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The Relationship between Accounting and Market Measures of Firm Financial Performance: How Strong Is It?

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The construct of firm performance is of central importance to management research because explaining variation in performance is an enduring theme in the study of organizations (e.g., Hoopes *et al.*, 2003). Although firm performance has been recently proposed as a multidimensional construct that consists of many different aspects such as operational effectiveness, corporate reputation, and organizational survival (Richard *et al.*, 2009), one of the most extensively studied areas is its financial component, the fulfillment of the economic goals of the firm (Barney, 2002; Venkatraman and Ramanujam, 1986). To assess the financial aspect of firm performance (i.e., financial performance), organizational researchers generally use either accounting-based measures of profitability such as return on assets (ROA), return on sales (ROS), and return on equity (ROE), or stock market-based measures such as Tobin's Q and market return (Combs *et al.*, 2005; Hoskisson *et al.*, 1999; Hult *et al.*, 2008).

Although both accounting-based and market-based measures are widely accepted as valid indicators of firm financial performance, there is an ongoing debate about their relationship in management research, especially regarding how closely they are related (Chakravarthy, 1986; Combs *et al.*, 2005; Keats, 1988; Murphy *et al.*, 1996; Richard *et al.*, 2009; Rowe and Morrow, 1999). Theoretically, researchers generally conceptualize accounting measures as reflections of past or short-term financial performance, and market measures as reflections of future or long-term financial performance (Hoskisson *et al.*, 1994; Keats and Hitt, 1988). However, there is no consensus about the relationship between past/short-term performance and future/long-term performance. In an oft-cited article that conceptualizes both accounting and market measures as indicators of the financial aspect of firm performance, Venkatraman and Ramanujam (1986) suggest

that these measures can be unrelated because of the conflicts between achieving short-term and long-term economic goals. Among those who expect accounting and market measures to be related, there is a debate about whether their relationship is sufficiently high so that they can be treated as equivalent, interchangeable measures of firm financial performance (Combs *et al.*, 2005; Richard *et al.*, 2009).

Empirical findings are mixed about the relationship between accounting and market measures of financial performance. While some studies report a positive relationship (Hoskisson *et al.*, 1994; McGuire and Matta, 2003), others report a negative relationship (Keats and Hitt, 1988; Nelson, 2003) or no relationship at all (Chakravarthy, 1986; Hillman, 2005). In the few studies using factor analysis and structural equation methods, the findings are also mixed. Rowe and Morrow (1999) report that the first-order factors of accounting profitability and market performance are significantly correlated with each other and load significantly on a second-order factor. In contrast, Keats (1988) and Combs *et al.* (2005) find the empirical overlap between accounting profitability and market performance to be relatively small and that they do not converge into a higher order factor.

This ongoing debate about the relationship between accounting and market measures has important implications for organizational research because it concerns whether firm financial performance can be treated as a single unidimensional construct (Combs *et al.*, 2005; Keats, 1988; Richard *et al.*, 2009; Rowe and Morrow, 1999)[1]. If accounting and market measures are highly correlated, that is, they demonstrate sufficient convergent validity (Nunnally and Berstein, 1996; Schwab, 1999), it suggests that these measures can be treated as equivalent, interchangeable indicators of firm financial performance, a necessary condition to be considered a single unidimensional construct. In this situation, theories of firm financial performance that find support in accounting measures should also find support in market measures, and vice versa. Researchers can also increase measurement reliability by using both of them to create a composite measure of firm financial performance (Rowe and Morrow, 1999; Schwab, 1999). On the other hand, if accounting and market measures are not correlated or are correlated only at a low level, it suggests that firm financial performance is not a single unidimensional construct and that accounting and market measures capture its distinct dimensions. In this situation, researchers should attend to the differences between accounting profitability and market performance, and develop separate theories to explain their variation.

When findings about the relationship between two variables are mixed, scholars often resort to meta-analysis to detect their relationship at the population level (Hunter and Schmidt, 1990). Meta-analysis is a statistical technique that generates an estimate of the relationship between two variables by aggregating empirical results across individual studies. It is widely used in micro-organizational research (Schmidt, 2008) and has been increasingly used in strategy research (Combs *et al.*, 2005; Dalton and Dalton, 2008).

Although meta-analysis can correct for various statistical artifacts resulting from the samples used in individual studies, its reliance on the results reported in these studies has some important limitations. First, these studies may not all report the information needed. Second, because there is a risk that a study may not survive the review process if it reports no support for the theory under investigation with either accounting or market measures of firm financial performance, an estimate derived from a meta-analysis of published studies suffers from a selection bias (Orwin and Cordray, 1985). Lastly, estimates derived from a meta-analysis of previous studies can be either distorted by effects obtained from multiple publications using the same dataset (Wood, 2008) or biased toward effects in over-sampled companies, such as the *S&P* 500 or *Fortune 500*

firms.

