality. Although companies have surged forward with quality initiatives, there is little documentation of the value of such programs. ISO 9000 is one of the most widely recognized international quality initiatives, and in fact, its use is so widespread that competitors in certain industries are compelled to adopt. The Baldridge Award is a competition based on adherence to quality standards that was established by Congress and is administered by the US Department of Commerce. It was developed in an attempt to encourage US companies to become more competitive based on a strategy of quality. Since its initial development, over a half million companies have become ISO registered and certified. Most companies register and become certified in hopes of reducing costs from customer complaints, improving customer service, reducing work in process, and increasing their ability to compete. In addition, hundreds of US companies compete annually for the Baldridge Award. The argument arises as to what extent companies are seeing results consistent with the financial rewards expected from adoption these quality initiatives. The purpose of this research is to determine if companies that invest quality initiatives see returns in the form of above average revenues or return on investment.

INTRODUCTION

Much has been written in the management literature about the strategic necessity of quality. Although companies have pressed forward with quality initiatives, and antidotal evidence suggests benefits, there is little documentation of the value of such programs. This paper reports the results of comparisons between common financial accounting measures of performance between adopters of quality initiatives and the adopter's industry average.

During recent decades as competition increased in local and foreign markets, companies searched for ways to maintain a competitive advantage over rivals and delivering a quality product consistently to customers became a key strategic goal for many organizations. Industrial, commercial, and governmental entities established their own quality systems and standards, but to insure equality and to facilitate foreign exchange between manufacturers or service providers and

their suppliers, a standard was needed to effectively manage and control methods used to attain the label "quality assured".

Total Quality Management (TQM), Six Sigma, and ISO 9000 are three, quality improvement initiatives widely recognized internationally. In addition, the Malcolm Baldrige National Quality Award (Baldridge Award) program is generally the most prestigious quality award in the US and is widely credited as a tool that has helped applicants to become more competitive on the basis of quality.

ISO 9000 is one of the most widely recognized quality initiatives internationally, and in fact, its use is so widespread that competitors in certain industries are compelled to adopt. The International Organization of Standardization (ISO), the world's largest developer of standards, began operations in 1947 with one member from each of the 147 countries (ISO, 2003). ISO is not just a standard for quality but rather an organization designed to bridge business practices and consumers needs. It provides companies with guidelines on how to establish systems for managing quality products or services (Barnes, 1998). In 1989, the Registrar Accreditation Board (RAB) was established to provide accreditation services for ISO registrars. Soon after, ISO 9000 was developed to provide a common standard by which a company could manage and measure quality assurance. Later in 1991, RAB and the American National Standards Institute (ANSI) united to establish the American National Accreditation Program for Registrars of Quality Systems. Since its initial development, over a half million companies have become ISO registered and certified. Most companies register and become certified in hopes of reducing costs from customer complaints, improving customer service, reducing work in process, and increasing their ability to compete (RABNet, 2004). The question arises as to the extent customers of ISO certified companies are seeing consistent improvement in the quality of their products.

In the US, the Malcolm Baldrige National Quality Award program was developed to recognize those applicants that have demonstrated the highest commitment to quality. In the early and mid-1980s, many industry and government leaders became convinced that a emphasis on quality was no longer an option for American companies but necessary for doing business in ever expanding, and more demanding, competitive world market. However an emphasis on quality was slow to develop in many American businesses. Moreover, managers did not know how to begin in their quest for quality. In 1987, Congress established the award program to recognize US organizations for their achievements in quality and performance and to raise awareness about the importance of quality and performance excellence as a competitive edge. The National Institute of Standards (NIST), a branch of the US. Department of Commerce, administers Baldridge Award.

CHARACTERISTICS OF AWARD RECIPIENTS

The organizations that apply for the Baldridge Award compete on a comprehensive set of quality criteria. The criteria are revised annually to reflect the latest developments in quality. They

are designed to help organizations use an integrated approach to organizational performance management that results in delivering of improved value to customers, contributing to market success, improving overall organizational effectiveness and capabilities, and providing organizational and personal learning. In 2003, the criteria were built upon the following set of interrelated core value and concepts (NIST, 2003a).

- Visionary leadership
- Customer-driven excellence
- Organizational and personal learning
- Valuing employees and partners
- Agility
- Focus on the future
- Managing for innovation
- Management by fact
- Social responsibility
- Focus on results and creating value
- Systems perspective

To examine the comparative performance of adopters of quality initiatives, it was first necessary to identify a study group of adopters. Although many companies have adopted TQM, ISO 9000, Six Sigma, and a host of other quality initiatives, it is difficult to identify adaptors and difficult to determine the degree of commitment of each company to quality initiatives. Because winners of the Baldridge award have demonstrated a strong commitment to quality, these companies will be used as a surrogate for adopters of quality initiatives in this study.

It is expected that if there is, in fact, quality is a necessary component of success for US businesses, then there should exist a positive relationship between winning the Baldridge Award and company performance. A study conducted by NIST (2003c) found that companies adopting quality management experience an overall improvement in employee relations, higher productivity, greater customers' satisfaction, increased market shares, and improved productivity. A recent NIST study that tracks a hypothetical stock investment in Baldrige Award winners contendss that these companies soundly outperformed the Standard & Poor's 500 by almost three-to-one.

Rajan et al. (1999), supported the hypothesis that long-term investors are rewarded for investing in Baldrige award receipts. An implication of this finding is that an effective TQM strategy can be a driving force behind firm equity value. Specifically, companies that demonstrate their commitment to customer satisfaction by focusing on Baldrige core value and concepts generate solid returns that ultimately benefit shareholders.

Przasnyski and Tai (1999) examined the stock reaction to announcement of the winning the Baldridge Award and the long-term impact of buying, and holding, shares of award-winning

companies. In the first case, the results support the semi-strong efficient market hypothesis. They concluded that the award is expected any advantage is reflected in the market price before the award is announced. In the second part of analysis, a fictitious mutual fund made up of Baldridge Award winners underperformed stocks with similar risk and industry characteristics by a 31% margin. Surprisingly, the award-winning stocks as a group performed much worse than similar industries.

In the early years, three awards were given annually in each of these categories: manufacturing, service, small business. Starting in 1999, awards in the area of education and healthcare were added. From 1988-2002, there were 51 awards given to the US organizations as shown in Table 1. These 51 awards represent 44 organizations because two or more divisions in a firm were given awards. For example, AT&T Network Systems Group Transmission Systems Business Unit got an award in1992, AT&T Universal Card Services got an award in 1992, and AT&T Consumer Communications Services got an award in 1994.

Table 1. Baldridge Award Winners

Year	Categories	Organizations
1988	Small Business	Globe Metallurgical Inc.
	Manufacturing	Westinghouse Electric Corporation Commercial Nuclear Fuel Division
	Manufacturing	Motorola Inc.
1989	Manufacturing	Milliken & Company
	Manufacturing	Xerox Corporation, Business Products & Systems
1990	Manufacturing	Cadillac Motor Car Company
	Manufacturing	IBM Rochester
	Service	Federal Express Corporation
	Small Business	Wallace Co., Inc.
1991	Small Business	Marlow Industries, Inc.
	Manufacturing	Zytec Corporation
	Manufacturing	Solectron Corporation
1992	Manufacturing	AT&T Network Systems Group Transmission Systems Business Unit
	Service	The Ritz-Carlton Hotel Company
1992	Service	AT&T Universal Card Services
	Manufacturing	Texas Instruments Incorporated Defense Systems & Electronics Group
	Small Business	Granite Rock Company

Table 1. Baldridge Award Winners		
Year	Categories	Organizations
1993	Small Business	Ames Rubber Corporation
	Manufacturing	Eastman Chemical Company
1994	Service	AT&T Consumer Communications Services
	Small Business	Wainwright Industries, Inc.
	Service	Verizon Information Services
1995	Manufacturing	Armstrong World Industries, Inc.,
	Manufacturing	Corning Incorporated,
1996	Manufacturing	ADAC Laboratories
	Service	Dana Commercial Credit Corporation
	Small Business	Custom Research Inc.
	Small Business	Trident Precision Manufacturing, Inc.
1997	Manufacturing	3M Dental Products Division
	Manufacturing	Solectron Corporation
	Service	Merrill Lynch Credit Corporation
	Service	Xerox Business Services
1998	Manufacturing	Boeing Airlift and Tanker Programs
	Manufacturing	Solar Turbines Incorporated
	Small Business	Texas Nameplate Company, Inc.
1999	Manufacturing	STMicroelectronics, Inc. - Region Americas
	Service	The Ritz-Carlton Hotel Company, L.L.C.
	Service	BI
	Small Business	Sunny Fresh Foods
2000	Manufacturing	Dana Corporation - Spicer Driveshaft Division
	Manufacturing	KARLEE Company, Inc
	Service	Operations Management International, Inc.
	Small Business	Los Alamos National Bank

