To the Graduate Council:

I am submitting herewith a dissertation written by Richard Anthony Riley, Jr. entitled "The Value Relevance of Non-Financial Performance Variables and Accounting Information: The Case of the Airline Industry." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Business Administration.

Bruce K. Behn, Major Professor

We have read this dissertation
and recommend its acceptance.

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Associate Vice Chancellor and
Dean of The Graduate School

The Value Relevance of Non-Financial Performance Variables and Accounting Information: The Case of the Airline Industry

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Richard Anthony Riley, Jr.

May 1998

DEDICATION

To my wife,

Shelley Hedy Riley

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ABSTRACT

The purpose of this research is to examine the value relevance to investors of non-financial performance variables, traditional accounting variables (earnings and changes in abnormal earnings) and other financial statement information in the airline industry. From analysts' written pronouncements and financial press articles, customer satisfaction, load factor, market share and available seat miles are identified as fundamental (non-financial) performance metrics used to evaluate airline performance. Consistent with prior capital markets research, earnings and changes in abnormal earnings represent traditional accounting information. In addition, because financial statements include details such as revenues, gross profit, assets, etc., a search of these metrics is conducted to construct financial statement proxies that reflect value relevance that is similar to that of non-financial performance metrics. Non-financial performance variables, traditional accounting variables and financial statement proxies are examined on a stand-alone basis and in a combined model. The findings of stand-alone panel data regressions suggest that accounting earnings, changes in abnormal earnings and non-financial performance variables are significantly associated with stock returns. When non-financial performance metrics, earnings and changes in abnormal accounting earnings are included in the same model, non-financial performance variables exhibit incremental value relevance over traditional accounting metrics. Finally, although the financial statement proxies are highly correlated with the non-financial performance metrics, with the exception of the load factor proxy, the financial statement proxies were generally not associated with stock returns.

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Chapter 1:

Introduction

The purpose of this research is to examine the value relevance to investors of non-financial performance variables in the airline industry. Birchard (1994), the AICPA Jenkins Committee (1994),[1] Wallman (1995, 1996) and Amir and Lev (1996) have expressed concern that financial (accounting) reporting and disclosure are not keeping pace with a dynamic and constantly changing business world. The consequences of inadequate financial information, according to Wallman (1995), may be less efficient capital markets, a higher cost of capital and, possibly, a lower standard of living. To enhance traditional financial reporting, policymakers such as the AICPA Jenkins Committee (1994) and Wallman (1996) have suggested that financial statement users be provided with non-financial performance information that can be used in conjunction with current financial data to assess future financial performance. While these policymakers suggest that non-financial performance information aids in the assessment of future financial performance, research that empirically investigates the usefulness of this non-financial information is limited. This study tests the value relevance of non-financial performance information for seven of the largest airlines during the period 1988-1996 using panel data econometric techniques. The value relevance of non-financial performance variables is examined on a stand-alone basis and after controlling for (1) earnings and changes in abnormal earnings and (2) other financial statement information.

The findings suggest that for non-financial performance metrics, load factor and available ton miles are positively associated with stock returns while market share and customer dissatisfaction are negatively associated with stock returns. In contrast to Amir and Lev's (1996) finding for wireless communications companies, accounting earnings and changes in abnormal accounting earnings are associated with stock returns for members of the airline industry. When

[1] American Institute of Certified Public Accountants (AICPA) Special Committee on Financial Reporting.

both traditional accounting variables (earnings and changes in abnormal earnings[2]) and non-financial performance variables are included in the same model, non-financial performance metrics exhibit incremental statistical significance.

In addition to earnings and changes in earnings, accounting financial statements include other details such as revenues, gross profit, assets, etc. Using financial statement details other than earnings and changes in abnormal earnings, this study also identifies financial statement variables that may proxy (referred to as "financial statement proxies") for the information reflected in non-financial performance metrics. Although the financial statement proxies are highly correlated with non-financial performance metrics, on a stand-alone basis, only the load factor proxy exhibits a statistical association with stock returns similar to its non-financial performance counterpart. When non-financial performance metrics, financial statement proxies and earnings and changes in abnormal earnings are included in the same model, both the financial statement proxies and non-financial performance metrics exhibit statistical associations with stock returns.

The results of this study contribute to the on-going debate related to the value relevance of non-financial performance variables and regarding the domain and boundaries of accounting information. First, in contrast to Amir and Lev's (1996) finding for the wireless communications industry, earnings and changes in abnormal earnings provide value relevant information on a stand-alone basis in the airline industry. Second, similar to Amir and Lev (1996), the findings suggest that financial statement information and non-financial performance information are complementary. Finally, the results suggest that for members of the airline industry, non-financial performance metrics provide value relevant information that is incremental to that contained in accounting financial statements.

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[2] Abnormal earnings are based on the definition provided in Ohlson (1995).

This paper is organized as follows: Chapter II will elaborate on the debate related to the domain of accounting. Relevant airline industry research will be discussed in more detail in Chapter III. Chapter IV will include an overview of airline commerce. The model will be developed and econometric approach outlined in Chapter V and data sources, the sample and variables presented in Chapter VI. Findings and sensitivity tests will be discussed in Chapters VII and VIII, respectively. Finally, contributions and limitations will be considered in Chapter IX.

Chapter 2:

The Financial Accounting Debate

The accounting profession is embroiled in a debate that considers whether the traditional financial reporting and disclosure model is adequate. Proponents of change argue that a dynamic business environment has eroded the utility of traditional financial statement data and related disclosure and, therefore, financial reporting does not provide investors and creditors with information necessary to assess future financial performance. To enhance traditional financial reporting, one consistent suggestion has been to provide financial statement users with non-financial performance information that is indicative of future financial results. In contrast, others charge that the value relevance of financial statements has not deteriorated in recent years and that proponents of change should carefully consider the effect(s) of any changes to the traditional financial reporting model.

Proponents of change include the AICPA Jenkins Committee, the Securities and Exchange Commission (SEC), practitioners and some academic researchers. The AICPA Jenkins Committee was charged with identifying information that companies should provide to investors and creditors. In 1994, the Committee concluded that "a lot is right with today's business reporting in the United States.... Yet, many users are strongly critical of certain aspects of (financial) reporting." One of the recommendations of the Jenkins Committee for meeting users' needs is that financial reporting should "focus more on the factors that create longer term value, including non-financial measures indicating how key business processes are performing."

Similarly, as part of a preliminary proposal to improve financial reporting, SEC Commissioner Wallman (1996) suggests a five-layered corporate reporting system that de-emphasizes recognition and focuses on providing more relevant information. Pertinent to this research, one layer would include information that is "highly relevant,.... consistently measurable

with a high degree of reliability" but does not meet the definition of an asset, liability or component of equity. In spirit, these arguments and proposals are consistent with FASB Statement of Financial Accounting Concepts No. 1: financial reporting should provide information that is useful (i.e., relevant) to present and potential investors and creditors and other users in making rational investment, credit and similar decisions.[3]

Although non-financial performance variables may be value relevant, research of this association is limited. For example, Birchard (1994) notes that the missing link in performance measurement is an "airtight correlation" between financial results and companies' progress in operating activities. Further, the author argues that this link will come from research demonstrating that non-financial performance variables are indicative of future bottom line results. In one of the first studies to document the value relevance of non-financial performance variables, Amir and Lev (1996) found that, in the high technology wireless communications industry, the explanatory power of non-financial performance variables overwhelmed that of traditional financial accounting variables and argued that their results indicate the importance of significantly expanding accounting reporting and disclosure to include non-financial information. In an industry such as wireless communications where most companies are young and incurring losses, non-financial performance metrics may be more informative about future profitability than traditional financial statement data.[4] However, in mature industries, such as airlines, non-financial performance variables may not embody value relevant information beyond that contained in traditional financial accounting reports. This research extends the work of Amir and Lev (1996) by examining whether non-financial performance variables are value relevant in the mature, capital

[3] The concept of value relevance is not explicitly defined in generally accepted accounting principles (GAAP).

[4] In 1985, cellular service subscribers totaled 340,000 versus 16 million in 1993. Further, Amir and Lev's (1996) sample companies reported earnings losses in 69% of the quarters observed.

asset intensive airline industry, an environment where such variables might be thought to occupy a less significant role. In addition, the research will incorporate non-financial variables such as customer satisfaction whose value relevance has not been empirically evaluated.

Although many advocates of changing financial reporting exist and their arguments have some empirical support, such views are not universal. For example, Francis and Schipper (1996) state that the common (and unacceptable) goal of the AICPA Jenkins Committee initiatives is to improve financial reporting by altering some or all of the elements of the current financial reporting model and/or by altering the fundamental nature of the assurance function. Further, the authors note that professional financial statement analysts, significant users of financial statement reporting and disclosure, have not expressed severe criticisms about the current financial reporting model. For example, the AIMR (Association for Investment Management and Research) prefer enhancement of Form 10-K annual reporting requirements rather than the broad, comprehensive model proposed by the AICPA Jenkins Committee.[5] To evaluate their contentions, Francis and Schipper (1996) examine the value relevance of financial (accounting) information using 95,252 firm-year observations during the period 1951-1993 and conclude that, overall, their tests yield no systematic evidence that financial statements have lost their value relevance. However, the authors note that their tests do not imply that efforts to improve financial reporting are inappropriate. The empirical results related to the value relevance of non-financial performance metrics in the airline industry contribute to this important accounting profession debate.

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[5] See Financial Reporting in the 1990s and Beyond, AIMR (1993).

Chapter 3:

Relevant Research in the Airline Industry

The following section describes prior airline industry research related to the non-financial performance metrics that are incorporated in this investigation. First, Schefczyk (1993) uses data envelopment analysis (DEA) to evaluate airline operating efficiency (i.e., the ratio of outputs to inputs). Using available flight tons per kilometer, flight operating costs, and non-flight assets as inputs and revenue per passenger kilometer and non-service revenues as outputs, the author finds that efficiency, load factor and the percentage of passenger revenues are positively associated with return on equity. Dresner and Xu (1995), on the other hand, examine the effect of three customer service variables on customer satisfaction and in turn on profitability for U.S. airlines. The authors analyze the association between customer satisfaction and on-time performance, mishandled baggage and ticket oversales and the association between these customer service variables and corporate profitability. The results strongly support the hypothesis that increasing customer service raises customer satisfaction and that increasing customer service improves corporate performance.

The work of Schefczyk (1993) and Dresner and Xu (1995) was extended by Behn and Riley (1998) who argue that load factor is an important indicator of both customer satisfaction and corporate financial performance and that market share and available ton miles (capacity) are also associated with corporate financial performance as measured by operating revenues, operating expenses and operating income. The authors test both a contemporaneous relationship and the ability of monthly non-financial performance metrics to predict quarterly financial performance. Their contemporaneous and predictive findings suggest that (1) customer satisfaction, load factor, market share and available ton miles are significant predictors of operating income and operating revenues and (2) customer satisfaction and available ton miles are significantly associated with expenses.

Based on the findings of these studies, it appears that timely non-financial performance metrics can be used to predict financial performance in the U.S. airline industry. However, as noted above, the recommendations of the Jenkins Committee (1994) and the arguments of Wallman (1995, 1996), Birchard (1994) and Amir and Lev (1996) suggest that the major focus of the debate is whether non-financial variables are indicative of future financial results. Thus, while the findings of prior research in the airline industry demonstrate both contemporaneous (i.e., same period) and short-term prediction links between non-financial performance variables and corporate financial performance (i.e., accounting variables), the results do not specifically address whether non-financial performance variables are significant indicators of long-term performance. Consistent with prior research, this study uses stock returns as a proxy for future financial performance.

Chapter 4:

The Airline Industry

On October 24, 1978, the Airline Deregulation Act (ADA) was enacted. Regulatory reform, which eliminated control of (1) entry and exit into the airline industry, (2) entry and exit into specific airline markets and (3) domestic fares, took place gradually until 1984 when the deregulation process was complete. Industry performance since regulatory reform has been turbulent. The industry recovered from an economic slump in 1984 just as the deregulation process was completed. In the latter part of the 1980s, as a result of an economic recovery and relatively low fuel prices, the largest three carriers, American, Delta and United Airlines were profitable and new capacity was continually added within the industry. However, as the 1980s came to an end, airlines suffered from declining revenues and spiraling costs. In addition, in 1990, Iraq invaded Kuwait and fuel costs escalated. An overall economic recession in the United States in 1989-90 resulted in decreased consumer travel budgets and the threat of terrorism depressed passenger levels even lower. In 1991, airline traffic declined for the first time in its then 67-year history. Now defunct air carriers such as Eastern Airlines bore the burden of industry decline; however, most airlines added debt to their financial structure from the acceptance of new aircraft ordered during prosperous times and from funding earnings deficits.

In response, airlines retreated into profitable markets, cut operating costs, restructured operations and are now preparing for an immediate future of increased competition. In 1996, airline traffic was again on the rise, capacity had leveled off and load factor (the percentage of seats sold) had improved. Ott and Neidl (1995) argue that the turbulent financial past is prologue for the future. Competition, especially from "no-frills" airlines such as Southwest, will continue to be problematic and the industry will continue to be cyclical.[6]

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[6] "No-frills" airlines provide minimum service levels and charge lower fares (by comparison to full service airlines) to reward passengers for enduring fewer services.

Chapter 5:

Methodology

Model Development:

To examine the relationship between financial (accounting), non-financial performance variables and stock returns, this study uses the Ohlson (1995) theoretical framework that explains the relation between firm equity value, financial statement data and other value relevant information. Using clean surplus accounting, where all changes in assets and liabilities unrelated to dividends must pass through the income statement, Ohlson (1995) derives the following valuation model:

$$P_{it} = f(BV_{it}, AE_{it}, V_{it}) \qquad (1)$$

where P_{it} represents the stock price per share for firm i in time t, BV_{it} represents book value per share for firm i in time t, AE_{it} represents abnormal earnings per share for firm i at time t and V_{it} represents "other" value relevant information for firm i in time t that modifies the prediction of future profitability. Abnormal earnings per share for firm i at time t is determined by subtracting from earnings per share for firm i in time t, the beginning of year book value multiplied by an appropriate discount rate.[7] To derive the relation between performance metrics and returns, assuming a linear relationship, the change in equation (1) is computed:[8]

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[7] Bernard (1995) uses a discount rate of 13% whereas Abarbanell and Bernard (1995) incorporate rates between 11% and 15%. Due to the subjective nature of choosing an appropriate discount rate, rates of 11%, 13% and 15% are examined in this study and the results are virtually unchanged from those presented in the Tables where 13% was incorporated. Some studies, including Abarbanell and Bernard (1995), use more complicated methods to estimate individual firms' cost of capital (discount rate). However, the results using company specific discount rates tend to yield results similar to those when all companies are examined using the same discount rate.

[8] Amir and Lev (1996) pose the following question: How should non-financial performance variables be incorporated in a valuation model? The authors note that, by its nature, the accounting system transforms primitive, non-financial metrics (e.g., hours, units, quantities, etc.) into monetary costs, earnings, assets and other traditional financial statement metrics. Thus, the accounting system "prices" non-financial performance metrics relative to each other so that "priced" hours, units, quantities, etc. are additive,

$$\Delta P_{it} = \delta_0 + \delta_1 \Delta BV_{it} + \delta_2 \Delta AE_{it} + \delta_3 \Delta V_{it} \qquad (2)$$

where δ represents regression coefficients. Because the change in book value equals earnings (X_{it}) minus dividends (d_{it}, $\Delta BV_{it} = X_{it} - d_{it}$), dividends can be added to both sides. Further, dividing both sides by $P_{i,t-\tau}$ yields returns on the left-hand side and a combination of accounting and non-financial information on the right-hand side as follows:[9]

$$\frac{\Delta P_{it} + d_{it}}{P_{i,t-\tau}} = \delta_0 + \delta_1 \frac{X_{it}}{P_{i,t-\tau}} + \delta_2 \frac{\Delta AE_{it}}{P_{i,t-\tau}} + \delta_3 \frac{\Delta V_{it}}{P_{i,t-\tau}}. \qquad (3)$$

Letting $\Delta NFPM_{it}$ represent non-financial performance metrics, ΔV_{it} is hypothesized to have the following characterization where K represents the number of non-financial performance variables:

$$\Delta V_{it} = \sum_{k=1}^{K} \Delta NFPM_{it}^{k}. \qquad (4)$$

Substituting for ΔV_{it} results in the following returns model:[10]

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resulting in traditional financial statements (i.e. income statement, balance sheet and statement of cash flows). Because of the theoretical relation between financial statement information and equity valuation, it is natural to relate them empirically as prior research has done. However, the means by which non-financial performance metrics should be incorporated in equity valuation is less obvious. Amir and Lev (1996) conclude that given no theoretical guideline for model specification, they combine financial and non-financial performance metrics linearly, while noting that an appropriate combination of these indicator variables deserves further consideration.

[9] Christie (1987) states that in return studies, the correct deflator is the market price of equity at the beginning of the stock return period. Stock returns, earnings and changes in abnormal earnings are expressed in terms of per share amounts prior to scaling by price in the beginning of the stock return period. In contrast, non-financial performance variables are not stated in per share amounts. Thus, the sensitivity of the results to non-financial performance variables being scaled by market value of equity at the beginning of the stock return period instead of the stock price at the beginning of the stock return period is explored in the sensitivity section.

[10] Christie (1987) derives the returns model from the price model, demonstrating that the two are algebraically equivalent.

$$R_{it} = \delta_0 + \delta_1 \frac{X_{it}}{P_{i,t-\tau}} + \delta_2 \frac{\Delta AE_{it}}{P_{i,t-\tau}} + \sum_{k=1}^{K} \delta_{k+2} \frac{\Delta NFPM_{it}^{k}}{P_{i,t-\tau}}. \qquad (5)$$

Empirically, R_{it} represents the raw return for firm i in time t $\left(R_{it} = (P_{it} - P_{i,t-\tau} + d_{it})/P_{i,t-\tau}\right)$ defined in equation (3) less the corresponding equally-weighted *CRSP* return. This returns model, developed within the Ohlson (1995) framework, is used to examine the value relevance of non-financial performance metrics.

Econometric Technique:

The sample includes seven companies from the airline industry (represented by i) and several quarterly periods (represented by t). Thus, the data set will be in panel format and panel data econometric techniques, fixed and random effects models, are used.[11] The fixed effects model is an appropriate model when the sample is focused on a specific set of firms and the researcher is concerned with making inferences about those sample firms but not about firms excluded from the sample (i.e., the remaining population). In contrast, when sample firms are examined to make inferences about a larger population, the random effects model is appropriate.[12] Because the

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[11] Panel data refers to data that is sampled on both a cross-sectional and time series basis. The major problem with a pooled OLS regression where firm and time differences are ignored is heterogeneity bias (i.e., model misspecification). Heterogeneity manifests itself in the following form:

$$e_{it}^{OLS} = \mu_i + \lambda_t + \varepsilon_{it}.$$

Thus, the OLS error component consists of μ_i that denotes the unobservable individual firm (i.e., state) effects, λ_t that denotes the unobservable time period effects and ε_{it} that denotes the residual disturbance (i.e., mutually independent white noise error terms). As a result of this heterogeneity, OLS estimates are biased and the OLS parameter variance-covariance matrix estimator is inconsistent (In samples where the number of firms (i) and the number of time periods (t) approach infinity, parameter estimates may be consistent). To account for the unobservable firm specific and time period effects, a fixed effects or random effects (panel data) model is required (i.e., Two-Way Error Component Regression Model).

[12] The major difference between a fixed effects and a random effects model is the treatment of the firm specific effects (μ_i) and the time specific effects (λ_t). With the fixed effects model (μ_i) and (λ_t) are treated as fixed in repeated samples whereas in the random effects model (μ_i) and (λ_t) are treated as random variables.

sample does not encompass the entire population of airlines and the results contribute to the debate regarding the value relevance of non-financial performance variables to investors, a random effects model appears to be the proper econometric technique provided the random effects model provides unbiased and consistent coefficient estimates. [13] In the findings section, the results for both fixed and random effects regressions are presented.

More specifically, the panel data regression model utilized to examine the value relevance of non-financial performance metrics is the following:

$$R_{it} = \delta_0 + \delta_1 \frac{X_{it}}{P_{i,t-\tau}} + \delta_2 \frac{\Delta AE_{it}}{P_{i,t-\tau}} + \sum_{k=1}^{K} \delta_{k+2} \frac{\Delta NFPM_{it}^{k}}{P_{i,t-\tau}} + \sum_{i=1}^{I-1} \mu_i Z_{\mu}^{i} + \sum_{t=1}^{T-1} \lambda_t Z_{\lambda}^{t} + \varepsilon_{it} \qquad (6)$$

where μ and λ represent the firm-specific and time-specific effects, Z_{μ} and Z_{λ} are firm and time dummy variables, respectively and δ refers to the regression coefficients. Firm and time dummy variables account in all regressions for firm-specific and time-specific effects, such as financial risk, not explicitly represented in equation (5). The random effects coefficients are calculated using a generalized least squares approach.

Empirical Analyses:

As stated in the introduction, the purpose of this research is to examine the value relevance to investors of non-financial performance variables, traditional accounting variables (earnings and changes in abnormal earnings) and other financial statement information in the airline industry. To accomplish

[13] Hausman Test - A critical assumption of the random effects model is that the unobserved heterogeneity (arising from firm specific and time period effects) is not correlated with the independent variables. If this assumption is violated, the random effect estimators are biased and inconsistent. In contrast, the fixed effects coefficient estimates are consistent estimators even if the unobserved heterogeneity is correlated with the independent variables. The Hausman Test is used to determine whether the random effect coefficients are biased and inconsistent.

this task, the following models are tested. First, to examine the value relevance of non-financial performance variables on a stand-alone basis, the following empirical model will be utilized:

$$R_{it} = \delta_0 + \sum_{k=1}^{K} \delta_k \frac{\Delta NFPM_{it}^k}{P_{i,t-\tau}} + \sum_{i=1}^{I-1} \mu_i Z_\mu^i + \sum_{t=1}^{T-1} \lambda_t Z_\lambda^t + \varepsilon_{it} \quad (7)$$

In model (7), the coefficients on accounting earnings and changes in abnormal earnings are restricted to zero.

Second, to examine the value relevance of traditional accounting variables (earnings and changes in abnormal earnings) on a stand-alone basis, model (8) is examined where the coefficients on the non-financial performance metrics are restricted to zero.

$$R_{it} = \delta_0 + \delta_1 \frac{X_{it}}{P_{i,t-\tau}} + \delta_2 \frac{\Delta AE_{it}}{P_{i,t-\tau}} + \sum_{i=1}^{I-1} \mu_i Z_\mu^i + \sum_{t=1}^{T-1} \lambda_t Z_\lambda^t + \varepsilon_{it} \quad (8)$$

Model (6) above represents the "full" model that includes non-financial performance variables and accounting variables (earnings and changes in abnormal earnings).

Finally, in addition to earnings and changes in earnings, accounting financial statements include other details such as revenues, gross profit, assets, etc. Using financial statement details other than earnings and changes in abnormal earnings, financial statement variables that may proxy (referred to as "financial statement proxies") for the information reflected in non-financial performance metrics are identified. These proxies are substituted into models (6) and (7) for non-financial performance variables to evaluate the value relevance of other financial statement information. In addition, the following model (9) that incorporates traditional accounting information (earnings and changes in abnormal earnings), non-financial performance variables and financial statement proxies is examined:

$$R_{it} = \delta_0 + \delta_1 \frac{X_{it}}{P_{i,t-\tau}} + \delta_2 \frac{\Delta AE_{it}}{P_{i,t-\tau}} + \sum_{k=1}^{K} \delta_{k+2} \frac{\Delta NFPM_{it}^{k}}{P_{i,t-\tau}} + \sum_{j=1}^{J} \delta_{j+k+2} \frac{\Delta \Pr oxy_{it}^{j}}{P_{i,t-\tau}} + \sum_{i=1}^{I-1} \mu_i Z_{\mu}^{i} + \sum_{t=1}^{T-1} \lambda_t Z_{\lambda}^{t} + \varepsilon_{it} \quad (9)$$

Chapter 6:

Data Sources, Sample and Variable Definitions

Data Sources:

Non-financial performance data are obtained from two sources. Since 1987, the U.S. Department of Transportation (DOT), Office of Consumer Affairs, has published the "*Air Travel Consumer Report*" (monthly) that provides airline operating statistics for major airlines related to on-time performance, mishandled baggage, ticket over-sales and customer complaints. Similarly, in 1973, the DOT began issuing the "*Air Carrier Traffic Statistics Monthly.*"[14] This report provides operating statistics such as revenue passenger miles, revenue load factor, passenger enplanements, etc. Both of these reports, which are compiled by an independent third party (i.e., DOT) based on airline company submissions, provide timely information that permits comparability among industry members. All financial data are obtained from *Compustat* tapes, *CD Disclosure*, 10-Ks or annual reports. Stock price and returns data are from *CRSP* (Center for Research of Security Prices) tapes.

Sample:

To evaluate the association between stock returns, financial and non-financial performance variables, the largest ten airlines that consistently appeared in the *Air Travel Consumer Report* between 1988 and 1996 were identified. *Compustat* tapes, *CRSP* Tapes, 10-Ks and/or annual reports were examined to identify public airlines filing with the Securities and Exchange Commission. As a result of this search procedure, three of the ten largest airlines, Continental, Northwest, and TWA were deleted because stock prices and returns were not available on *CRSP*.

[14] One may question whether the accounting profession should report and audit statistics that are available from other public sources. However, while the DOT collects and publishes airline industry operating statistics, non-financial performance metrics are not available for most industries. Thus, the purpose of this research is to make inferences regarding potential value relevance in other industries whose characteristics (e.g., mature, capital asset intensive, etc.) are similar but for which non-financial performance metrics are not available (e.g., other transportation industries, hotel industry, etc.).

Table 1
Variable Definitions and Predicted Signs

Variables	Predicted Signs	Variable Definitions
Dependent Variables:		
R		Stock return is computed as the period (quarterly) change in stock price plus dividends divided by the beginning of period stock price $((P_q-P_{q-1}+d_q)/P_{q-1})$ less the value-weighted *CRSP* return for the same period.
Independent Variables – Financial:		
EPS	+	Quarterly earnings (EPS) per share is measured as quarterly income before extraordinary items divided by the number of outstanding common shares scaled by stock price at the beginning of the stock return period. $((EPS_q)/P_{q-1})$.
ABEPS	+	Quarterly abnormal earnings (ABEPS) per share determined by subtracting from earnings (EPS) per share for the current quarter, the beginning of quarter book value per share multiplied by a discount rate of 13%. The change in this variable from the same period in the prior year is scaled by stock price at the beginning of the stock return period. $((\text{abnormal earnings}_q-\text{abnormal earnings}_{q-4})/P_{q-1})$.
Independent Variables - Non-Financial:		
CMPLNTFT	-	Change in quarterly fitted complaints from the same period of the prior year scaled by stock price at the beginning of the stock return period. $((\text{fitted complaints}_q-\text{fitted complaints}_{q-4})/P_{q-1})$.
LOADFCTR	+	Change in quarterly revenue load factor from the same period of the prior year scaled by stock price at the beginning of the stock return period. Load factor equals revenue ton miles divided by available ton miles. $((\text{load factor}_q-\text{load factor}_{q-4})/P_{q-1})$.
MKTSHR	?	Change in quarterly market share from the same period in the prior year scaled by stock price at the beginning of the stock return period. $((\text{market share}_q-\text{market share}_{q-4})/P_{q-1})$.
AVLMILES	+	Change in the quarterly available ton miles from the same period in the prior year scaled by stock price at the beginning of the stock return period. $((\text{available ton mile}_q-\text{available ton miles}_{q-4})/P_{q-1})$.

Table 1 (continued)
Variable Definitions and Predicted Signs

Variables	Predicted Signs	Variable Definitions
Independent Variables – Financial Statement Proxies:		
LFPROXY	+	Change in quarterly gross profit as a percent of assets from the same period of the prior year scaled by stock price at the beginning of the stock return period. ((load factor $proxy_q$-load factor $proxy_{q-4}$)/P_{q-1}).
MSPROXY	?	Change in quarterly revenue divided by total revenue for the seven airlines included in this study from the same period in the prior year scaled by stock price at the beginning of the stock return period. ((market share $proxy_q$-market share $proxy_{q-4}$)/P_{q-1}).
AVMPROXY	+	Change in quarterly assets from the same period in the prior year scaled by stock price at the beginning of the stock return period. ((capacity $proxy_q$-capacity $proxy_{q-4}$)/P_{q-1}).
Independent Variables – Time Dummies:		
YR96	?	Dichotomous variable that equals one for observations in the year 1996, zero otherwise.
YR95	?	Dichotomous variable that equals one for observations in the year 1995, zero otherwise.
YR94	?	Dichotomous variable that equals one for observations in the year 1994, zero otherwise.
YR93	?	Dichotomous variable that equals one for observations in the year 1993, zero otherwise.
YR92	?	Dichotomous variable that equals one for observations in the year 1992, zero otherwise.
YR91	?	Dichotomous variable that equals one for observations in the year 1991, zero otherwise.
YR90	?	Dichotomous variable that equals one for observations in the year 1990, zero otherwise.
Independent Variables – Firm Dummies:		
AMR	?	Dichotomous variable that equals one for American Airlines observations, zero otherwise.
ALASKA	?	Dichotomous variable that equals one for Alaska Airlines observations, zero otherwise.
AWEST	?	Dichotomous variable that equals one for America West Airlines observations, zero otherwise.
DELTA	?	Dichotomous variable that equals one for Delta Airlines observations, zero otherwise.
SWEST	?	Dichotomous variable that equals one for Southwest Airlines observations, zero otherwise.
UNITED	?	Dichotomous variable that equals one for United Airlines observations, zero otherwise.

Table 2
Descriptive Statistics

Variable	Mean	Std. Dev.	Median	Minimum	Maximum
CMPLNTFT	-0.014	0.091	-0.003	-1.184	0.096
LOADFCTR	0.092	0.869	0.008	-6.748	7.008
LFPROXY	0.082	0.764	0.004	-0.782	7.735
MKTSHR	-0.001	0.136	0.006	-1.369	0.276
MSPROXY	-0.013	0.128	0.003	-1.273	0.193
AVLMILES	557.5	6590.8	921.4	-62220.0	11540.0
AVMPROXY	9.34	27.81	9.24	-239.80	72.12
EPS	-0.060	0.521	0.007	-6.789	0.864
ABEPS	0.057	0.487	0.001	-0.692	5.771

Table 3
Correlation Matrix

	CMPLNTFT	LOADFCTR	LFPROXY	MKTSHR	MSPROXY
CMPLNTFT	1				
LOADFCTR	0.230	1			
LFPROXY	-0.295	0.818	1		
MKTSHR	0.536	0.292	0.037	1	
MSPROXY	0.565	0.113	-0.167	0.905	1
AVLMILES	0.469	-0.292	-0.554	0.716	0.834
AVMPROXY	0.637	0.011	-0.302	0.777	0.825
EPS	0.192	0.050	0.070	0.803	0.832
ABEPS	-0.415	0.648	0.897	-0.183	-0.410

	AVLMILES	AVMPROXY	EPS	ABEPS	
AVLMILES	1				
AVMPROXY	0.779	1			
EPS	0.614	0.626	1		
ABEPS	-0.752	-0.476	-0.148	1	

The remaining seven airlines include Alaska, America West, American, Delta, Southwest, United and USAir.[15]

Dependent Variables - Stock Returns:

The dependent variable, the raw stock return less equally-weighted *CRSP* return, will represent one quarter's return $\left(R_{it} = (P_{it} - P_{i,t-\tau} + d_{it})/P_{i,t-\tau}\right)$. To determine the appropriate return period, financial statement release dates were compared to non-financial performance release dates as follows. First, a manual examination of financial statement release dates found that all companies announced earnings within a few days of each other and even at fiscal year-end, the announcements usually occurred within 30 days after period end.[16] Regarding non-financial performance measures from the Department of Transportation, the information from the reports discussed in the data sources section are available monthly with a 4-5 week delay (e.g., January performance is released around the end of February or first of March).[17] Further, many airlines release their non-financial performance results to the financial press with a delay of a few weeks. As a result, a three-month stock return window is utilized. This return window starts two months

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[15] According to the "*Air Travel Consumer Report*," the 10 largest airlines account for more than 90% of domestic operating revenues. The seven sample airlines average 85% of the total passengers included in the top ten airlines. Therefore, data for this study represent approximately 76.5% of domestic operating revenue (i.e., 90% * 85% = 76.5%). For an additional discussion of sample airline characteristics, see Appendix C.

[16] The SEC requires that in fiscal quarters 1, 2 and 3, public companies must file their financial statements at the SEC within 45 days. In contrast, at year-end, public companies must file their 4th quarter and fiscal year financial statements at the SEC within 90 days. Although larger companies tend to announce their financial results within close proximity to one another, smaller companies may not operate on the same announcement schedule. Thus, variation in the issuance of financial statement data may exist. The earnings and earnings per share announcement dates were compared across the seven airlines included in the sample to ensure financial, non-financial and stock returns data were properly matched. Generally, the results of a manual search found that all companies announced earnings within a few days of each other and even at fiscal year-end, the announcements occurred within 15-30 days after quarter-end.

[17] The Department of Transportation does not maintain the release dates of their reports. Thus, an event study methodology is not possible.

prior to quarter-end and extends one month subsequent to quarter-end. In the sensitivity analyses section, a four-month window is evaluated.

Independent Variables - Non-Financial Performance Variables:

Lev and Thiagarajan (1993) and Behn and Riley (1998) rely primarily on analysts' reports to identify a set of variables hypothesized to be value relevant. Based on a search of *Value Line* and *Standard & Poor's* and relevant financial press articles, primarily from the *Wall Street Journal* and *Wall Street Journal Transcripts*, customer satisfaction, load factor, market share and capacity are fundamental drivers of financial performance.[18] Variable definitions and predicted signs are summarized in Table 1, descriptive statistics are presented in Table 2 and the correlation matrix appears in Table 3.[19] All variables are measured as the change from the same period in the prior year scaled by stock price at the beginning of the stock return period.[20]

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[18] Given that non-financial performance metrics related to the quantity of airlines capacity sold is available, if investors knew average price, an estimate of airline revenues could be calculated. However, although individual airline flight prices are available from sources such as the Internet, anecdotal evidence suggests the pricing of airfares is complicated. Cyert, Kumar and Williams (1995) state that airlines offer and thus maintain over 70,000 airfares and in 1991 airfare changes averaged 20,000 per day. In 1992, 6% of American Airline passengers paid "full fare" compared to 35.6% in 1982. Even though travel guides such as those published weekly in the *Wall Street Journal* provide information on prices, the most sophisticated investor would have difficulty estimating average price. The mix of passengers further complicates the issue. Petzinger (1995) states that business passengers tend to pay higher airfares than recreational passengers pay. Related to this phenomenon, Borenstein and Rose (1994) estimated a 36% variation in mean airline ticket prices for any given flight. The authors find that competitive routes, airport dominance and the airline owning the flight reservation system tend to increase dispersion while the number of flights (market density) and a larger percentage of tourists tend to decrease ticket price dispersion. The conclusion from these findings is that the pricing of airfares is a significant unknown to investors.

[19] Based on a review of Table 3, several independent variables are highly correlated. High correlation may result in multicollinearity where the coefficients are unbiased but the standard errors may be inflated. Correlations are discussed in the findings section when highly correlated independent variables are included in the same model.

[20] Because of seasonality of the airline industry (e.g., peak travel during summer months, Thanksgiving and Christmas), the independent variables are measured based on the change from the current period (i.e., independent variable$_q$) to the same period in the prior year (i.e., independent variable$_{q-4}$).

Customer Satisfaction (CMPLNTFT): Marketing research has demonstrated that the longevity of customer relationships favorably influences company profitability (e.g., Zeithaml, Berry and Parasuraman, 1996). Reichheld and Sasser (1990) contend that customer defections have a stronger impact on firm earnings than market share and other factors usually associated with competitive advantage. As a result, customer satisfaction is expected to be positively associated with future financial results. However, customer satisfaction is difficult to quantify for investors, because firms do not disclose the results of internal customer satisfaction surveys. Even if such disclosures were made public the likelihood that these surveys would be standardized across airlines is unlikely.

Therefore, investors may use customer service measures such as mishandled baggage, customer complaints, on-time arrivals, ticket oversales, and in-flight service to proxy for customer satisfaction. An instrumental variable for customer satisfaction is developed in Appendix A. Fitted complaints is measured as the predicted (fitted) values from regressing customer complaints (CMPLNT) on the customer satisfaction metrics. CMPLNTFT is measured as the change in fitted complaints from the same quarter in the prior year scaled by stock price at the beginning of the stock return period. Thus CMPLNTFT (fitted value of complaints [i.e., estimated complaints]) is expected to be negatively associated with stock returns because dissatisfied customers are not expected to continue flying with the same airline.

Load Factor (LOADFCTR): Load factor is revenue ton miles divided by available ton miles and reflects the percentage of seats sold. LOADFCTR is measured as the change in load factor from the same quarter in the prior year scaled by stock price at the beginning of the stock return period. Analysts and the financial press often refer to load factor as a key variable in the airline industry. For example, both *Standard & Poor's* and *Value Line* report historical and projected load factor performance for each airline as a single line item statistic and virtually every

airline analysts' report discusses load factor. Increases in load factor are predicted to have a positive effect on stock returns.

Market Share (MKTSHR): Market share is the number of passengers for the sample airline divided by the total number of passengers for the ten largest airlines. MKTSHR is measured as the change in market share from the same quarter in the prior year scaled by stock price at the beginning of the stock return period. Prior research on the relation between market share and profitability is mixed (see Fraering and Minor, 1994, for a summary). Further, since deregulation, the airline industry is notorious for its fierce competition. Recent trends in airline market share suggest that air carriers are concentrating on markets where they have a competitive advantage. Based on the competitive nature of the airline industry and the findings of Fraering and Minor (1994), the direction of the association between stock returns and market share is not predicted.

Capacity (AVLMILES): Airlines' capacity to service passengers is proxied by available ton miles. AVLMILES is measured as the change in available ton miles from the same quarter in the prior year scaled by stock price at the beginning of the stock return period. Available ton miles is explicitly discussed in analysts' reports related to the airline industry and mentioned in *Wall Street Journal* articles. Predicated on comments by O'Connor (1995), Ott and Neidl (1995) and written pronouncements by *Value Line* and *Standard & Poor's*, excess capacity was problematic in the airline industry in the late 1980's and early 1990's. However, over long periods, rational managers would be expected to make capacity increases that would tend to increase profitability. Thus, an increase in available seat miles is predicted to increase long-term profitability and a positive association between AVLMILES and stock returns is expected.

Independent Variables - Proxies for Non-Financial Performance Variables:

One objective of the research is to examine the value relevance of financial statement metrics other than earnings and changes in abnormal earnings that proxy for the non-financial performance variables incorporated in this study. Other than customer satisfaction, the following proxies for non-financial performance variables were identified through an empirical analysis of the data.[21]

Load Factor Proxy (LFPROXY): Load factor represents the ability of an airline to generate passengers given its capacity. The variable LFPROXY is measured as the change in gross profit as a percent of assets scaled by stock price at the beginning of the stock return period.[22]

Market Share Proxy (MSPROXY): The variable MSPROXY is measured as the change in company revenue as a percent of total revenues for the seven airlines included in this study scaled by stock price at the beginning of the stock return period.

Capacity Proxy (AVMPROXY): The variable AVMPROXY is measured as the change in assets scaled by stock price at the beginning of the stock return period.[23]

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[21] The primary criteria for choosing suitable financial statement proxies was a high correlation between a proxy candidate and the non-financial performance variable of interest. A more sophisticated search technique may have resulted in a stronger association between stock returns and financial statement information other than earnings and changes in abnormal earnings. This possibility is discussed in the conclusions and limitations chapter. A suitable proxy for customer satisfaction could not be identified in the financial statements.

[22] Alternative load factor proxies considered were revenues as a percent of assets and revenues as a percent of property plant and equipment. However, changes in these alternatives (scaled by beginning of period stock price) demonstrated little correlation with load factors changes (scaled by beginning of period stock price). An investigation of reasons for the apparent lack of association is beyond the scope of this study.

[23] Changes in property plant and equipment scaled by beginning of period stock price were considered as an alternative capacity metric. However, changes in property plant and equipment (scaled by beginning of

Independent Variables - Financial Performance Variables:

Financial performance variables included in the Ohlson model are earnings per share (EPS) and changes in abnormal earnings per share (ABEPS). These variables have also been incorporated in prior capital markets research. The definition of each variable is discussed in more detail in Table 1.

period stock price) demonstrated little correlation with available ton mile changes (scaled by beginning of period stock price). An investigation of reasons for the apparent lack of association is beyond the scope of this study.

Chapter 7:

Findings

Quarterly Non-Financial Performance Metrics, Earnings and Changes in Abnormal Earnings:

Results from regressing quarterly returns on quarterly non-financial performance variables, earnings (EPS) and changes in abnormal earnings (ABEPS) appear in Tables 4 (fixed effects) and 5 (random effects). The "model (7)" column of Table 4 presents fixed effects coefficients and standard errors when traditional financial accounting information, the coefficients on earnings (EPS) and changes in abnormal earnings (ABEPS), are restricted to zero.[24] Consistent with predictions, fitted complaints (CMPLNTFT) is negative and significantly associated with stock returns, suggesting that as complaints increase, stock returns tend to decrease. Also consistent with expectation, load factor (LOADFCTR) is significant and positive. This result suggests that the stock market reacts favorably when airlines are successful at selling their available capacity. The regression coefficient on market share (MKTSHR) is negative and significant. Thus, stock returns are generally negative for airlines capturing market share from their competitors.[25] However, capacity (AVLMILES) is positive and significantly associated with stock returns, suggesting that the stock market reacts favorably to airlines that expand their capacity. The combined results for market share (MKTSHR) and capacity (AVLMILES)

[24] All standard errors for the fixed effects results are Whites (1980) heteroscedastic-consistent estimates.

[25] This result is contrary to Behn and Riley (1998) who note a strong positive relationship between percentage changes in market share and short-term profitability changes in the airline industry. The differing results may be due to the longer-term focus of stock returns. While airlines may generate short-term profit upon entry into new markets, the highly competitive nature of the airline industry may make longer-term profitability more questionable. An alternative explanation is that, as demonstrated by Abarbanell and Bushee (1997), the results from fundamental analyses (where fundamental variables are regressed on long-term profits) may differ from the findings of capital market studies. Another potential explanation is that the result is an anomaly due to multicollinearity influencing the results. As noted in Table 2, the correlation between market share (MKRSHR) and capacity (AVLMILES) is .716. To examine this possibility, (1) capacity (AVLMILES) was dropped from the model and (2) returns were regressed on market share (MKTSHR) and firm and time dummy variables. In both cases, the coefficient on market share remained negative and significant with a p-value of .05 or lower. Thus, the result does not appear to be due to multicollinearity.

Table 4
Quarterly Fixed Effects Regressions of Returns on Non-financial and Financial Performance Metrics[a]

	Model (7)	Model (8)	Model (6)
Variable[b, c]	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
Constant	-0.079** (0.039)	0.018 (0.057)	-0.008 (0.054)
CMPLNTFT	-0.618*** (0.101)		-1.659*** (0.233)
LOADFCTR	0.150*** (0.019)		0.259*** (0.016)
MKTSHR	-0.747*** (0.126)		-0.705* (0.392)
AVLMILES	0.00002*** (0.000003)		0.00002*** (0.00001)
EPS		0.103*** (0.037)	0.054*** (0.018)
ABEPS		0.123*** (0.042)	0.052** (0.028)
YR96	-0.003 (0.039)	-0.083 (0.060)	-0.054 (0.063)
YR95	0.087** (0.045)	0.085 (0.059)	0.129** (0.064)
YR94	-0.092*** (0.036)	-0.113* (0.060)	-0.108** (0.055)
YR93	-0.047 (0.040)	-0.061 (0.077)	-0.087 (0.059)
YR92	-0.105*** (0.041)	-0.111* (0.059)	-0.135** (0.064)
YR91	-0.116*** (0.037)	-0.160*** (0.053)	-0.138*** (0.054)
YR90	0.028 (0.040)	-0.035 (0.057)	-0.044 (0.058)
AMR	0.054* (0.031)	0.012 (0.047)	0.050 (0.041)
ALASKA	0.068** (0.035)	0.013 (0.048)	0.064 (0.043)
AWEST	0.002 (0.051)	0.056 (0.085)	-0.022 (0.049)
DELTA	0.075** (0.034)	0.017 (0.047)	0.073* (0.040)
SWEST	0.085** (0.041)	0.022 (0.055)	0.078 (0.051)
UNITED	0.093** (0.036)	0.015 (0.065)	0.073 (0.062)
Adjusted R-squared	.30	.15	.43
Model F-statistic	6.2***	3.5***	9.3***

***,**,* indicate significance at the .01, .05 and .10 levels. The coefficients for CMPLNTFT, LOADFCTR, AVLMILES, EPS and ABEPS are one-tailed tests. The coefficients on all other variables are two-tailed tests. Fixed effects standard errors are White's (1980) heteroscedastic consistent estimates.

[a] The quarterly sample consists of 212 observations from 1989-1996.

[b] All variables are defined in Table 1.

[c] The technique use to generate CMPLNTFT, LOADFCTR, MKTSHR and AVLMILES for model (6) is discussed in the results section related to model (6).

Table 5
Quarterly Random Effects Regressions of
Returns on Non-financial and Financial Performance Metrics[a]

	Model (7)	Model (8)	Model (6)
Variable[b, c]	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
Constant	-0.052 (0.040)	-0.023 (0.031)	-0.016 (0.078)
CMPLNTFT	-0.572*** (0.140)		-1.623*** (0.290)
LOADFCTR	0.140*** (0.020)		0.253*** (0.031)
MKTSHR	-0.687*** (0.166)		-0.639* (0.387)
AVLMILES	0.00002*** (0.000004)		.00002** (0.00001)
EPS		0.105*** (0.031)	0.062*** (0.028)
ABEPS		0.131*** (0.033)	0.048*** (0.033)
Adjusted R-squared	.17	.12	.35
Hausman Test	1.00	0.61	1.00

***,**,* indicate significance at the .01, .05 and .10 levels. The coefficients for CMPLNTFT, LOADFCTR, AVLMILES, EPS and ABEPS are one-tailed tests. The coefficients on all other variables are two-tailed tests.

[a] The quarterly sample consists of 212 observations from 1989-1996.

[b] All variables are defined in Table 1.

[c] The technique use to generate CMPLNTFT, LOADFCTR, MKTSHR and AVLMILES for model (6) is discussed in the results section related to model (6).

indicates that on average the stock market reacts negatively as airlines expand their capacity at a pace faster than the industry but positively when airlines increase capacity by relatively similar amounts.

The adjusted r-squared for the model is .30 and the F-statistic suggests that the model fits the data reasonably well. The results for the "model (7)" column of Table 5 are similar to those presented in Table 4, where fitted complaints and market share are significant and negatively associated with stock returns and load factor and capacity are positively associated with stock returns. The random effects model adjusted r-squared deteriorates from .30 in Table 4 to .17 in Table 5 because the firm and time dummy variables are treated as random rather than fixed in repeated samples. The results of the Hausman test suggests that the coefficient estimates for the random effects model are unbiased because the independent variables are not correlated with the error term.

The "model (8)" column of Table 4 contains the results of regressing stock returns on traditional accounting variables, earnings (EPS) and changes in abnormal earnings (ABEPS). The purpose of this analysis is to compare the result to Amir and Lev's (1996) finding that in the emerging wireless communications industry, accounting information is not value relevant. In contrast to Amir and Lev (1996), in the airline industry traditional accounting information is value relevant. The coefficients on both earnings (EPS) and changes in abnormal earnings (ABEPS) are positive and highly significant. The results presented in "model (8)" column of Table 5 (random effects) are similar to those presented in Table 4. Both earnings (EPS) and changes in abnormal earnings (ABEPS) are significant and positively associated with stock returns. Similar to "model (7)," "model (8)" adjusted r-squared declines from .15 in Table 4 to .12 in Table 5. The large p-value on the Hausman test indicates that the coefficient values from the random effects model are unbiased.

In the "model (6)" column of Tables 4 (fixed effects) and 5 (random effects), the findings for the full model that includes non-financial performance variables, accounting earnings (EPS)

and changes in abnormal earnings (ABEPS) are presented. As observed in Table 3, the correlations between earnings (EPS) and market share (MKRSHR) is .803 and earnings (EPS) and capacity (AVLMILES) is .614, and the correlation between changes in abnormal accounting earnings (EPS) and fitted complaints (CMPLNTFT) is -.415, load factor (LOADFCTR) is .648 and available miles is -.752. To mitigate the effects of multicollinearity, each non-financial performance variable is regressed on earnings (EPS) and changes in abnormal earnings (ABEPS) and the residual value from these individual regressions is incorporated in "model (6)" along with earnings (EPS) and changes in abnormal accounting earnings (EPS). This technique has the effect of removing the significant correlations while allowing the identification of the additional information provided by the non-financial performance metric that is incremental to traditional accounting information. Further, the overall explanatory power of the models (adjusted R^2 and F-statistics) are identical whether the raw values or the residuals are included in the model.

The coefficient signs and significance levels for the non-financial performance variables are consistent with those presented in "model (7)" and "model (8)" columns. Customer complaints (CMPLNTFT) and market share (MKTSHR) are negative and significantly associated with stock returns. This result suggests that as complaints and market share increase, on average, stock returns decrease. In contrast, load factor (LOADFCTR) and capacity (AVLMILES) are positively associated with stock returns in the airline industry, indicating that increases in airline capacity and increases in the utilization of that capacity are reacted to favorably by the stock market. In addition, earnings (EPS) and abnormal earnings (ABEPS) are positively associated with stock returns in the airline industry. Overall these results suggest that similar information is imbedded in both traditional accounting information (earnings (EPS) and changes in abnormal earnings (ABEPS)) and non-financial performance metrics. However, the non-financial performance variables exhibit value relevance that is incremental to earnings (EPS) and changes in abnormal earnings (ABEPS).

Proxies for Non-Financial Performance Metrics, Non-Financial Performance Metrics, Earnings and Changes in Abnormal Earnings:

The non-financial performance measures examined in this study are available on a monthly basis. One reason for this timeliness (in comparison to quarterly financial statements) may be that non-financial performance measures do not require accrual adjustments necessary to produce periodic financial statements. Because non-financial performance metrics do not require accrual adjustment, the incremental cost to generate timely non-financial performance metrics may be less than the incremental cost to generate more timely financial statement information. Notwithstanding the issues of timeliness and preparation and dissemination costs of alternative performance metrics, one objective of this research is to examine financial statement variables other than earnings (EPS) and changes in abnormal earnings (ABEPS) that are available in the financial statements that may proxy for non-financial performance metrics.[26]

The following financial statement proxies were identified through an empirical analysis of the data: LFPROXY (change in gross profit as a percent of assets scaled by price at the beginning of the stock return period); MSPROXY (change in company revenue as a percent of total revenues for the seven airlines included in this study scaled by price at the beginning of the stock return period); and AVMPROXY (change in total assets scaled by price at the beginning of the stock return period). As observed in Table 3, the univariate correlation between load factor (LOADFCTR) and the proxy for load factor (LFPROXY) is .818, between market share (MKTSHR) and the proxy for market share (MSPROXY) is .905 and between capacity (AVLMILES) and the proxy for capacity (AVMPROXY) is .779. In addition, a regression of each non-financial performance variable on its proxy counterpart results in a highly significant (positive) coefficient.

[26] In an experimental market setting, Dietrich, Kachelmeier, Kleinmuntz and Linsmeier (1997) find that even though non-financial performance information is redundant, disclosures of non-financial performance metrics improve capital market participant's ability to value companies.

The results of the regression analysis of stock returns on the non-financial performance proxies appear in Tables 6 (fixed effects) and 7 (random effects). In the "model (7)" column, the results of regressing stock returns on fitted complaints (CMPLNTFT), the proxy for load factor (LFPROXY), the proxy for market share (MSPROXY) and the proxy for capacity (AVMPROXY) are presented. In this analysis, only the coefficient on the proxy for load factor (LFPROXY) is statistically significant. Thus, it appears that although the proxies are highly correlated with the non-financial performance metrics, with the exception of the load factor proxy (LFPROXY) the market does not incorporate this information in stock returns. The results from the random effects model (Table 7) parallel those of the fixed effects regression (Table 6).

In the "model (8)" column of Table 6, traditional accounting earnings (EPS) and changes in abnormal earnings (ABEPS) are added to the model. Fitted complaints (CMPLNTFT) is significant and negatively associated with stock returns. In addition, the proxy for load factor (LFPROXY) is positive and highly significant, suggesting that as airlines increase their gross profit as a percent of assets, stock returns tend to increase. Further, in contrast to prior results, the proxy for market share (MSPROXY) is positive and significant. Also inconsistent with prior results, the coefficients on earnings (EPS) and changes in abnormal earnings (ABEPS) are negative and significant. The results for the random effects model presented in "model (8)" column of Table 7 parallel those observed in Table 6. Results inconsistent with prior analyses may be due to multicollinearity between the financial statement proxies and earnings (EPS) and changes in abnormal earnings (ABEPS). For example, the correlation between the load factor proxy and changes in abnormal earnings (ABEPS) is .897 and between the market share proxy and earnings (EPS) is .832. This possibility is explored in the "model (9)" column of Tables 6 and 7.

In the "model (9)" column, variables representing the information contained in the non-financial performance variables are added to the model. High correlations are noted between the earnings (EPS) and changes in abnormal earnings (ABEPS) and non-financial metrics and the financial statement proxies in the correlation matrix (Table 3). To mitigate the effects of

Table 6
Quarterly Fixed Effects Regressions of Returns on Financial Statement Proxies, Non-financial and Financial Performance Metrics[a]

	Model (7)	Model (8)	Model (9)
Variable[b, c]	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
Constant	-0.030 (0.045)	-0.065 (0.043)	-0.038 (0.037)
CMPLNTFT	-0.155 (0.191)	-0.738*** (0.140)	-0.931*** (0.247)
LFPROXY	0.057** (0.027)	0.152*** (0.025)	0.202*** (0.033)
LOADFCTR			0.196*** (0.066)
MSPROXY	0.235 (0.277)	0.864*** (0.216)	-0.782 (0.525)
MKTSHR			-1.061*** (0.307)
AVMPROXY	-0.001 (0.001)	0.001 (0.001)	0.003*** (0.001)
AVLMILES			0.00001** (0.000007)
EPS		-0.224*** (0.037)	-0.020 (0.019)
ABEPS		-0.117*** (0.039)	0.002 (0.019)
YR96	-0.0004 (0.041)	0.019 (0.040)	-0.0004 (0.039)
YR95	0.087* (0.047)	0.107** (0.047)	0.086* (0.047)
YR94	-0.081** (0.041)	-0.084** (0.039)	-0.086** (0.037)
YR93	-0.042 (0.042)	-0.049 (0.041)	-0.047 (0.042)
YR92	-0.057 (0.043)	-0.086** (0.041)	-0.108** (0.045)
YR91	-0.110*** (0.040)	-0.120*** (0.038)	-0.121*** (0.038)
YR90	0.050 (0.041)	0.034 (0.040)	0.030 (0.041)
AMR	0.037 (0.036)	0.043 (0.035)	0.032 (0.030)
ALASKA	0.024 (0.041)	0.053 (0.039)	0.068* (0.038)
AWEST	0.026 (0.056)	-0.010 (0.052)	-0.020 (0.049)
DELTA	0.037 (0.038)	0.056 (0.037)	0.070** (0.032)
SWEST	0.034 (0.044)	0.049 (0.043)	0.083** (0.041)
UNITED	0.051 (0.042)	0.081** (0.041)	0.093*** (0.037)
Adjusted R-squared	.16	.25	.30
Model F-statistic	3.4***	4.7***	5.1***

***,**,* indicate significance at the .01, .05 and .10 levels. The coefficients for CMPLNTFT, LFPROXY, LOADFCTR, AVMPROXY, AVLMILES, EPS and ABEPS are one-tailed tests. The coefficients on all other variables are two-tailed tests. Fixed effects standard errors are White's (1980) heteroscedastic consistent estimates.

[a] The quarterly sample consists of 212 observations from 1989-1996.

[b] All variables are defined in Table 1.

[c] The technique use to generate CMPLNTFT, LOADFCTR, MKTSHR and AVLMILES for model (9) is discussed in the results section related to model (9).

Table 7
Quarterly Random Effects Regressions of Returns on Financial Statement Proxies, Non-financial and Financial Performance Metrics[a]

	Model (7)	Model (8)	Model (9)
Variable[b, c]	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
Constant	-0.016 (0.036)	-0.037 (0.063)	-0.021 (0.060)
CMPLNTFT	-0.140 (0.156)	-0.637*** (0.188)	-0.882*** (0.310)
LFPROXY	0.055*** (0.016)	0.138*** (0.036)	0.185*** (0.038)
LOADFCTR			0.191*** (0.069)
MSPROXY	0.289* (0.164)	0.896*** (0.256)	-0.573 (0.532)
MKTSHR			-0.956*** (0.307)
AVMPROXY	-0.001 (0.001)	0.0002 (0.0008)	0.002** (0.001)
AVLMILES			0.00001* (0.000007)
EPS		-0.202*** (0.048)	-0.007 (0.024)
ABEPS		-0.108** (0.060)	0.006 (0.027)
Adjusted R-squared	.09	.14	.20
Hausman Test	.92	.66	1.00

***,**,* indicate significance at the .01, .05 and .10 levels. The coefficients for CMPLNTFT, LFPROXY, LOADFCTR, MSPROXY, MKTSHR, AVMPROXY, AVLMILES, EPS and ABEPS are one-tailed tests. The coefficients on all other variables are two-tailed tests.

[a] The quarterly sample consists of 212 observations from 1989-1996.

[b] All variables are defined in Table1.

[c] The technique use to generate CMPLNTFT, LOADFCTR, MKTSHR and AVLMILES for model (9) is discussed in the results section related to model (9).

multicollinearity, for each non-financial performance metric, the non-financial performance variable is regressed on its financial statement proxy and earnings (EPS) and changes in abnormal earnings (ABEPS) (e.g., load factor (LOADFCTR) is regressed on the proxy for load factor LFPROXY, earnings (EPS) and changes in abnormal earnings (ABEPS)). Similarly, each financial statement proxy is regressed on earnings (EPS) and abnormal earnings (ABEPS). The residuals from these individual regressions are incorporated along with earnings (EPS) and changes in abnormal earnings (ABEPS) in the full model. The results are presented in the "model (9)" column of Tables 6 and 7.

Without exception, the statistical association between the non-financial performance variables and stock returns is consistent with the results presented in Tables 4-5. In addition, the proxies for load factor (LFPROXY) and capacity (AVMPROXY) are positive and significantly associated with stock returns. Only the proxy for market share is not statistically significant. Further, in this analysis, earnings (EPS) and changes in abnormal earnings (ABEPS) are not significant. The results from the random effects model (Table 7) parallel those of the fixed effects regression (Table 6). Overall, the results from Tables 6 and 7 suggest that although the financial statements contain information that is highly correlated with the non-financial performance metrics incorporated in this study, the stock market reacts incrementally to non-financial performance metrics.

Chapter 8:

Sensitivity Testing

To examine the sensitivity of these results, additional analyses are performed for (1) a longer returns window, (2) the effects of macro-economic information, (3) the effects of bankruptcies, (4) the effects of airline accidents and (5) alternative specifications of the dependent variables. In addition, because non-financial performance variables are available on a monthly basis whereas traditional accounting information is disclosed quarterly, the relationships examined in Tables 4-5 are also tested on a monthly basis in Appendix B.

First, because in some periods, non-financial and traditional accounting information may be released with delay and because often accounting earnings (EPS) information is available before the detailed financial statements, a four-month return window is evaluated. This return window extends from two months before quarter end to two months after quarter end. Generally, the results of these analyses are qualitatively similar to those presented herein, where customer complaints (CMPLNTFT) and market share (MKTSHR) are negative and significantly associated with stock returns and load factor (LOADFCTR) and capacity (AVLMILES) are positively associated with stock returns.

In some cases, it could be argued that non-financial performance metric changes parallel changes in macro-economic variables. For example, when the economy is growing, airlines are likely to operate closer to capacity (and load factor is likely to increase). To examine this possibility, using quarterly state income data and the geographic areas covered by each airline, a weighted average macro-economic factor was developed. Changes in the macro-economic factor were incorporated in the quarterly analyses and the results were qualitatively similar to those presented in Tables 4-7. Changes in the weighted average macro-economic factor from both the prior quarter and same period of the prior year were never statistically significant.

During the period examined in the study America West Airlines filed for bankruptcy (June 1991 to August 1994). A dichotomous variable was created which equaled zero for all airlines and

all periods except America West for the quarters ending June 1991 through September 1994 which were coded one. This variable was then added to the quarterly models. The coefficient on the bankruptcy dummy variable was negative and significant and the results for the other variables discussed in prior analyses were qualitatively unchanged.

Chance and Ferris (1987) find a significant negative association between airline accidents and stock returns. During the period of this study, the airlines included in this sample experienced eleven events with ten fatalities or more. For the quarters in which each of these events occurred a dichotomous variable was set to one for the sample airline that experienced the accident, zero otherwise. The coefficient on this dummy variable was significant and negative and the results for the other variables were qualitatively similar to those presented in Tables 4-7.

Several alternative specifications of the non-financial performance variables are examined to evaluate the robustness of the results presented in Tables 4 and 5 (specifically, "model (6)" and "model (7)").[27] First, Amir and Lev (1996) do not scale non-financial performance variables. When unscaled changes in non-financial performance variables are substituted into "model (7)" and "model (6)", fitted complaints (CMPLNTFT) and market share (MKTSHR) are negatively associated with stock returns while load factor (LOADFCTR) and available ton miles (AVLMILES) are positively associated with stock returns. In addition, in "model (6)", changes in abnormal earnings (ABEPS) is also positively associated with stock returns. In this analysis, because the results related to unscaled changes in available ton miles (AVLMILES) may be related to size differences among the airline, available ton miles (AVLMILES) is scaled by the market value of equity at the beginning of the stock return period. In "model (7)" which includes only non-financial performance metrics, the significance of market share (MKTSHR) declines to the .10 level and available ton miles (AVLMILES) is no longer significant.

[27] In each of the "alternative specification" of the independent variables, returns (R), earnings (EPS) and changes in abnormal earnings (ABEPS) are scaled by stock price in the beginning of the stock return period. Only the measurement of the non-financial performance variables is changed as described in the text.

In another sensitivity examination, non-financial performance variables are scaled by the market value of equity at the beginning of the stock return period. In "model (7)" where the coefficients on earnings (EPS) and changes in abnormal earnings (ABEPS) are restricted to zero, the significance level and signs of all the non-financial performance variables is virtually identical to those presented in Tables 4 and 5. For equation (6) which includes both non-financial performance metrics and earnings (EPS) and changes in abnormal earnings (ABEPS), the signs and significance levels of fitted complaints (CMPLNTFT), load factor (LOADFCTR) and available ton miles (AVLMILES) are the same as those presented in Tables 4 and 5. However, market share (MKTSHR), earnings (EPS) and changes in abnormal earnings (ABEPS) are no longer statistically significant.

Finally, Behn and Riley (1998) incorporate percentage changes in their examination of non-financial performance variables. To ensure comparability between studies, non-financial performance variables are measured as percentage changes (i.e., $[(NFPM_q - NFPM_{q-1}) / NFPM_{q-4}]$) scaled by stock price at the beginning of the stock return period. With regard to "model (7)," the results of these analyses are qualitatively similar to those presented herein, where customer complaints (CMPLNTFT) and market share (MKTSHR) are negative and significantly associated with stock returns and load factor (LOADFCTR) and capacity (AVLMILES) are positively associated with stock returns. Related to "model (6)," only fitted complaints (CMPLNTFT) and load factor (LOADFCTR) are significantly associated with stock returns. In addition, neither earnings (EPS) nor changes in abnormal earnings (ABEPS) are statistically significant. Similarly, on a stand-alone basis, the statistical association between stock returns and fitted complaints (CMPLNTFT), load factor (LOADFCTR), market share (MKTSHR) and available ton miles (AVLMILES) appears robust to alternative specifications. However, only fitted complaints (CMPLNTFT) and load factor (LOADFCTR) consistently demonstrate incremental explanatory power over earnings (EPS) and changes in abnormal earnings (ABEPS) when alternative variable specification are examined.

Chapter 9:

Contributions and Limitations

Based on arguments cited by Birchard (1994), The Jenkins Committee (1994), Wallman (1995, 1996), Amir and Lev (1996) and Francis and Schipper (1996), the domain of accounting information and, more specifically, the boundaries of financial reporting and disclosure, are important topics facing the accounting profession. In this research, an examination of the association between non-financial performance variables and stock returns in the U.S. airline industry is presented. Amir and Lev (1996) note that industry valuation studies that consider financial and non-financial variables are rare in market-based accounting research, which tends to rely heavily on large, cross-sectional (inter-industry) analysis. The results from this study contribute to the body of research related to the value relevance of non-financial performance metrics to investors and provide empirical evidence related to an important topic in the accounting profession.

The findings suggest that load factor and capacity (available ton miles) are positively associated with stock returns while market share and customer dissatisfaction are negatively associated with stock returns. In contrast to Amir and Lev's (1996) finding for wireless communications companies, accounting earnings (EPS) and changes in abnormal accounting earnings (EPS) are associated with stock returns for members of the airline industry. Traditional accounting variables and the non-financial performance variables included in this study are highly correlated and when both accounting and non-financial performance variables are included in the same model, earnings (EPS) and changes in abnormal earnings (ABEPS) are statistically significant while non-financial performance metrics exhibit incremental value relevance.

Some of the results presented in this research are inconsistent with those found by Behn and Riley (1998). The authors found a significant positive association between market share and short-term profitability and a negative association between capacity and short-term profits. In contrast, in this examination, the associations between these non-financial performance metrics and

stock returns are significant but reversed. Stock returns appear to be positively associated with capacity increases but negatively associated with market share increases. The major difference between the two studies is that Behn and Riley (1998) use a short-term fundamental analysis approach while this study incorporates a capital markets approach, focusing on relationships between non-financial performance metrics and long-term profitability. Research using a long-window fundamental analysis approach, where the association between non-financial performance variables and measures of long-term profitability is examined, may reconcile the conflicting results from the two studies.

One of the main limitations of this research is that non-financial performance variable hypotheses are developed from analysts' written pronouncements and anecdotal assertions from financial press articles. Therefore, neither a solid theoretical nor analytical modeling foundation exists for variable predictions. Although the hypotheses are intuitive, the explicit means by which non-financial performance variables track into future financial performance is not obvious. Thus, one extension may be for researchers to theoretically model the association between non-financial and financial performance. This may be especially important because in the airline industry, many of the non-financial performance variables incorporated in this research are disclosed monthly whereas financial statement data are systematically released quarterly.

Another limitation of this research is that it is completed at the industry level. Both sample size and generalizability of the results are adversely impacted. However, the specificity of analysis and insights gained in industry studies are often more explicit than general cross-sectional studies. Further, the listing of non-financial performance variables incorporated in this study is not complete. One may argue that variables related to geographic coverage, hub concentration, haul length and frequent flier membership are important non-financial performance variables. However, Amir and Lev (1996) argue that the inclusion of additional non-financial performance metrics would only strengthen the association between stock returns and non-financial performance information. Finally, the procedure used to select financial statement proxies lacks sophistication.

If a more sophisticated procedure was used to identify financial statement proxies, for example Ou (1990) and Ou and Penman (1989), the results for the financial statement proxies may have been more consistent with those of the non-financial performance metrics examined in this study.

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Appendices

Appendix A

Development of a Proxy Variable for Customer Satisfaction

Because airline data explicitly related to customer satisfaction are not available, an instrumental variable (i.e., proxy) is developed and this customer satisfaction proxy is incorporated in the statistical models to examine its association with stock prices and returns. The variables are incorporated in prior research by Dresner and Xu (1995) and Behn and Riley (1998) and are briefly discussed below. Variable descriptions appear in Table A1. For a more complete discussion, please refer to these papers.

Table A1
Variable Definitions and Predicted Signs

Variables	Predicted Sign	Variable Definitions
Dependent Variable:		
CMPLNT		Quarterly rate of complaints per 100,000 passengers.
Independent Variables:[A2]		
ONTIME	-	Quarterly percentage of on-time flights.
MISBAGS	+	Quarterly rate of mishandled baggage per 1,000 passengers.
OVERSALE	+	Quarterly rate of passengers involuntarily denied boarding ("bumped") per 10,000 passengers.
INFLIGHT	+	Quarterly revenue load factor is measured as revenue ton miles divided by available ton miles.

Independent Variables - Customer Satisfaction Variables:

On-Time Performance (ONTIME): ONTIME is measured as the percentage of flights that arrive within 15 minutes of the scheduled time shown in the carriers' Computerized Reservation System (CRS). On-time performance is predicted to have a positive effect on customer satisfaction and thus a negative association with customer complaints.

[A2] Except for INFLIGHT which appears in the Department of Transportation "*Air Carrier Statistics Monthly,*" all customer service variables appear in the Department of Transportation "*Air Travel Consumer Report*" (monthly).

Mishandled Baggage (MISBAGS): MISBAGS is measured as the rate of mishandled baggage per 1,000 passengers from lost, damaged, delayed or pilfered bags. Mishandled baggage is predicted to have a negative effect on customer satisfaction and thus a positive association with customer complaints.

Ticket Oversales (OVERSALE): OVERSALE is measured as the number of passengers who hold confirmed reservations and are involuntarily denied boarding (i.e., bumped) per 10,000 passengers. Ticket oversales are predicted to have a negative effect on customer satisfaction and a positive association with customer complaints.

In-flight Service (INFLIGHT): INFLIGHT (which is identical to LOADFCTR) is the ratio of revenue ton miles to total available ton miles and reflects the percentage of airline capacity used to generate revenues. This variable is hypothesized to effect customer service because the higher the percentage of sold seats, the less in-flight service (i.e., individual attention) passengers receive and the more crowded the flights. In-flight service is predicted to have a negative effect on customer satisfaction and thus a positive association with customer complaints.

The Customer Satisfaction Model:

The analysis of the effect of customer service variables on customer satisfaction and, in turn, on future financial performance is estimated using an instrumental-variables approach. This approach is employed because customer satisfaction variables such as on-time arrival, mishandled baggage, ticket oversales and in-flight service are hypothesized to have an indirect effect on stock returns. In addition, customer satisfaction is unobservable and can only be measured indirectly as a function of customer service levels and the number of complaints submitted by passengers. Therefore, the relationship of customer service variables and customer complaints is estimated and

a fitted (i.e., predicted) value of customer complaints that proxies for customer satisfaction is incorporated in the financial performance regressions. The following ordinary least squares regression is used to develop the customer service proxy (CMPLNTFT) used in the financial performance regressions:

$$CMPLNT = \alpha_0 + \alpha_1 ONTIME + \alpha_2 MISBAGS + \alpha_3 OVERSALE + \alpha_4 ONBOARD + \sum_{t=1}^{9} \alpha_{4+t} YR\,89-96 + \sum_{i=1}^{7} \alpha_{13+i} AIRLINE + \varepsilon$$

This equation measures the ability non-financial customer service variables to customer satisfaction (proxied by customer complaints).

Findings:

Descriptive statistics, the correlation matrix and regression results are included in Tables A2, A3 and A4, respectively. Consistent with prior research, on-time performance is negatively associated with customer complaints (our proxy for customer satisfaction) both on a quarterly and monthly basis. In contrast, mishandled baggage and crowded flights are positively associated with customer complaints. Ticket oversales (which is not available on a monthly basis) does appear to be associated with customer satisfaction.[A1]

[A1] Behn and Riley (1996) find a significant negative association between percentage changes in OVERSALES and customer complaints. When the variable is measured as percentage changes, OVERSALES demonstrate a significant negative association with complaints for the data included in this study.

Table A2
Descriptive Statistics

Variable	Mean	Std. Dev.	Median	Minimum	Maximum
OTQ	79.857	6.034	79.850	60.400	94.600
MBQ	5.712	1.550	5.499	3.306	12.410
OSQ	1.828	2.217	1.090	0.030	19.380
TRLFQ	53.145	4.443	53.039	40.420	62.980

Table A3
Correlation Matrix

	ONTIME	MISBAGS	OVERSALE	INFLIGHT
ONTIME	1			
MISBAGS	-0.486	1		
OVERSALE	0.077	0.077	1	
INFLIGHT	-0.152	-0.119	-0.190	1

Table A4

Regression of Complaints on Customer Service Variables

	Quarterly[a]	Monthly[b]
Variable[c]	Coefficient (Std. Error)	Coefficient (Std. Error)
Constant	1.354** (0.649)	1.727*** (0.414)
ONTIME	-0.026*** (0.006)	-0.013*** (0.003)
MISBAGS	0.065*** (0.022)	0.020* (0.014)
OVERSALE	-0.008 (0.014)	[d]
INFLIGHT	0.032*** (0.008)	0.010*** (0.004)
YR96	-0.770*** (0.105)	-0.624 ***0.073
YR95	-0.657*** (0.097)	-0.634*** (0.069)
YR94	-0.530*** (0.096)	-0.542*** (0.068)
YR93	-0.469*** (0.094)	-0.515*** (0.067)
YR92	-0.201** (0.097)	-0.290*** (0.068)
YR91	-0.137 (0.095)	-0.206*** (0.067)
YR90	-0.235*** (0.088)	-0.221*** (0.065)
AMR	0.083 (0.083)	0.088 (0.061)
ALASKA	-0.317*** (0.082)	-0.385*** (0.061)
AWEST	0.356*** (0.097)	0.353*** (0.064)
DELTA	-0.510*** (0.084)	-0.444*** (0.062)
SWEST	-0.285*** (0.098)	-0.485*** (0.065)
UNITED	-0.127 (0.098)	0.046 (0.068)
Adjusted R-squared	.64	.48
Model F-statistic	24.6***	39.3***

***, **, * indicate significance at the .01, .05 and .10 levels. The coefficients for ONTIME, MISBAGS, OVERSALE and INFLIGHT are one-tailed tests. The coefficients on all other variables are two-tailed tests.

[a] The quarterly sample consists of 212 observations from 1989-1996.

[b] The monthly sample consists of 659 observations from 1989-1996.

[c] All variables are defined in Table 1.

[d] Ticket oversales (OVERSALE) is not available on a monthly basis.

Appendix B

Monthly Analysis of Non-financial Performance and Accounting Information

Because non-financial performance variables are available on a monthly basis whereas traditional accounting information is disclosed quarterly, the relationships examined above are also tested on a monthly basis in Appendix B: Tables 1 (fixed effects) and 2 (random effects).[B1] In the "model (7)" column, monthly stock returns are regressed on monthly non-financial performance variables and excluded from the model are earnings (EPS) and change in abnormal earnings (ABEPS). The findings from the analysis of monthly variables are unchanged from the quarterly results presented Tables 4 and 5 except for the coefficient on fitted complaints which is negative and significant at the .10 in the monthly analysis versus .01 level in the quarterly analysis.

In the "model (8)" column, the results of regressing returns on earnings (EPS) and changes in abnormal earnings (ABEPS) are presented. In this analysis only changes in abnormal accounting earnings (EPS) have significant explanatory power for returns. Given the positive and significant association noted in the quarterly analyses, this result is probably due to earnings (EPS) and changes in abnormal earnings (ABEPS) being constrained to the same value for three consecutive months. In the "model (6)" column of Appendix B: Tables 1 and 2, the results of the full model including both monthly non-financial performance variables and quarterly earnings (EPS) and changes in abnormal accounting earnings (EPS) are presented. Similar to the "model (6)" column of Tables 4 and 5, the residuals from individual regressions of the non-financial performance variables on earnings (EPS) and changes in abnormal earnings (ABEPS) are included in the full model. In this analysis, load factor (LOADFCTR), market share (MKTSHR) and capacity (AVLMILES) are all significantly associated with stock returns as found in prior

[B1] In this analysis, monthly stock returns are computed as discussed in Table1 and earnings (EPS) and changes in abnormal earnings (ABEPS) are control variables. As a result the quarterly values for each variable scaled by stock price at the beginning of the stock return period is included in the regression models. Because of measurement error in these variables, traditional accounting information may not contain the value relevance observed in the quarterly regressions.

Table B1
Monthly Fixed Effects Regressions of
Returns on Non-financial and Financial Performance Metrics[a]

	Model (7)	Model (8)	Model (6)
Variable[b, c]	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
Constant	-0.016 (0.016)	-0.010 (0.016)	-0.005 (0.016)
CMPLNTFT	-0.113* (0.082)		-0.030 (0.112)
LOADFCTR	0.047*** (0.008)		0.045*** (0.008)
MKTHR	-0.315*** (0.074)		-0.374*** (0.076)
AVLMILES	0.000005*** (0.000001)		0.000005*** (0.000001)
EPS		-0.001 (0.011)	-0.003 (0.014)
ABEPS		0.026** (0.013)	0.002 (0.012)
YR96	-0.001 (0.015)	0.004 (0.015)	-0.004 (0.015)
YR95	0.029* (0.017)	0.031* (0.017)	0.025 (0.017)
YR94	-0.019 (0.015)	-0.012 (0.016)	-0.018 (0.016)
YR93	0.001 (0.015)	0.005 (0.016)	-0.005 (0.015)
YR92	-0.027** (0.014)	-0.012 (0.014)	-0.024* (0.014)
YR91	-0.037** (0.016)	-0.034** (0.016)	-0.034** (0.015)
YR90	0.018 (0.015)	0.024 (0.015)	0.019 (0.015)
AMR	0.005 (0.015)	0.004 (0.015)	0.001 (0.015)
ALASKA	0.009 (0.015)	0.001 (0.016)	0.005 (0.016)
AWEST	-0.011 (0.020)	0.002 (0.021)	-0.008 (0.020)
DELTA	0.013 (0.015)	0.005 (0.015)	0.010 (0.015)
SWEST	0.031* (0.017)	0.018 (0.017)	0.029* (0.017)
UNITED	0.016 (0.016)	0.009 (0.017)	0.012 (0.017)
Adjusted R-squared	.09	.03	.10
Model F-statistic	4.9***	2.4***	5.9***

***,**,* indicate significance at the .01, .05 and .10 levels. The coefficients for CMPLNTFT, LOADFCTR, AVLMILES, EPS and ABEPS are one-tailed tests. The coefficients on all other variables are two-tailed tests. Fixed effects standard errors are White's (1980) heteroscedastic consistent estimates.

[a] The monthly sample consists of 659 observations from 1989-1996.

[b] All variables are defined in Table 1 except monthly stock returns are computed and monthly non-financial performance metrics are measured as the change for the current month from the same month in the prior year scaled by stock price at the beginning of the stock return period.

[c] The technique use to generate CMPLNTFT, LOADFCTR, MKTSHR and AVLMILES for model (6) is discussed in the findings section related to model (6).

Table B2
Monthly Random Effects Regressions of
Returns on Non-financial and Financial Performance Metrics[a]

	Model (7)	Model (8)	Model (6)
Variable[b, c]	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
Constant	-0.010 (0.013)	-0.004 (0.008)	-0.002 (0.020)
CMPLNTFT	-0.095* (0.055)		-0.019 (0.078)
LOADFCTR	0.045*** (0.007)		0.044*** (0.008)
MKTHR	-0.303*** (0.049)		-0.370*** (0.054)
AVLMILES	0.000004*** (0.000001)		0.000005*** (0.000001)
EPS		0.001 (0.008)	-0.001 (0.008)
ABEPS		0.026*** (0.008)	0.002 (0.009)
Adjusted R-squared	.07	.02	.09
Hausman Test	1.00	.44	1.00

***,**,* indicate significance at the .01, .05 and .10 levels. The coefficients for CMPLNTFT, LOADFCTR, AVLMILES, EPS and ABEPS are one-tailed tests. The coefficients on all other variables are two-tailed tests.

[a] The monthly sample consists of 659 observations from 1989-1996.

[b] All variables are defined in Table 1 except monthly stock returns are computed and monthly non-financial performance metrics are measured as the change for the current month from the same month in the prior year scaled by stock price at the beginning of the stock return period.

[c] The technique use to generate CMPLNTFT, LOADFCTR, MKTSHR and AVLMILES for model (6) is discussed in the findings section related to model (6).

analyses. However, the coefficients on earnings (EPS) and changes in abnormal earnings (ABEPS) do not exhibit statistical significance. This result is mostly likely due to the traditional accounting variables being constrained to the same value each period. The major insight derived from these analyses is that the stock market incorporates the information contained in the monthly non-financial performance metrics as they are released. However, the results reveal little about the relative contribution of traditional accounting information compared to non-financial information.

Overall, these results suggest that as complaints increase; stock returns tend to decrease, the stock market reacts favorably when airlines are successful at selling their available capacity; stock returns are generally negative for airlines capturing market share from their competitors; and the stock market reacts favorably to airlines that expand their capacity. The models adjusted r-square's range from .03 for the fixed effects regression of earnings (EPS) and changes in abnormal earnings (ABEPS) on returns to .10 for the full model fixed effects regression. Similar to Table 5, the data examined in Appendix B: Table 2 fail to reject the Hausman test statistic indicating that the coefficients from the random effects model are unbiased.

Appendix C

Discussion of Sample Airline Characteristics

The final sample includes seven airlines: Alaska, America West, American, Delta, Southwest, United and USAir. Each of these airlines generates the majority of their revenues from passenger flight service.

Alaska Airlines is a regional airline providing flight service primarily in the northwestern United States, including Alaska.

America West is the nation's ninth largest airline. With hubs in Phoenix and Las Vegas, the America West operates primarily in western portion of the country. The airline filed for bankruptcy in June of 1991 and emerged from bankruptcy in August of 1994.[C1]

American, Delta and United Airlines are the three largest air carriers in the United States with flights covering most geographic areas. