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**THE RELATIVE IMPORTANCE OF EARNINGS AND BOOK
VALUE IN REGULATED AND DEREGULATED MARKETS: THE
CASE OF THE AIRLINE INDUSTRY**

by

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ABSTRACT

This paper examines the valuation effects of earnings and book values on security prices of the airline companies under two different market structures: the regulated and the deregulated periods. In regulated markets, and under the cost recovery plus adequate rate of return on assets, security prices are highly aligned with book values of the respective companies. In the airline industry, regulation took the form of guaranteed routes and of subsidies to service rural areas. In addition, many airlines provide international service which was not subject to US regulations. These features give rise to the differential effect of both book values and earnings. In deregulated times, airline firms operate in highly competitive markets with large airline firms enjoying the benefits of economy of scale and service diversification. Thus, both the asset capitalization (book value) and operational efficiencies (earnings) would be major indicators in the market assessment of the firm's future profitability and security price. The literature lacks empirical evidence in examining the relative importance of earnings and book values in regulated and deregulated markets, especially in an airline industry. This paper aims at extending the literature examining the valuation relevance of earnings and book value in the assessment of security prices in the airline industry. The empirical results of this paper support the predictions of differential impact of earnings and book value in explaining security prices of the airline firms in both economic structures.

I. INTRODUCTION

Investors use accounting reports and disclosures, among other publicly available information, to assess the risk and valuation of firms. Prior research has indicated that the value relevance of specific accounting information may vary depending upon the nature of its industry. For example, regulated industries do not exhibit the same reaction to earnings announcements as do nonregulated ones (Teets 1992). The operating risk of a firm in a regulated industry is reduced compared to those in nonregulated industries and its expectations of earnings and forecasts are more stable and predictable.

The airline industry was regulated through guaranteed routes and fares until 1976 when the Civil Aeronautics Board began to voluntarily relax its control over the industry until it subsequently ended (regulation) with the passage of the Airline Deregulation Act (1978). The emergence of this industry from regulation to nonregulation provides a unique opportunity to test the value relevance of accounting information with a more accurate testing of firms in two different economies than does prior research (which uses random samples of nonregulated firms to assess the differential effect of accounting information). This paper will examine the changing value relevance of book value and earnings announcements as the industry transforms itself from regulated to nonregulated.

II. PRIOR RESEARCH

Firms in regulated industries generally enjoy rates that ensure achieving a “normal” rate of return (ROR) on their net assets based on an appropriate cost of capital. They enjoy some degree of certainty because of guaranteed markets and rates of return. As a result, a regulated firm’s operating risk would normally be lower than that of a firm in a nonregulated industry. Teets (1992) compares the earnings response coefficients (ERC’s) for electric utilities with a random sample of nonregulated firms drawn from a sample of firms identified by Brown, Hagerman, Griffin, and Zmijewski (1987). He finds that the ERC for the utilities are more tightly clustered than for nonregulated firms and have a much smaller average ERC than for nonregulated firms. This result is consistent with the notion that the effects of unexpected earnings are less permanent for utilities.

Nwaeke (1998) studied the relative contribution of income statement items to the valuation of electric utilities using a matched sample (by size) of manufacturing firms to highlight the effect of regulation. Among his findings are: 1) there is considerable alignment between market value and book value for electric utilities, 2) the contribution of earnings levels in explaining market value diminishes markedly in the presence of book values for electric utilities, whereas, 3) earnings levels compliment book values in explaining market valuation of manufacturing firms, and 4) earnings change compliments earnings levels in explaining market values of manufacturing firms. Therefore, balance sheet book value is more closely aligned with utilities than with manufacturing firms, whereas earnings levels and earning changes are

important in explaining the market value of manufacturing firms. These results are explained by the fact that in regulated industries, rates of return and guaranteed markets are assured.