Table 1. Baldridge Award Winners		
Year	Categories	Organizations
2001	Manufacturing	Clarke American Checks, Inc.
	Small Business	Pal's Sudden Service
	Education	Pearl River School District
	Education	University of Wisconsin-Stout
	Education	Chugach School District
2002	Manufacturing	Motorola Commercial, Government & Industrial Solutions Sector
	Health Care	SSM Health Care
	Small Business	Branch-Smith Printing Division

Data for this study was obtained from the Standard & Poor's Industry Surveys since they provide return on equity and return on revenue data for publicly traded companies in the US and the same data based on industry averages. The required data years are 1988-2003 since 1988 is the first year that awards were given. However, each issue provides the data for the previous year so the issues for years 1989 through 2003 were used.

From the Table 1, there are 44 organizations that received Baldridge Award. Some winners, however, were not publicly traded companies or were segments of other companies for which no segregate data was available. Eliminating the firms for which there was no data left a sample of seventeen firms.

First, a comparison was conducted between return on revenue of the Baldridge Award winners and their own industries average by the following methodology.

- The Baldridge Award winner's return on revenue was determined in the year of the award (Year 1).
- Industry average return of revenue for each firm was determined in the year of the award.
- The difference between the individual firms return on revenue and the industry average was determined.
- The difference was expressed as a percent of the industry (Tables 2-3)
- The resulting data was subjected to ANOVA statistic analysis (Tables 4-6)
- This process was then repeated for the year following the award (Year 2) and for each subsequent year (Years 3 - 14) for which data was available.

Table 2. The difference as percent of average industries (Return on revenue)

Company	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Motorola, Inc.	1988	-32%	-25%	-12%	-23%	4%	-22%	-16%	-12%	-45%	-56%	NM	-77%	-67%	NM
Westinghouse Electric Corp/CBS	1988	-2%	-1%	-56%	NM	-34%	NM	-87%	NM	NM	NM	NM	-60%	NA	NA
Xerox Corp.	1989	4%	100%	NM	NM	NM	147%	NA	NA	NA	NA	NA	NA	NA	
Federal Express Corp	1990	-90%	NA	-36%	-4%	20%	37%	46%	-1%	-21%	-11%	-32%	25%		
General Motors	1990	-3%	NM	NM	-45%	-26%	12%	-25%	26%	-65%	-29%	-29%	-90%		
IBM	1990	-6%	52%	NM	NM	4%	36%	79%	86%	48%	11%	37%	206%		
Texas Instruments	1992	-63%	-52%	-48%	-39%	NM	-74%	-53%	NA	NA	NA				
AT&T	1992	91%	38%	32%	-96%	78%	-7%	10%	-50%	-40%	NM				
Ritz Carlton/Mariott International	1992	-55%	-73%	-75%	-73%	-71%	-66%	-54%	-52%	-56%	-73%				
Eastman Chemical Co.	1993	91%	5%	10%	10%	-1%	7%	-76%	11%	NM					
Verison/GTE Corp	1994	9%	15%	4%	-13%	6%	14%	41%	-84%						
Armstrong World Industries	1995	-79%	88%	57%	NM	-94%	NA	NA							
Corning Inc.	1995	NM	20%	25%	35%	-4%	-47%	NM							
ADAC Labs	1996	-9%	-37%	-78%	-100%	NA	NA								
Dana Corp	1996	-25%	-15%	-24%	-36%	-48%	NM								
Merrill Lynch	1997	-49%	-73%	-46%	-37%	-87%									
The Boeing Company	1998	-64%	-27%	-19%	6%										

Table 3. The difference as percent of average industries (Return on equity)

Company	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Motorola, Inc.	1988	-16%	28%	36%	25%	48%	39%	20%	28%	-19%	-147%	NM	-132%	-151%	NM
Westinghouse Electric Corp/CBS	1988	7%	6%	-51%	NM	-38%	NM	-86%	NM	NM	NM	NM	-92%	NA	
Xerox Corp.	1989	74%	92%	236%	NM	NM	137%	NA	NA	NA	NA	NA	NA	NA	
Federal Express Corp.	1990	-92%	NA	-95%	-39%	-14%	-4%	12%	-6%	-28%	-21%	-31%	10%		
General Motors	1990	-27%	NM	NM	101%	38%	52%	-12%	77%	-	14%	-12%	-		
IBM	1990	-20%	35%	NM	NM	22%	53%	93%	29%	19%	47%	75%	225%		
Texas Instruments	1992	-3%	15%	27%	43%	NM	-60%	-39%	NA	NA	NA				
AT&T	1992	72%	89%	140%	-95%	115%	-20%	-7%	-70%	-77%	NM				
Ritz Carlton/Mariott International	1992	NA	NA	74%	75%	40%	137%	79%	36%	34%	-12%				
Eastman Chemical Co.	1993	96%	78%	-22%	27%	-23%	8%	-96%	-53%	NM					
Verison/ GTE Corp	1994	45%	50%	55%	-7%	-1%	31%	92%	-85%						
Armstrong World Industries	1995	NM	52%	-44%	NM	-89%	NA	NA							
Corning Inc.	1995	NM	-1%	83%	66%	43%	-58%	NM							
ADAC Labs	1996	-41%	-11%	-65%	-100%	NA	NA								
Dana Corp	1996	61%	49%	6%	-31%	-29%	NM								
Merrill Lynch	1997	11%	-42%	-20%	-16%	-85%									
The Boeing Company	1998	-45%	27%	12%	97%										

As for return on revenue, there are only three years, Year 1, Year 5, and Year 11 that average return on revenue of the Baldridge Award winners was better than the average for their industries. Moreover, the years that were better were better than the average by only a few percentage points. The differences, when subjected to ANOVA did not prove to be statistically significant.

Table 4. Anova and analysis of the results

Return on Revenue					Return on Equity				
Groups	Count	Sum	Average	Variance	Groups	Count	Sum	Average	Variance
Year 0	16	-2.8094	-0.1756	0.2755	Year 0	14	1.2283	0.0877	0.2943
Year 1	15	0.1367	0.0091	0.2765	Year 1	14	4.6514	0.3322	0.1488
Year 2	14	-2.6716	-0.1908	0.1659	Year 2	15	3.7069	0.2471	0.7308
Year 3	13	-4.1496	-0.3192	0.1630	Year 3	13	1.4697	0.1131	0.4409
Year 4	13	-2.5546	-0.1965	0.2269	Year 4	13	0.2783	0.0214	0.3237
Year 5	11	0.3757	0.0342	0.3725	Year 5	11	3.1561	0.2869	0.4386
Year 6	10	-1.3482	-0.1348	0.3135	Year 6	10	0.5529	0.0553	0.4683
Year 7	8	-0.7769	-0.0971	0.2851	Year 7	8	-0.4458	-0.0557	0.3361
Year 8	6	-1.7863	-0.2977	0.1688	Year 8	5	-0.7187	-0.1437	0.1896
Year 9	5	-1.5866	-0.3173	0.1166	Year 9	5	-1.1988	-0.2398	0.5403
Year 10	3	-0.2465	-0.0822	0.1505	Year 10	3	0.3274	0.1091	0.3192
Year 11	5	0.0456	0.0091	1.5228	Year 11	4	0.1175	0.0294	2.5505
Year 12	1	-0.6742	-0.6742	--	Year 12	1	-1.5072	-1.5072	--

Table 5. Anova and analysis of the results

	Source of Variation	SS	df	MS	F	P-value	F crit
Return on Revenue	Between Groups	1.897659	12	0.158138	0.544374	0.880908	1.843745
	Within Groups	31.083	107	0.290495			
	Total	32.98066	119				
Return on Equity	Between Groups	5.240125	12	0.436677	0.95033	0.500831	1.847354
	Within Groups	47.32856	103	0.459501			
	Total	52.56869	115				

A similar process was followed to compare each company with their industry average for return on equity. The company average results are significantly higher than the industry averages for this measure. There are only 4 years that the individual results are worse than the average. These differences were not statistically significant either.

From this result, there is no support for the hypothesis that winners of the Baldridge Award out perform their industry average.

Since some winners were represented by only certain divisions and one department cannot be expected to represent the activities of the whole firm, eight companies were eliminated on the basis that the entire company was not given the award. After deleting those firms, there were nine firms in this study as shown in Table 6 and Table 7. From these, data was analyzed as in the prior section.