To contribute to the debate concerning appropriate performance measurement, this paper presents a more comprehensive analysis of the relationship between accounting profitability and market performance and asks the question whether or not accounting and market measures of performance are highly correlated enough at either the individual industry or the population level to be used as interchangeable indicators of performance. Accordingly, this paper also investigates whether or not certain industries show a stronger relationship between these measures than others. Instead of conducting a meta-analysis using existing studies, this study employs data from all the publically traded firms in the COMPUSTAT database from 1961 to 2008 to examine the relationship of market-based and accounting measures both across-industry and within each industry at the two-digit and the four-digit standard industry code (SIC) level.

In the cross-industry analysis, the results indicate that, although measures of accounting profitability and market performance are positively correlated, their covariance is less than 10% and thus provides no evidence of convergence (Kline, 1998). The findings also suggest that measures of accounting profitability and market performance do not load on a higher-order factor. On the basis of these findings, the results indicate that accounting profitability and market performance represent distinct dimensions of firm financial performance. Because of the centrality of firm financial performance in organizational research and the extensive use of accounting profitability and market performance measures as its indicators, this study concludes with several recommendations for future research on the basis of these findings.

LITERATURE REVIEW

Financial performance, which assesses the fulfillment of the firm's economic goals, has long been a central focus in management research on firm performance (Barney, 2002; Combs *et al.*, 2005; Hult *et al.*, 2008; Richard *et al.*, 2009). Because of the influence of industrial organization economics (Porter, 1981), researchers in the early years primarily used accounting-based profitability ratios, such as ROA, ROE, and ROS, as measures of financial performance (Hoskisson *et al.*, 1999). Starting in the mid-1980s, finance theories and market-based performance measures were introduced into management research (e.g., Bromiley, 1990; Lubatkin and Shrieves, 1986). With the rise of shareholder activism during the late 1980s and the early 1990s, many corporations started to adopt shareholder value maximization as their stated objective and use it in executive compensation (Useem, 1993). This change promoted the adoption of market-based performance measures in management research, and the use of market-based performance measures has been increasing since the early 1990s (Hoskisson *et al.*, 1999).

Debate about the Relative Strengths of Accounting and Market Measures

The use of accounting and market measures as indicators of firm financial performance has been the subject of numerous debates over the past two decades (Chakravarthy, 1986; Combs *et al.*, 2005; Johnson *et al.*, 1985; Keats, 1988; Lubatkin and Shrieves, 1986; Richard *et al.*, 2009). In the beginning, researchers focused on the relative strengths and weaknesses of each type of measure. When finance theories and market measures were first introduced into management research, some scholars cautioned about their use by calling for attention to the underlying assumption of stock

market efficiency. For example, Bromiley (1990) points out that finance theories are generally developed on the assumption of market efficiency, which views stock price as representing the firm's fundamental value (i.e., the present value of expected future dividends). Because the assumption of market efficiency has been questioned by some eminent finance scholars (e.g., Tobin, 1984), Bromiley (1990) cautions management researchers to be extremely careful in their use and interpretation of market performance data. Even if the assumption of market efficiency holds, Bettis (1983) argues that a firm's stock price does not necessarily reflect its fundamental value because it is influenced by the information managers choose to disclose to investors.

To justify and promote the use of market-based performance measures, its proponents emphasize their advantages over accounting measures. For example, Lubatkin and Shrieves (1986) argue that market-based performance measures incorporate all relevant information and thus, unlike accounting measures, they are not limited to a single aspect of firm performance. Some researchers even explicitly take the shareholder perspective and propose that maximization of shareholder wealth is the ultimate criterion for the fulfillment of the firm's economic goals (e.g., Johnson *et al.*, 1985). In addition, accounting measures have been criticized for being subject to managerial manipulation and distortions due to depreciation policies, inventory valuation and treatment of certain revenue and expenditure items, differences in methods of consolidating accounts, and outright lying and fraud (Chakravarthy, 1986).

Recognizing that neither accounting nor market measures are perfect, many management researchers accept them both as valid measures of firm financial performance (Hoskisson *et al.*, 1999). The focus of the critiques and debates subsequently shifts to the relationship between them and the implications for the conception of firm financial performance (e.g., Combs *et al.*, 2005; Keats, 1988; Murphy *et al.*, 1996; Rowe and Morrow, 1999). Conceptually, researchers generally treat accounting profitability as measures of past or short-term financial performance and market performance as measures of future or long-term performance (Hoskisson *et al.*, 1994; Keats, 1988). However, there are opposing views about their empirical relationship and whether they are equivalent measures or capture distinct dimensions of firm financial performance.

Debate about the Convergent Validity between Accounting and Market Measures

Although a few researchers (e.g., Chakravarthy, 1986) suggest that accounting and market measures are unrelated because of the conflicts between achieving short-term and long-term economic goals, many researchers expect them to be correlated, either positively or negatively. Some suggest a positive relationship on the basis of the relative stability of firm financial performance and because past performance is a good predictor of future performance (e.g., Hoskisson *et al.*, 1994; Jacobsen, 1988). Others imply a negative relationship by suggesting that investors do not expect either high performance or low performance to last long (e.g., Keats and Hitt, 1988). Specifically, because investors expect that high performance will decrease in the future and low performance tends to bounce back, Keats and Hitt (1988) suggest that market measures, because they are expectations of future performance, are negatively related to accounting measures.

Among those who expect accounting and market measures to be correlated, there is an ongoing debate about whether their relationship is sufficient so that researchers can treat them as equivalent measures of a single, unidimensional construct of firm financial performance. Keats (1988) proposes that because accounting measures reflects historical, operation-oriented information and market measures reflect anticipatory, market-

oriented information, they represent two possible dimensions of financial performance that are related, yet distinct. In a structural equation analysis using data from 110 *Fortune 500* companies, Keats (1988) finds that measures of accounting profitability load on one factor and measures of market performance load on another factor. Moreover, she finds that although the standardized path coefficient relating accounting profitability to market performance is statistically significant (ξ = -0.23), these two factors do not converge in a single factor model. On the basis of these results, Keats (1988) concludes that accounting profitability and market performance do not demonstrate sufficient convergent validity and thus reflect distinct dimensions of firm financial performance.

Combs *et al.* (2005) also propose that accounting returns and market measures represent two distinct dimensions of firm performance. In their meta-analysis of prior studies published in the *SMJ*, these authors find that accounting returns are highly correlated with each other ($r >= 0.6$), but only moderately correlated with measures of market performance ($r\sim=0.3$). Moreover, in their confirmatory factor analysis, Combs *et al.* (2005) find further support that accounting returns and market returns reflect two distinct dimensions of firm financial performance.

In contrast, Rowe and Morrow (1999) propose that although accounting and market measures are distinct, they may be heavily dominated by a higher order factor that can be described as a single underlying construct of firm financial performance. Using data from a sample of large companies ranked in the *Fortune* reputation survey from 1982 to 1992, these authors find evidence that accounting and market performance load significantly on a single second-order factor. They thus conclude that the construct of firm financial performance "has a higher order structure" and accounting and market measures "are distinct yet similar" in that they both provide insights into this higher order factor.

The debate about the relationship between accounting and market measures has important implications for the conception and measurement of firm financial performance (Combs *et al.*, 2005; Keats, 1988; Rowe and Morrow, 1999). If accounting and market measures are correlated at a high level (e.g., $|r| > 0.50$, Cohen and Cohen, 1983), it suggests that these measures can be treated as equivalent indicators of a unidimensional construct of financial performance. Because of their respective limitations (Bromiley, 1990; Chakravarthy, 1986; Lubatkin and Shrieves, 1986), researchers can use them both to create a composite measure to better assess firm financial performance (Rowe and Morrow, 1999; Schwab, 1999). Showing that the two measures correlate with one another would suggest that the measures can be used interchangeably in studies and help connect strategy's use of the term "performance" with other fields, such as accounting and economics. If accounting and market measures *are not* correlated or are correlated only at a relatively low level (e.g., $|r| < 0.30$, Cohen and Cohen, 1983), firm financial performance may not be a single construct of which accounting and market measures capture distinct dimensions. Instead, studies can only address one type of performance with each measure and the term "performance" in strategy research will need to be more carefully considered (Combs *et al.*, 2005; Keats, 1988). Researchers will need to attend to the differences between accounting profitability and market performance and develop separate theories to explain their respective variation.

METHODS

The sample includes all publicly traded firms listed in the U.S. that conform to the

U.S. Generally Accepted Accounting Principles (GAAP), excluding foreign firms that were listed through American Depositary Receipt (ADR). Data were obtained from the COMPUSTAT database over a 48-year period from 1961 to 2008. The initial sample excluded observations with missing information on assets, sales, net income, and stock market performance information. The sample was also trimmed at the 5th and 95th percentile of each performance variable due to extensive outliers. Although this treatment reduces the sample size, it is necessary to minimize the influence of outliers on the results. The final sample consists of 11,809 firms and 122,709 firm-year observations with complete information for at least two years.

Measures

Accounting profitability was measured with four of the most extensively used measures of accounting profitability for each firm-year: ROA, ROE, ROS, and ROI (Combs *et al.*, 2005). ROA was calculated as net income divided by total assets plus depreciation, ROE as net income divided by common equity, ROS as net income divided by total sales, and ROI as net income divided by total invested capital. Following the definitions outlined in the COMPUSTAT manuals, all ratios used net income before extraordinary items in the calculations.

Stock market performance was measured using market-to-book value ratio (MTB) and market return, both of which are most widely used measures of stock market performance in management research. According to Combs *et al.*'s (2005) survey, they each accounted for 38% of the times when market measures were used as indicators of firm financial performance in the articles published in the *SMJ* from 1980 to 2004. These measures were used in separate analysis and obtained essentially the same results. For the purpose of parsimony, only the results employing MTB as the market measure are reported. Additionally, prior research suggests that MTB might be the measure most likely to show high correlations with measures of accounting performance (Richard *et al.*, 2009). MTB was calculated as the ratio of the firm's total market value divided by its total asset value.

Statistical Analysis

This study took two approaches to investigate the relationship between accounting profitability and market performance across industries for the entire sample. The first approach focuses on their correlation coefficients. A correlation coefficient reveals the direction and the covariance between two variables. Although correlations are inadequate in testing causal relationships because they lack statistical control for moderators, in examining the convergence between measures of the same construct, correlation coefficients are often used as an important indicator (Kline, 1998). Because market performance is assumed to reflect future performance (Hoskisson *et al.*, 1994), this study presents not only MTB's correlations with measures of accounting profitability during the same fiscal year, but also its correlations with measures of accounting profitability during the following fiscal year.

In the second approach, this study presents firm fixed-effects regression analyses with a set of fiscal year dummy variables to control for any potential influence of time on the relationship between accounting profitability and market performance[2]. Because market performance is often assumed to incorporate all relevant information and reflect

future performance (Lubatkin and Shrieves, 1986), it should be able to predict future accounting profitability. Moreover, because information about accounting profitability is not available until the firm releases it after the end of the fiscal year, market performance at the end of the fiscal year should also be indicative of accounting profitability of the same fiscal year. Finance research actually shows that equity market variables lead accounting variables (Fama, 1981). Thus, MTB at time t was used as the independent variable and each measure of accounting profitability at t and $t+1$ as the dependent variable in the initial regression analysis.

These data violated some basic requirements of OLS regression. Wooldridge's test (Wooldridge, 2002) suggested that the panel data have an autocorrelated structure ($F = 3{,}228.72$, $p < 0.001$). Further analysis using Greene's modified Wald-test (Greene, 2000) also indicates variance differences across panels, a condition known as groupwise heteroskedasticity ($\chi^2 = 4.8\text{x}10^6$, $p < 0.001$).

Two techniques were employed to handle these violations. First, autocorrelation was addressed by including a one-year lag of the dependent variable, a common correction for first-order autocorrelations (Greene, 2000). A separate Arellano-Bond test of average autocovariance shows no evidence that these data suffer from second-order or higher order autocorrelations ($Z = 1.32$, *n.s.*). To adjust for heteroskedaticity, robust standard errors were employed in the regression models (Greene, 2000). Additionally, half of the analysis was within industry, so each industry would have its own variance estimate and a separate regression. Thus, both violations of OLS assumptions are addressed using two techniques.

To examine whether there are certain industries in which the relationship between accounting profitability and market performance is strong enough that they can be treated as equivalent, interchangeable indicators of firm financial performance, firms were separated into individual industries using the SIC code at both the coarse two-digit designation and the more tightly defined four-digit level. Firm fixed-effects regression analyses were conducted for each subsample (industry) and the summary results of each individual regression tabulated to summarize the relationship for the four measures of accounting profitability and MTB.

RESULTS

Table I reports the means, standard deviations, and correlation coefficients for the entire sample. The results show that, although the correlations between MTB and all the measures of accounting profitability are statistically significant, they are rather small when considered in the context of convergent validity. The highest correlation is between MTB_t and ROA_t, which is 0.18, indicating a covariance of only 3%. To be considered as evidence of convergence between measures of the same construct, their covariance should be significantly different from zero and sufficiently large (Campbell and Fiske, 1959). Although what is considered to be sufficiently large is subjective, Kline (1998) suggests that a covariance of less than 10%, which means a correlation of less than 0.30, should not be considered as evidence of convergence. Using this criterion, results in Table I show no evidence of convergence between MTB and the measures of accounting profitability across industries. In contrast, the correlations between the four measures of accounting profitability during the same year are all above 0.65 (i.e., a covariance of at least 42%), indicating strong evidence of convergent validity between these measures (Kline, 1998).