Interstate trucking is another industry that transformed itself from regulation to deregulation. Schipper, Thompson, and Weil, (1987) studied the effects of regulatory changes on shareholder wealth as a result of the Motor Carrier Act of 1980, which had the effect of making truck-operating rights easier to secure and thereby allowed entry into new markets. The Act also affected the rate setting practices of the past. Their study demonstrated that several of the regulatory changes made prior to enactment of the Motor Carrier Act of 1980 resulted in negative share price reactions and reduced shareholder wealth, owing to fear that deregulation would result in increased competition in both routes and pricing.

The airline industry was, until 1978, a regulated industry where both airline prices and airline routes were subject to approval of the Civil Aeronautics Board (CAB). The first signs of congressional interest in deregulating the airline industry began in 1970. Reaction to attempts at deregulation of the airline industry was generally greeted negatively by most airlines. Predictions of adverse consequences of deregulation included the creation of inefficiencies as new and inexperienced airlines entered the field. This created excess capacity leading to increased costs, heightened price competition, and decreased profitability. This was particularly true of the small and weaker airlines, which were concerned, once the industry was deregulated, about their ability to compete on price and routes with the larger, more financially able firms.

Events and hearings on deregulating the industry continued for eight years and through two political administrations before the Airline Deregulation Act was signed on October 10, 1978. Industry profits at the time deregulation became law were approximately \$1.4 billion and tumbled to a loss of approximately \$225 million in 1980 (Davidson, Chandy, and Walker 1984). The immediate post deregulation period was also characterized by an increase in capacity that peaked in the early 1980s. The resultant overcapacity and financial losses led to a period of active merger activity (Kyle, Strickland, and Fayissa 1992). Between 1985 – 1987, in an attempt to restructure the airline industry, 14 mergers of airlines were completed. This extensive merger activity resulted in positive abnormal returns for both the target (14.5%) and the bidding firm (3.7%) over the three-day period surrounding the merger announcement date (Kyle, Strickland, and Fayissa 1992).

The transformation of the airline industry from being regulated to unregulated provides a unique setting to test hypotheses concerning the impact of earnings announcements on market valuations in a specific industry. El-Gazzar, Sannella, and Shalaby (2003) tested the impact of earnings announcements in three distinct economic environments as airlines go from regulation to partial regulation (transition period) to full deregulation. Using both a revaluation index (RI) and a standardized revaluation index (SRI) they concluded that earnings announcements do contain information content during each period and that the relevance of accounting information increases as the industry goes from regulation to deregulation. This supports the notion that in a deregulated environment there is greater competition, resulting in more risk and uncertainty for the investor in valuing securities. According to the authors, “earnings have more value relevance in competitive markets than in regulated ones.”

Banker, Das, & Ou (1995) used financial ratios to test various hypotheses about the market responses to events leading up to airline deregulation. Their empirical results indicated that operating performance is positively related to the market reaction to deregulation. Their results also indicated that stronger airlines were more likely to benefit from deregulation, while weaker ones were less likely. Investor expectations are more interested in operating efficiency than financial health when entering a more competitive environment brought about by deregulation.

Banker, Das, & Ou (1997) also sought to test the impact of deregulation from a differential perspective. Airline firms were divided into *trunk* (generally large airlines that cater to long distance lines serving large population centers) and *local* (smaller sized airlines serving less populated and less traveled areas) to test whether similar reactions to deregulation occurred. As deregulation became more imminent, local airlines experienced much larger percentage increases (than did trunk airlines) in systematic risk than existed when deregulation was less imminent; both groups displaying a negative reaction to deregulation. These studies indicate that book value has more value relevance during periods of regulation and that earnings have more value relevance during periods of deregulation. The transformation of the airline industry from regulation to deregulation is a unique opportunity to provide a stronger test of this hypothesis.

III: DEVELOPMENT OF HYPOTHESES

Nature of the Airline Regulation

In a typical regulated industry such as utilities, the service is priced on cost plus a normal rate of return on assets. Theoretically, this cost recovery plus the allowed rate of return would lead to aligning the utilities' book value with its market value. Accordingly, balance sheet information (book value) would be superior to earnings in explaining security prices. However, achieving a pure cost recovery plus normal rate of return is constrained by the frequency of reviewing the allowed rate of return and by management's discretion in accounting for many balance sheet assets, resulting in prices charged to generate profits over (or below) the allowed rate of return (Nwaeze 1998 and Sherman 1989). In this condition, earnings should complement book value in explaining the market value.

The airline industry regulation differs from the typical cost recovery pricing models of the utilities. The airline regulation was a mix of guaranteed routes and financial subsidies to provide air travel service for rural locations. In addition, many US airline companies were also operating on international routes which are subject to extensive competition. These regulation features make the inference of the relative valuation power of earnings and book value mixed. On the other hand, deregulation of the industry provided a competitive market where large airline companies enjoy the benefits of economy of scale and diversification in operations between national and international flights, giving rise, again, to the expectation that explanatory power of book value is greater than earnings.

Based on the above arguments, the following hypotheses are tested:

H01: *There is a higher correlation between book value and prices than earnings and prices during the regulation period.*

H02: *The operating risk of firms in the airline industry is lower in regulated than in deregulated times.*

H03: *There is a higher association between earnings and security prices than book value and security prices in the deregulated period.*

IV. RESEARCH DESIGN

Sample

We began our sample selection by retrieving all the firms in the Scheduled Air Transportation industry, SIC=4512, from the 2005 edition of the S&P Annual COMPUSTAT. We required that firms have valid data for key variables in years between 1970 and 1984 and are incorporated in the US. We found a total of 52 firms with 370 firm-year observations.

Since our test relies on a between-sample comparison among regulated (1970 – 1975) and deregulated (1979 – 1984) periods, we required that each period is well represented by all sample firms. Firms that appear in only one sample period but not in the other were excluded. This requirement reduced our sample to 23 firms and 231 firm-year observations. This base sample was used for our empirical tests. To control for the potential bias of repeated firms in the test years, we included a dummy variable for each firm and year tested. This dummy variable takes the value of 1 if the observation is from a particular firm or year and 0 otherwise. Statistically, this is equivalent to the Generalized Least Squares (GLS) model with fixed effect components.

To increase the reliability of the inferences from the analysis of empirical results, we constructed a control sample from the manufacturing sector and ran the same tests during the two economic periods. This control sample was randomly selected from the total population of the manufacturing industries with SIC codes from 3000 to 3999, taking into consideration the proportionate size of the population (Palepu 1989).

Model

Studies testing the valuation effects of accounting information have been using the association between the different accounting metrics such as earnings per share, cash flow from operations, and the book value as evidence of the value relevance of accounting information. This approach is known as *level tests* (Beaver 2002). However, other researchers (e.g., Easton 1999) argued that level tests suffer from aggregation and lack of direct attribution. Specifically, they argued that higher association between accounting metrics and security prices can be a result of both accounting measures and security prices being highly correlated with other market

or economic drivers; therefore, results from level tests should be subject to additional analysis for reliable inferences.

In this paper, we use both level and change tests. Change tests examine the relationship between changes in prices and changes in the specific accounting metric under investigation. Some researchers argue that combining the two models into one may produce a complementary explanation for the effect of accounting numbers on market valuation (Nwaeze 1998).

Time Span of the Study

This study examines the valuation effects of the earnings and book value on airlines' security prices in two distinctive economic environments: regulation and deregulation (competition). Although the deregulation act was signed in 1978, the Civil Aeronautics Board began to voluntarily relax its control over the industry in 1976. Therefore, the time coverage in the study is partitioned into three sub-periods: regulated, transition, and deregulated periods. Since the research compares the role of earnings and book value in the regulated versus deregulated environment of the airline industry, no specific tests were conducted for the transition period.

Regulated Economy 1970 – 1975	Transition Economy 1976-1978	Deregulated Economy 1979- 1984
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The following models were tested in this paper in each of the three economic settings above:

$$PRC_j = a_j + b1(BV_j) + e_j \tag{1}$$

$$PRC_j = a_j + b1(EPS_j) + e_j \tag{2}$$

$$PRC_j = a_j + b1(BV_j) + b2(EPS_j) + e_j \tag{3}$$

Where:

PRC_j : market price of security j on closing day of the firm's fiscal year end adjusted for stock splits;

BV_j : book value per share of firm j adjusted for stock splits;

EPS_j : annual earnings per share of firm j adjusted for stock splits;

V: ANALYSIS OF RESULTS

Descriptive Statistics

Table 1 presents descriptive statistics of performance and operating measures of sample firms. Panel A of Table 1 presents the statistics of the airline sample, while Panel B presents those of the manufacturing sample. The statistics demonstrate major differences in the variables in two dimensions: a) across the two test periods among the airline companies, and b) between the airline companies and the control manufacturing sample. For instance, the sales to total assets ratio improved from 0.9813 in the regulation period to 1.1621 in the deregulation period. This improvement suggests that as the airline industry became competitive, management devoted

more efforts to survive competition, and increased the volume of operations. However, income before interest and taxes (IBIT) significantly decreased from .0722 in the regulated economy to 0.0501 in the deregulated market. The two observations taken together suggest that, as the airline industry deregulated, increased competition led to increased volume but at a competitive pricing, causing the profit margin and earnings to be lower. Similarly, interest coverage as a measure of liquidity is significantly lower in the deregulated period as compared to the regulated times. These findings are consistent with prior research reporting that the post regulation period was characterized by higher competition and lower profitability compared to regulated times (Davidson et al. 1984; Banker et al. 1997).

TABLE 1

Descriptive Statistics of the Airline Sample and the Control Industrial Sample During the Regulated and Deregulated Periods

	Regulated Period 1970-75		Deregulated Period 1979-84	
	Mean	Median	Mean	Median
Panel A: Airline Sample				
Number of Firms	23		23	
Total Firm-year Observations	124		107	
Total Sales (\$mil.)	465	271	1684	1110
Total Assets (\$mil.)	574	299	1472	1027
Total Market Value (\$mil.)	191	68	321	153
EBIT on Sales	0.0722	0.0655	0.0501	0.0525
Market to Book Ratio	0.5969	1.0797	1.7916	0.9048
Earnings to Price Ratio	0.0454	0.0487	-0.1717	0.0480
Sales to Total Assets	0.9813	0.9418	1.1621	1.1864
CAPM Beta	1.6985	1.6841	1.1547	1.1168
Standard Dev. Of Stock Price	0.0338	0.0346	0.0311	0.0314
Capital Expenditure on Sales	0.1646	0.0961	0.1723	0.1327
Advertising Expense on Sales	0.0195	0.0180	0.0179	0.0183
Debt to Asset Ratio	0.4916	0.5127	0.4557	0.4676
Interest Coverage Ratio	1.9864	1.6414	1.6589	1.2673
Altman's Z-Score	1.6818	2.0965	2.5045	2.0071
Panel B: Manufacturing Sample				
Number of Firms	871		871	
Total Firm-year Observations	4253		4217	
Total Sales (\$mil.)	373	67	787	132
Total Assets (\$mil.)	293	47	585	97
Total Market Value (\$mil.)	203	24	336	62

EBIT on Sales	0.0957	0.0896	0.0861	0.0935
Market to Book Ratio	1.4141	0.9268	1.4606	1.1553
Earnings to Price Ratio	0.1065	0.0922	0.0942	0.0925
Sales to Total Assets	1.3780	1.3431	1.4232	1.3903
CAPM Beta	1.0882	1.0674	0.9908	0.9679
Standard Dev. Of Stock Price	0.0310	0.0278	0.0257	0.0238
Capital Expenditure on Sales	0.0554	0.0386	0.0642	0.0443
Advertising Expense on Sales	0.0176	0.0115	0.0211	0.0143
Debt to Asset Ratio	0.2399	0.2398	0.2078	0.1991
Interest Coverage Ratio	28.692	6.1258	21.343	5.5132
Altman's Z-Score	3.4026	3.2314	3.5099	3.4793

Note:

This table provides descriptive statistics for the sample of firm year observations used in the study. We began our sample selection by retrieving all the firms in the Scheduled Air Transportation industry, SIC=4512, from the 2005 edition of the S&P Annual COMPUSTAT. We required that firms have valid data for key variables in years between 1970 and 1984 and are incorporated in the US.

We found a total of 52 firms with 370 firm-year observations. Since our test relies on between-sample comparison among regulated (1970 – 1975 and deregulated (1979 – 1984) periods, we required that each period is well represented by all sample firms. Firms that appear in only one or two sample periods but not the other are excluded. This requirement reduces our sample to 23 firms and 297 firm-year observations. Following Altman (1968), the Z-score equals $1.2(\text{Net working capital/total assets}) + 1.4(\text{Retained earnings/Total assets}) + 3.3(\text{Earnings before interest and taxes/Total assets}) + 0.6(\text{market value of equity/Book value of liabilities}) + 1.0(\text{Sales/Total assets})$. Lower Altman's Z-score indicates poorer financial health.

Contrasting the statistics of the airline firms with those of the manufacturing firms in Panel B of Table 1, one observes a significant demarcation among the two samples in the test periods. Manufacturing companies tend to have higher and more stable measures of performance and operations in the two test periods than the airline companies. For instance, manufacturing companies have on average a ratio of sales to total assets of 1.4, which is significantly higher than the airline companies' ratio of 1.1 and relatively stable over the three test periods. The earnings before interest and taxes (EBIT) ratio shows that manufacturing companies are on average more profitable than the airline companies in all test periods. Similarly, manufacturing companies have interest coverage ratios of 28.692 and 21.343 during the two test periods, respectively, while the airline sample has average interest coverage ratios of 1.98 and 1.65 for the same two test periods respectively. This suggests that airline companies suffer greater liquidity problems than do manufacturing firms. The Altman's Z-Score for manufacturing firms is around 3.5 for the test periods compared to 2.0 for airlines during the same test periods, suggesting that the airline companies have higher probability of financial distress (and ultimately) bankruptcy than their counterparts in the manufacturing sector.

Regression Results

To test the relative importance of earnings and book values in the valuation of equity securities of the airline firms in the regulated and competitive market settings, we regress the security prices of firms at the end of the fiscal year on both the book value and earnings of

sample firms. Table 2 presents the regression coefficients of earnings and book values. Panel A of Table 2 presents the coefficient estimates for the airline firms in the two time periods (regulated 1970-1975) and deregulated (1979-1984), while Panel B presents the coefficient estimates for the control/ manufacturing firms during the same test periods.

TABLE 2

Coefficient Estimates of Regressing Stock Price on Book Value and Earnings in the Two Economies (Regulated 1970-1975 and Deregulated 1979-1984)

Panel A: Airline Industry (SIC 4512)

Independent Variables	Predicted Sign	Model 1		Model 2		Model 3	
		1970-75	1979-84	1970-75	1979-84	1970-75	1979-84
<i>Intercept</i>		0.2360 (0.4548)	-0.0861 (0.6521)	-0.4055 (0.0750)	-0.9453 (0.0001)	0.2416 (0.4422)	-0.3558 (0.0946)
<i>BVPS</i>	+	0.6597 (0.0004)	0.8847 (0.0001)			0.5589 (0.0051)	0.6863 (0.0001)
<i>EPS</i>	+			0.1805 (0.0122)	0.4154 (0.0001)	0.0994 (0.1807)	0.1812 (0.0105)
<i>Firm Fixed-effect</i>		Yes	Yes	Yes	Yes	Yes	Yes
<i>Year Fixed-effect</i>		Yes	Yes	Yes	Yes	Yes	Yes
<i>Number of Observations</i>		124	107	124	107	124	107
<i>Adj. R-squared</i>		0.8188	0.8440	0.8067	0.7995	0.8204	0.8549

Panel B: Manufacturing Industry (SIC between 3000 – 3999)

<i>Intercept</i>		0.3104 (0.5083)	-0.2062 (0.4896)	-0.1063 (0.8186)	-0.5748 (0.0524)	0.2492 (0.5785)	-0.2844 (0.3054)
<i>BVPS</i>	+	0.8244 (<0.0001)	0.7394 (<0.0001)			0.5109 (<0.0001)	0.5216 (<0.0001)
<i>EPS</i>	+			0.3878 (<0.0001)	0.3875 (<0.0001)	0.2659 (<0.0001)	0.2808 (<0.0001)
<i>Firm Fixed-effect</i>		Yes	Yes	Yes	Yes	Yes	Yes
<i>Year Fixed-effect</i>		Yes	Yes	Yes	Yes	Yes	Yes
<i>Number of Observations</i>		4,253	4,217	4,253	4,217	4,253	4,217
<i>Adj. R-squared</i>		0.7813	0.8226	0.7861	0.8248	0.8002	0.8466

Note:

The first number in each cell is the parameter estimate and the second number is the p-value which indicates the significance level. The p-value is based on the t-test with White (1980) heteroskedasticity corrected standard error. All variables are standardized by subtracting the sample mean and dividing by the standard deviation. The standardized variables have means equal to 0 and standard deviations equal to 1. To control for the potential of a repeated sample effect, we included firm dummy variables and year dummy variables in all regressions. Statistically, this is equivalent to the Generalized Least Square (GLS) model with fixed-effect components. These dummy variables take value 1 if the observation is from a particular firm or year and 0 otherwise. All models are estimated with these dummy variables but the parameters of these dummies are omitted from the table.

Variable definition: *BVPS* – Total common equity divided by common shares outstanding;

EPS – Basic earnings per share before extraordinary items.

The Airline Firms

From Panel A of Table 2, Model 1 examines the correlation between prices and book values per share during the two test periods: the regulated period (1970-1975), and the deregulated period (1979-1984). The coefficient of the book value per share (BVPS) is positive (0.6597) and significant ($p < 0.0004$) during the regulated period, confirming the prediction. During the deregulated period, the book value per share has a stronger relationship with security prices (BVPS 0.8847 and $p < 0.0001$). The results of Model 1 for the airline industry confirms the importance of book value in explaining security prices in both economies, regulated and deregulated.

Model 2 of Panel A reports the coefficient estimates of the effect of earnings per share (EPS) on security prices during the two test periods. Earnings per share have a positive and significant coefficient during both the regulated and deregulated periods, with higher impact during the deregulated period (0.1805 and $p < 0.0122$ and 0.4154 with $p < 0.0001$, respectively). These results suggest that earnings have lower loading and importance on prices during regulated periods compared to deregulated times. These results are consistent with the predictions stated earlier.

Model 3 combines both book values and earnings as explanatory variables for prices. The results are consistent with the hypothesis that BVPS has a stronger relation with prices during regulated times, while earnings have an insignificant impact on prices. Although BVPS still holds a significant correlation with prices during the deregulated period, EPS also has a significant impact in explaining prices. The results of Model 3 suggest that in competitive markets earnings complement book values in explaining prices and are consistent with prior research (Nwaeze 1998).

The Manufacturing Firms

Panel B of Table 2 presents regression coefficient estimates of the relationship between both earnings and book value and security prices for the control sample of manufacturing firms. The coefficients of both earnings and the book value per share are positive and significant under each of the model specifications and periods of tests. The inclusion of both book value and earnings per share in Model 3 increased the explanatory power of the model and R-squared is the highest in the three periods compared to those of Model 1 and Model 2, where BVPS and EPS are introduced one at a time. These results confirm prior research that book value and earnings individually have significant association with security prices, and that earnings (book value) complement book value (earnings) in explaining security behavior.

VI. CONCLUDING REMARKS

Prior research argues (and finds support) that in traditional regulated industries such as utilities and transportation, the pricing of the service guarantees a fair rate of return on invested capital. In theory, this pricing policy would lead to an alignment of the book value with market value of the firm. Extending this inference to the period of airline regulation is not straight forward. The regulation of the airline industry was mainly in guaranteed routes and price subsidies. This paper examines whether earnings and book values have the differential explanatory power of security prices in the airline industry depending on the economic sittings: regulated versus competitive markets. Our results show that earnings have a complementary explanatory power to the book values in explaining security prices of the airline firms, with a higher effect in the deregulated test period.

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