Table 6. The difference as percent of average industries after eliminating (Return on revenue)

	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Motorola, Inc.	1988	-32%	-25%	-12%	-23%	4%	-22%	-16%	-12%	-45%	-56%	NM	-77%	-67%	NM
Federal Express Corp.	1990	-90%	NA	-36%	-4%	20%	37%	46%	-1%	-21%	-11%	-32%	25%		
AT&T	1992	91%	38%	32%	-96%	78%	-7%	10%	-50%	-40%					
Eastman Chemical Co.	1993	91%	5%	10%	10%	-1%	7%	-76%	11%						
Verison/GTE Corp	1994	9%	15%	4%	-13%	6%	14%	41%	-84%						
Armstrong World Industries	1995	-79%	88%	57%	NM	-94%	NA	NA							
Corning Inc.	1995	NM	20%	25%	35%	-4%	-47%								
ADAC Labs	1996	-9%	-37%	-78%	-100%	NA	NA								
Merrill Lynch	1997	-49%	-73%	-46%	-37%	-87%									

Table 7. The difference as percent of average industries after eliminating (Return on equity)

BALDRIDGE AWARD

Company	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Motorola, Inc.	1988	-16%	28%	36%	25%	48%	39%	20%	28%	-19%	-147%	NM	-132%	-151%	NM
Federal Express Corp.	1990	-92%	NA	-95%	-39%	-14%	-4%	12%	-6%	-28%	-21%	-31%	10%		
AT&T	1992	72%	89%	140%	-95%	115%	-20%	-7%	-70%	-77%					
Eastman Chemical Co.	1993	96%	78%	-22%	27%	-23%	8%	-96%	-53%						
Verison/GTE Corp	1994	45%	50%	55%	-7%	-1%	31%	92%	-85%						
Armstrong World Industries	1995	NM	52%	-44%	NM	-89%	NA	NA							
Corning Inc.	1995	NM	-1%	83%	66%	43%	-58%								
ADAC Labs	1996	-41%	-11%	-65%	-100%	NA	NA								
Merrill Lynch	1997	11%	-42%	-20%	-16%	-85%									

Table 8. Anova and analysis of the results after eliminating									
Return on Revenue					Return on Equity				
Groups	Count	Sum	Average	Variance	Groups	Count	Sum	Average	Variance
Year 0	8	-0.67412	-0.08426	0.484147	Year 0	7	0.75327	0.10761	0.437011
Year 1	8	0.299833	0.037479	0.241597	Year 1	8	2.4220 83	0.30276	0.207233
Year 2	9	-0.44695	-0.04966	0.180313	Year 2	9	0.675 214	0.075024	0.580745
Year 3	8	-2.28027	-0.28503	0.229907	Year 3	8	-1.38562	-0.1732	0.344437
Year 4	8	-0.78707	-0.09838	0.316579	Year 4	8	-0.05693	-0.00712	0.474056
Year 5	6	-0.17054	-0.02842	0.08667	Year 5	6	-0.04203	-0.00701	0.127394
Year 6	5	0.039653	0.007931	0.247248	Year 6	5	0.208954	0.041791	0.456907
Year 7	5	-1.37674	-0.27535	0.15312	Year 7	5	-1.8627	-0.37254	0.22081
Year 8	3	-1.06366	-0.35455	0.015621	Year 8	3	-1.24691	-0.41564	0.096465
Year 9	2	-0.67178	-0.33589	0.104929	Year 9	2	-1.67781	-0.83891	0.789981
Year10	1	-0.31959	-0.31959	#DIV/0!	Year10	1	-0.30933	-0.30933	#DIV/0!
Year11	2	-0.51372	-0.25686	0.522107	Year11	2	-1.21241	-0.60621	1.010834
Year12	1	-0.67424	-0.67424	#DIV/0!	Year12	1	-1.50716	-1.50716	#DIV/0!

Table 9. Anova and analysis of the results after eliminating							
	Source of Variation	SS	df	MS	F	P-value	F crit
Return on Revenue	Between Groups	1.362486	12	0.113541	0.461433	0.928186	1.939892
	Within Groups	13.04122	53	0.246061			
	Total	14.40371	65				
Return on Equity	Between Groups	6.413708	12	0.534476	1.404405	0.194004	1.943619
	Within Groups	19.78968	52	0.380571			
	Total	26.20339	64				

After eliminating the firms, in which a division won the award, the results show even less evidence that there is an advantage to the award. There are only two years that the company averages are better than their industries for return on revenue. Moreover, when compared with their industry average on return on equity, the number of years that the companies perform better drop to four.

CONCLUSION

The results show that winners' return on revenue and return on equity is below their industry average, but not to an extent that is statistically significant. Moreover, removing the firms where the award was presented to a division caused the results to be less positive. From this study, we cannot show support for the implementation of quality initiatives resulting in better financial performance. This supports the findings of Przasnyski and Tai (2002). Neither study actually addressed the possible reasons for Baldridge Award winners performing below their industry averages. However, Przasnyski and Tai (2002) speculate that it might be because they fail to take on projects with a normally acceptable degree of risk. Another possible explanation is simply that the company has invested a great deal of resources in attaining the Baldridge Award and that this investment has not yielded an above average return for the company. This conclusion would lead to the further conclusion that perhaps there is a level of quality for which customers are unwilling to pay that lies beyond the customers perception of value.

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THE EFFECTS OF DERIVATIVE USAGE ON SECURITY RETURNS

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ABSTRACT

This paper examines whether use of derivative financial instruments affects the security prices of firms which use them. One hundred sixty-three companies across seven industries were studied. Each company traded for three years prior to using any derivatives and continued to be listed and use derivatives for three years afterward. Not all of the industries included in the sample resulted in a significant information content of earnings effect. However, utilities, manufacturing, and finance/insurance did yield statistically significant results. Overall, the evidence suggests that in general investors perceive a difference in the information content of earnings when a firm uses derivatives, and that difference translates into a positive, significant impact on security prices. This is potentially important to the managers of these firms, along with financial analysts and investors.

INTRODUCTION

The use of derivative financial instruments is a contentious issue. Nevertheless, whether one subscribes to Warren Buffet's warning about the danger of derivatives or Allen Greenspan's assertion that derivatives reduce risk (Berry 2003), the fact is that derivatives are popular and growing in use (Bodner, Hayt, Marston, & Smithson 1995). Therefore, given the place of derivatives in the financial market place, it seems reasonable to ask what, if any, information content they provide.

Many studies have examined the risk associated with derivative usage (Cornfield 1996, Guay 1999, Kuprianov 1995, Newman 1994). In general these studies note that firms use derivatives as a hedge against exposure, but find that compared to firms which do not use derivatives, there does not appear to be any measurable difference in risk (Hentschel & Kothari 2001). This would lead one to suspect that no market impact from the use of derivative instruments would be found.

In addition to risk, other researchers have examined the role of derivatives in an earnings management context. Jan Barton (2001,) examined this issue and presented evidence "consistent with managers using derivatives and discretionary accruals as partial substitutes for smoothing

earnings." An implication of this finding is that derivatives in fact should have a market impact through their effect on corporate earnings.

An issue for further research deals with the wide variety of derivative structures in use today. For example, weather derivatives have been developed in response to the fact that utility companies find that power demand varies depending on the weather conditions. Similarly, credit derivatives have found a home with some bankers and manufactures (e.g. Siemens). Ultimately, derivative usage depends on the variety of product characteristics available and the industry risk profile to be addressed (Foote 2003). Based on industry need and product availability, we could reasonably expect to find some impact on the information content of earnings within particular industries. However, we also would expect that this effect to vary between industries, as well.

Given the use, nature, and debates about derivative financial instruments, and based on the research undertaken to date, studies, examining the impact of derivatives on securities prices, their purported risky nature, and the variety of derivative financial instrument available in the market place, are important to our understanding, analyses, and use of financial statement data.

HYPOTHESIS DEVELOPMENT

As previously noted, recent studies of derivatives do not directly link derivative usage to information content of earnings and security returns. However, if a correlation is established, evidence may suggest that firms could directly or indirectly affect the price of their stock in the capital markets through the use of derivatives.

As a test, earnings are analyzed for incremental information content relative to security prices for firms during periods when derivatives are used versus periods when these same firms did not utilize derivatives. Absent extraneous factors (i.e., change in corporate form, change in management, change in ownership, etc.) there should not be a significant difference in information content of earnings between the periods assessed for these firms. If, however, there exists a significant difference between these periods, it might be concluded that the presence of derivatives has a positive or negative effect on security prices. Thus, our first hypothesis tests for the existence of market reaction of derivatives. The null hypothesis tested is:

H1:	Earnings information content prior to derivative introduction is not significantly different from earnings information content after derivative introduction.

Introducing an industry-specific control allows for a test of the relationship of derivatives to earnings and security prices by industry. If derivatives as a whole contain no incremental earnings information, we should see consistency across industries with respect to their acceptance in the capital markets. If, however, derivative usage is perceived to be positive or negative in certain industries, that effect could also be captured. The null hypothesis tested is:

H2: Earnings information content prior to derivative introduction is not significantly different from earnings information content after derivative introduction when evaluated by industry.

RESEARCH DESIGN

The sample consists of security returns during the period 1990-2002. In order to qualify for sample selection, each firm must have had at least three years of public trading prior to utilizing derivatives. In addition, each firm must have had a minimum of three years of public trading during the time in which they were utilizing derivatives. In addition, security price data must be available from the Center for Research on Security Prices (CRSP), and earnings data available on Compustat. A total of 163 firms were selected for use in the study, representing seven different industries. Table 1 provides the summary of the sample used in the study

Table 1: Study Sample Summary Number of Firms

Original sample	290
Firms removed for not meeting 3 year prior rule	19
Firms removed for not meeting 3 year post rule	66
Firms removed for not meeting CRSP rule	28
Firms removed for not meeting Compustat rule	14
Final overall sample	163

TEST OF HYPOTHESIS 1

The purpose of this test is to assess the information content of earnings relative to security prices before a firm uses derivatives versus the period during which the firm employs derivatives. The following model is used to evaluate information content:

$$CAR_{it} = a+b_1UE_{it}+b_2D1_{it}UE_{it}+b_3MB_{it}+b_4B_{it}+b_5MV_{it}+e_{it}$$

Where:
- CAR_{it} = Cumulative abnormal return firm i, time t
- a = Intercept term
- UE_{it} = Unexpected earnings for firm i, time t
- $D1_{it}$ = Dummy variable, 0 for periods prior to the use of derivatives, 1 after the use of derivatives
- MB_{it} = Market to book value of equity as proxy for growth and persistence
- B_{it} = Market model slope coefficient as proxy for systematic risk
- MV_{it} = Market value of equity as proxy for firm size
- e_{it} = error term for firm i, time t

The coefficient "a" measures the intercept. The coefficient b_1 is the earnings response coefficient (ERC) for all firms in the sample (during both periods of use or non-use of derivatives).

The coefficient b_2 represents the incremental ERC for derivative use periods. Therefore, b_2 captures the difference in the information content for firms during the use and non-use of derivatives. The coefficients b_3, b_4, and b_5, are contributions to the ERC for all firms in the sample. To investigate the effects of the information content of derivative versus non-derivative use on ERC, there must be some control for variables shown by prior studies to be determinants of ERC. For this reason, the variables represented by coefficients b_3 through b_5 are included in the study.

Unexpected earnings (UE_i) is measured as the difference between the actual earnings (EA_i) and security market participants' expectations for earnings proxied by consensus analyst following as per Investment Brokers Estimate Service (IBES) (EX_i). The unexpected earnings are scaled by the firm's stock price (P_i) 180 days prior to the forecast:

$$UE_i = (EA_i - EX_i) / P_i$$

For each cross sectional sample firm, an abnormal return (AR_{it}) is generated for event days –1, 0, and +1, where day 0 is defined as the date earnings release identified by the Dow Jones News Retrieval Service (DJNRS). The DJNRS is also reviewed to insure that confounding factors, such as change of corporate ownership or form, or management change, are minimized by excluding any firms which contain these events. The market model is utilized along with the CRSP equally-weighted market index and regression parameters are estimated between –290 and –91. Abnormal returns are then summed to calculate a cumulative abnormal return (CAR_{it}). Hypotheses 1 is tested by examining the coefficient associated with the unexpected earnings of firms during periods of derivative usage, b_2. There are two possible conclusions; the usage of derivatives may be noisy, or interpreted as being less beneficial to investors which in this event, $b_2 \leq 0$, or it will possess an information-enhancing signal to the investor, which will result in $b_2 > 0$.

TEST OF HYPOTHESIS 2

The purpose of this test is to assess any incremental information content of earnings relative to security prices for firms that use derivatives by industry. Knowledge of this information could be of potential benefit to investors. The model construct is similar to that previously run for all 163 firms in the sample, however, 7 independent regressions are run, one for each industry represented in the sample. Table 2 summarizes the industries and number of firms represented by each industry.

RESULTS

Hypothesis 1 tests information content of earnings during periods of derivative usage relative to the information content of earnings during periods of non-usage. Table 3 reports results of using the sample of 163 firms. As indicated in the table, the coefficient representing the variable

which is the incremental ERC for derivative-use periods (b_2), has a value of .17 with a p-value of .01. The coefficient representing the overall ERC for all firms (b_1), has a value of .09 with a p-value of .10. All other control variables are not significant at conventional levels.

Table 2 Study Sample Summary by Industry

Industry	Number of Firms
Utilities	28
Manufacturing	40
Retail Trade	16
Finance/Insurance	39
Healthcare	18
Transportation	12
Construction	10
Total	163

Table 3 Test of Hypothesis One

Model: $CAR_{it} = a+b_1UE_{it}+b_2D1_{it}UE_{it}+b_3MB_{it}+b_4B_{it}+b_5MV_{it}+e_{it}$

Table represents data for 163 firms

	Coefficients (t-statistic)						
n	a	b_1	b_2	b_3	b_4	b_5	Adj. R^2
163	.23	.09	.17	.12	-.06	.02	.082
	(.88)	(1.65)[a]	(2.42)[b]	(.11)	(-.32)	(.28)	

[a] Significant at the .10 level (one-sided test). [b] Significant at the .01 level (one-sided test).

CAR_{it} = Cumulative abnormal return firm i, time t
a = Intercept term
UE_{it} = Unexpected earnings for firm i, time t
$D1_{it}$ = Dummy variable, 0 for periods prior to use of derivative, 1 after the use of derivatives
MB_{it} = Market to book value of equity as proxy for growth and persistence
B_{it} = Market model slope coefficient as proxy for systematic risk
MV_{it} = Market value of equity as proxy for firm size
e_{it} = error term for firm i, time t

These findings indicate that not only do earnings of firms which use derivatives contain information content, they appear to be a bit more robust in their information content qualities. In addition since the coefficient assessing the information content (b_2) is positive, the use of derivatives by firms could be viewed as an information-enhancing signal to investors. Results, therefore, suggest rejection of the hypothesis that information content of earnings during periods of non-use of derivatives is not significantly different from information content of earnings during periods of use of derivatives.

Hypothesis 2 tests information content of earnings concerning derivative use and non-use among each of the seven industries in the sample of 163 firms. Table 4 reports the results.

Table 4: Test of Hypothesis Two

Model: $CAR_{it} = a+b_1UE_{it}+b_2D1_{it}UE_{it}+b_3MB_{it}+b_4B_{it}+b_5MV_{it}+e_{it}$

Table represents data for 163 firms and 7 industries

		Coefficients (t-statistic)						
Industry	n	a	b_1	b_2	b_3	b_4	b_5	Adj. R^2
Utilities	28	.07	.11	.20	.08	-.03	.01	.091
		(.72)	(1.73)[a]	(2.62)[b]	(.15)	(-.24)	(.19)	
Manufacturing	40	.05	.13	.28	.05	-.06	.03	.087
		(.65)	(1.63)[a]	(2.49)[b]	(.18)	(-.21)	(.17)	
Retail Trade	16	.30	.08	.10	.13	-.05	.02	.062
		(.81)	(1.65)[a]	(1.59)[a]	(.16)	(-.19)	(.18)	
Finance/Insurance	39	.25	.10	.15	.07	-.03	.02	.095
		(.93)	(1.58)[a]	(2.64)[b]	(.23)	(-.21)	(.15)	
Healthcare	18	.30	.11	.14	.09	-.05	.01	.059
		(.86)	(1.62)[a]	(1.66)[a]	(.27)	(-.14)	(.16)	
Transportation	12	.22	.09	.12	.08	-.07	.03	.073
		(.92)	(1.61)[a]	(1.70)[a]	(.30)	(-.10)	(.17)	
Construction	10	.19	.12	.14	.10	-.05	.01	.077
		(.83)	(1.58)[a]	(1.64)[a]	(.25)	(-.09)	(.14)	

[a] Significant at the .10 level (one-sided test). [b] Significant at the .01 level (one-sided test).

CAR_{it} = Cumulative abnormal return firm i, time t

a = Intercept term

UE_{it} = Unexpected earnings for firm i, time t

$D1_{it}$ = Dummy variable, 0 for periods prior to use of derivative, 1 after the use of derivatives

MB_{it} = Market to book value of equity as proxy for growth and persistence

B_{it} = Market model slope coefficient as proxy for systematic risk

MV_{it} = Market value of equity as proxy for firm size

e_{it} = error term for firm i, time t

As indicated in the table, the coefficient representing the variable which is the incremental ERC for derivative-use periods (b_2), has a value of that is significantly different in industries comprising utilities, manufacturers, and finance/insurance firms. These industries have a p-value of .01 for information content of earnings during derivative-use periods. During periods of non-derivative use, the p value in these industries is .10. The coefficient b_2 is positive in each of these

industries as well, implying information-enhancing qualities of the information. All other industries do not indicate significant difference between periods of derivative use and non-use. This could be confounded by smaller samples of firms in these other industries.

CONCLUSIONS

This study provides empirical evidence regarding the information content of derivatives. Results indicate that, in general, investors perceive a difference in the information content of earnings when a firm uses derivatives. That difference translates as a positive, more highly significant impact on security prices. Specifically, these results are found to hold in industries comprised of utilities, manufacturers, and finance/insurance firms. This knowledge is of assistance to managers, particularly in the industries cited, along with financial analysts and investors.

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