Table I
Descriptive Statistics and Correlations of Variables for All the Sampled Firms, 1961-2008[A]

	Variables	Mean	S.D.	1	2	3	4	5	6	7	8
1	MTB_t	0.81	0.74								
2	ROA_t	3.11	7.02	0.18							
3	ROE_t	7.02	15.29	0.08	0.86						
4	ROI_t	5.19	10.98	0.13	0.94	0.91					
5	ROS_t	3.28	11.59	-0.03	0.71	0.66	0.68				
6	ROA_{t+1}	2.74	7.47	0.13	0.55	0.44	0.50	0.41			
7	ROE_{t+1}	5.92	17.16	0.06	0.44	0.47	0.46	0.37	0.85		
8	ROI_{t+1}	4.51	11.91	0.09	0.51	0.46	0.52	0.40	0.94	0.91	
9	ROS_{t+1}	2.87	12.05	-0.04	0.40	0.36	0.39	0.59	0.72	0.66	0.69

Pooled cross-sectional, time-series data. N = 122,709.
[a]All correlations are significant at $P < 0.05$

Table II
Firm Fixed-Effects Regression Analyses of
Different Measures of Accounting Profitability on MTB for the Entire Sample[A]

	ROA_t	ROE_t	ROI_t	ROS_t	ROA_{t+1}	ROE_{t+1}	ROI_{t+1}	ROS_{t+1}
MTB_t	3.32**	6.08**	4.90**	2.85**	1.75**	3.51**	2.77**	1.63**
	(0.06)	(0.10)	(0.09)	(0.09)	(0.04)	(0.10)	(0.06)	(0.06)
Lagged DV	0.21**	0.18**	0.20**	0.20**	0.23**	0.22**	0.22**	0.24**
	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
F	237.47**	141.70**	320.04**	118.29**	296.25**	209.58**	259.27**	208.43**
R^2	0.25	0.15	0.19	0.22	0.26	0.18	0.21	0.29
ΔR^2	0.06	0.04	0.06	0.03	0.02	0.01	0.02	0.01

**$p < 0.001$
[a]Year dummy variables are included in the analyses, but their coefficients are not reported. Robust standard errors are in the parenthesis.

Table II reports the results of firm fixed-effects regression analyses for the entire sample, with MTB as the independent variable and accounting profitability as the dependent variable. Year effects are not reported to save space. The results show the coefficients for MTB are positive and statistically significant in all models ($p < 0.001$), indicating that MTB has a positive relationship with accounting profitability of both the same year and the following year. Turning to the effect size, the covariance between MTB and measures of accounting profitability, after controlling for autocorrelations and time effects, is indicated by the changes in the R^2, which are in the range of 0.01 to 0.07. The highest is between MTB_t and ROA_t, which is 0.07. Although it is larger than the 4% covariance suggested by the correlation reported in Table I, it is still below the commonly accepted 10% threshold and thus should not be considered as evidence of convergence (Kline, 1998). Therefore, the regression results are consistent with the correlation analysis, showing no evidence of convergence between the four most extensively used measures of accounting profitability (ROA, ROE, ROI, and ROS) and one of the most extensively used measures of market performance (MTB).

Table III reports the distribution of within-industry correlations between MTB and the measures of accounting profitability at both the two-digit SIC level and the

Table III
Distributions of Significant Within-Industry Correlations between MTB and Different Measures of Accounting Profitability

A. Among the 72 industries at the Two-Digit SIC Level

	[-1, -0.5)	[-0.5, -0.3)	[-0.3, 0)	[0, 0.3]	(0.3, 0.5]	(0.5, 1]	Total
ROA_t	0	0	1	21	29	11	62
ROE_t	0	0	1	35	15	2	53
ROI_t	0	0	0	22	26	6	54
ROS_t	0	0	3	27	23	4	57
ROA_{t+1}	0	0	2	28	24	6	60
ROE_{t+1}	0	0	3	43	6	2	54
ROI_{t+1}	0	0	2	32	18	4	56
ROS_{t+1}	0	0	4	27	20	2	53

B. Among the 440 Industries at the Four-Digit SIC Level

	[-1, -0.5)	[-0.5, -0.3)	[-0.3, 0)	[0, 0.3]	(0.3, 0.5]	(0.5, 0.1]	Total
ROA_t	1	2	6	77	155	94	335
ROE_t	2	0	10	116	129	28	285
ROI_t	1	3	6	88	158	58	314
ROS_t	2	4	11	80	140	71	308
ROA_{t+1}	2	1	6	95	144	51	299
ROE_{t+1}	1	1	12	144	69	18	245
ROI_{t+1}	1	2	9	112	127	30	281
ROS_{t+1}	3	6	9	78	127	47	270

four-digit SIC level. Because the correlations must be significantly different from zero to be considered as evidence of convergence between measures of the same construct (Campbell and Fiske, 1959), the results include only correlations that are significant at $p < 0.05$. The correlations are presented in six categories: [-1, -0.5), [-0.5, -0.3), [-0.3, 0), [0, 0.3], (0.3, 0.5], and (0.5, 1][3]. These categories correspond to three conventionally accepted levels of correlations (e.g., Cohen and Cohen, 1983; Kline, 1998): low ($|r| <= 0.3$), moderate ($0.3 < |r| <= 0.5$), and high ($|r| > 0.5$).

Panel A of Table III reports the distribution of significant within-industry correlations among the 72 industries at the two-digit SIC level. The last column indicates the total number of industries in which the correlations between MTB_t and each of the accounting measures are statistically significant at $p < 0.05$. Overall Panel A shows that the strength of the relationship between MTB and accounting profitability varies by industry at the two-digit SIC level. For example, among the 72 industries in total, MTB_t and ROA_t co-vary at a low level ($|r| <= 0.3$) in 22 industries, at a moderate level ($0.3 < |r| <= 0.5$) in 29 industries, and at a high level ($|r| > 0.5$) in 11 industries. The correlations between MTB_t and the other measures of accounting profitability display a similar pattern, although the numbers of industries that exhibit moderate and high correlations are smaller than those between MTB_t and ROA_t.

Panel B of Table III reports the distribution of significant within-industry correlations among the 440 industries at the four-digit SIC level. It shows a similar pattern as that in Panel A. For example, among the 440 industries in total, MTB_t and ROA_t co-vary at a low level ($|r| <= 0.3$) in 84 industries, at a moderate level ($0.3 < |r| <= 0.5$) in 157 industries, and at a high level ($|r| > 0.5$) in 95 industries. Overall, results in Table III show that there are some industries in which the covariance of accounting profitability and MTB exceeds 25%, indicating evidence of convergence.

Table IV summarizes the results of firm fixed-effects regression analyses within each industry at the two-digit (Panel A) and the four-digit SIC level (Panel B). To ensure that the covariance between MTB and measures of accounting profitability is statistically significant, the table only includes industries in which both the coefficient for MTB and the *F*-statistics for the model are significant at $p < 0.05$. Corresponding to the low, moderate, and high levels of correlation effect sizes, Table III reports the frequency distribution of the increase in R^2 at three levels: [0, 0.1], (0.1, 0.25], and (0.25, 1].

Panel A shows that the covariance between MTB and accounting measures is in the range of [0, 0.1] for most industries at the two-digit SIC level after controlling for autocorrelations and time effects. However, there are a few industries in which the covariance is in the range of (0.1, 0.25]. For example, there are 32 industries (50%) in which the covariance between MTB_t and ROA_t is in this range. Panel B shows that many industries at the four-digit SIC level have the covariance between MTB and accounting measures in the range of (0.1, 0.25]. For example, among the 440 industries at the four-digit SIC level, MTB_t and ROA_t co-vary at a low level ([0, 0.1]) in 191 industries (64%), at a moderate level ((0.1, 0.25]) in 107 industries (36%), and at a high level ((0.25, 1]) only one industry. Overall, these results provide additional evidence that the relationship between accounting profitability and market performance varies significantly by industry, but these results do not effectively suggest convergence in any particular industry regardless of the extent of aggregation. In general, the relationship was higher between the two measures in the four-digit SIC industries, probably because the similarity between the firms reduces investor confusion and extraneous variance.

The highest variance explained across all measures were in four relatively unrelated

Table IV
Summaries of Firm Fixed-effects Regression Analyses of Accounting Profitability on MTB within Each Industry [A]

A. Among the 72 Industries at the Two-Digit SIC Level

	Average Model R^2	Average ΔR^2	[0, 0.1]	(0.1, 0.25]	(0.25, 1]	Total
ROA_t	0.29	0.10	31	32	1	64
ROE_t	0.24	0.05	55	7	0	62
ROI_t	0.28	0.07	39	24	0	63
ROS_t	0.25	0.05	41	15	0	56
ROA_{t+1}	0.25	0.06	53	9	0	62
ROE_{t+1}	0.19	0.03	56	1	0	57
ROI_{t+1}	0.22	0.06	53	8	0	61
ROS_{t+1}	0.21	0.05	51	4	0	55

B. Among the 440 Industries at the Four-Digit SIC Level

	Average Model R^2	Average ΔR^2	[0, 0.1]	(0.1, 0.25]	(0.25, 1]	Total
ROA_t	0.46	0.08	191	107	1	299
ROE_t	0.42	0.05	262	33	0	295
ROI_t	0.45	0.07	219	88	1	308
ROS_t	0.49	0.04	225	51	0	276
ROA_{t+1}	0.42	0.05	257	30	0	287
ROE_{t+1}	0.40	0.03	251	10	0	261
ROI_{t+1}	0.42	0.04	255	31	1	287
ROS_{t+1}	0.40	0.04	242	21	0	263

[a]Results reflect results for only those industries where the inclusion of accounting performance explained significant variance in the market to book ratio. Although the sample covered 72 and 440 industries respectively, the tables exclude models where the variance explained was statistically insignificant.

industries: cutlery manufacturing (19.2%), water transportation (18.7%), paint and varnish manufacturing (18.7%), and miscellaneous communication services (18.1%). Varying between services and physical manufacturing, these industries showed the highest significant relationship between accounting profitability and market to book ratio. The results did not suggest why these particular industries would display a higher relationship than others, but the average size of these industries does not recommend them as a more fruitful empirical setting for future research.

Additional Analysis

To verify the robustness of the findings, several additional analyses were conducted.

First, it is important to establish that the relationship does not change if a longer time period of accounting returns is used instead of single-year results. Analysis measuring accounting profitability and MTB using a three-year (*t-1*, *t*, *t+1*) moving average show that the cross-industry correlations obtained from the moving averages are a little higher than those obtained from the annual data, and the highest is 0.24 between the three-year moving average ROA and MTB (indicating a covariance of 6%). For within industry analysis, results show that the correlations of the three-year moving average measures vary by industry, in a pattern similar to the effect sizes of the annual data.

Second, it is important to establish whether accounting profitability and market performance load on a higher-order factor. To examine this possibility, a confirmatory factor analysis (CFA) was conducted. The construct validation literature suggests that the underlying factor should account for at least 50% of variance in the measures (i.e., with a factor loading above 0.70) to indicate that the measures co-vary at an adequate level (Fornell and Larcker, 1981; Nunnally and Bernstein, 1996). The first-order factor model shows that the four measures of accounting profitability – ROA, ROE, ROI, and ROS – load onto one single factor (eigenvalue = 3.22, and their factor loadings are 0.96, 0.91, 0.96, and 0.73 respectively). The second-order factor model shows that the eigenvalue for the first factor is only 0.19, and the factor loading is merely 0.31 for both accounting profitability and MTB. This finding suggests that MTB and measures of accounting profitability do not converge onto a single second-order factor across industries, supporting the argument that they reflect distinct dimensions of firm financial performance (Combs *et al.*, 2005; Keats, 1988).

Lastly, because it may be more difficult for investors to predict firm performance in fast growing or fast declining industries, analysis was conducted examining whether the relationship between accounting profitability and MTB is influenced by industry growth rate. On the basis of industry growth rate, industries were classified into five categories: very low (below 10th percentile), low (below 25th percentile), moderate (between 25th to 75th percentile), high (above 75th percentile), and very high (above 90th percentile). The results show no evidence of convergence between accounting profitability and MTB in any category.

DISCUSSION AND CONCLUSIONS

This study addresses an ongoing debate about the relationship between accounting and market measures of firm financial performance in the management literature, namely, whether their relationship is sufficiently high so that researchers can treat them as equivalent indicators of a single dimensional construct of firm financial performance (e.g., Chakravarthy, 1986; Combs *et al.*, 2005; Keats, 1988; Murphy *et al.*, 1996; Rowe and Morrow, 1999; Venkatraman and Ramanujam, 1986). Using annual financial data from all the publicly traded firms in the COMPUSTAT from 1961 to 2008, this study finds that although measures of accounting profitability and market performance are positively correlated across industries, their covariance is less than 10% and provides no evidence of convergence (Kline, 1998). Moreover, the results suggest that across industries accounting profitability and market performance do not load on a higher-order factor. Because of the centrality of firm financial performance in organizational research and the extensive use of accounting profitability and market performance measures as its indicators, the findings have some important implications for future research.

First, this study has direct implications for cross-industry studies that use both

accounting profitability and market performance as measures of firm financial performance. Prior research in strategic management has been criticized for using single indicators to measure key constructs such as firm financial performance (Boyd *et al.*, 2005). To improve the quality of construct measurement, an increasing number of strategic management researchers have started to use multiple indicators to measure key constructs and use structural equation modeling techniques in the analysis (Shook *et al.*, 2004). In this approach, researchers generally treat the indicators as equivalent reflections of the underlying construct and use factor analysis techniques to derive a composite estimate of the construct that accounts for the covariance of the individual measures (Podsakoff *et al.*, 2006). This paper's findings suggest that it is inappropriate to combine accounting and market measures into a single financial performance measure. Because the covariance of accounting profitability and market performance is less than 10% across industries, a composite estimate of financial performance derived from factor analysis leaves out a large amount of variance that is unique to each measure as measurement error. When the composite estimate is the dependent variable, researchers will not be able to detect factors that affect the unique variance of accounting profitability or market performance because the unique variance is dropped from analysis as measurement error.

This study provides clear evidence showing that firm financial performance is not a single unidimensional construct and that accounting profitability and market performance represent distinct dimensions that have little empirical overlap. Therefore, this study suggests that it will be difficult for organizational researchers to develop general theories of firm financial performance that can effectively explain variation in both accounting profitability and market performance. Researchers should focus on creating distinct theories of each and explaining why their variation is so unrelated. The value of a firm on the stock market is a reflection of its future value while the accounting profits of a firm are a reflection of its past performance. The two have the potential to be related, but the logic and philosophy they represent are different and cannot be assumed to overlap.

Second, this study has implications for studies that use only accounting profitability or market performance as measures of firm financial performance. Currently, many authors discuss firm performance very generally in their theory and hypothesis development and elaborate on their performance measures only in the method section. Building on the arguments presented in this paper, researchers should consider clearly defining the construct or the specific aspect of firm financial performance they intend to study first, and then using it to guide theory and hypothesis development.

For example, when investigating market performance, researchers should be clear from the beginning, carefully conceptualize what market performance represents, and then use this conception consistently in theory and hypothesis development. Because market performance does not reflect the firm's fundamental value, but investors' perceptions of it (Thaler, 2004), researchers interested in market performance should focus on how firm strategies and actions influence investors' perceptions.

Similarly, when investigating variance in profitability, researchers should carefully conceptualize what profitability reflects first and then use this conception to guide theory and hypothesis development. If accounting profitability is assumed to reflect operational efficiency and effectiveness, researchers should focus on how firm actions influence operational efficiency or effectiveness to understand the variation in firm profitability and use techniques developed to check and adjust for earnings manipulation (e.g.,

Dechow *et al.*, 1995).

In addition to the above general recommendations, this study also raises some important questions for future research. Market and accounting based performance measures continue to maintain a central place in not only the academic but also the practitioner view of firm performance. Future research into the connection between these two should examine the potential for mediation. Richard *et al.* (2009) suggest the importance of stakeholders to the firm, following in the tradition of important work into the behavioral theory of the firm (Cyert and March, 1963). A mediated model of the relationship between accounting and market performance should consider the role of equity analysts pushing the market and in turn being influenced by top management team influence behaviors. Analysts and managers interact in practice (Puffer and Weintrop, 1991), but this relationship is left out of current investigations.

Another direction for future research is to investigate how firms and their managers cope with the divergence between accounting profitability and market performance. For example, because of the increasing influence of investor activism (Useem, 1993), these firms might use more long-term incentive plans such as stock ownership and stock options to give investors an impression that managerial interests are well aligned with theirs (Westphal and Zajac, 1994).

Importantly, because the sample consists of only firms in the COMPUSTAT database, the findings are only applicable to the U.S. context. Research in finance and accounting has examined the relationship between accounting and market returns in non-U.S. contexts, such as the United Kingdom (O'Hanlon, 1991) and the emerging market of Czech Republic (Jindrichovska, 2001). Although the focus of this research is on stock market efficiency, that is, whether stock prices predict accounting returns or whether the release of information about accounting returns affects stock prices, it appears important to examine the convergence of accounting and market returns in non-U.S. contexts, particularly in emerging economies where legal protection of minority shareholder interests tend to be weak (La Porta *et al.*, 1998).

Lastly, this study does not suggest organizational researchers to focus solely on accounting profitability or market performance in the study of firm performance. Accounting profitability and market performance only reflect the financial aspect of firm performance. There are many other aspects of firm performance such as growth, operational effectiveness, corporate reputation, customer knowledge, business processes, and social performance (Bromiley, 1990; Combs *et al.*, 2005; Venkatraman and Ramanujam, 1986), which all deserve investigation and all may be variables of interest in furthering organizational objectives beyond profits and stock returns. Instead, researchers should always clearly define which aspect of firm performance they intend to study first, and then develop and test theories and hypotheses about that specific aspect of firm performance, a construct that was originally referred to as "organizational effectiveness." An accumulation of knowledge from these studies will not only enhance the understanding of each individual aspect of firm performance, but also the relationships between them and the overall construct of firm performance. Indeed, acknowledging that "performance" means very different things to different constituencies within the organization is one of the largest oversights in management research today (Richard *et al.*, 2009).

Notes

1. In the finance and accounting literature, there is also a stream of studies about the relationship between accounting measures and stock returns in both U.S. and international markets (e.g., Fama, 1981; Jindrichovska, 2001; O'Hanlon, 1991). This research focuses on stock market efficiency, specifically, whether the release of information about accounting returns affects stock prices or whether stock prices predict accounting returns. Methodologically, it primarily examines whether the relationship between accounting and market measures is *statistically significant*. In contrast, the debate in the management literature focuses on whether the relationship between accounting and market measures is *sufficiently high* to treat firm financial performance as a single unidimensional construct and to treat accounting and market measures as its equivalent indicators.
2. Compared with fixed-effects models, random-effects models require the firm-specific error term (random effect) to be independent of the independent variables (Wooldridge, 2002). When this requirement is not satisfied, random-effects models generate inconsistent estimates. In comparing the consistent fixed-effects model with the efficient random-effects model, the Hausman specification test suggests that the efficient random-effects model is inconsistent ($\chi^2 = 859.31, p < 0.01$).
3. To specify an interval, the paper uses parentheses to indicate an exclusive close to the interval while brackets to indicate an inclusive one. For example, (0.3, 0.5] indicates $0.3 < r <= 0.5$.

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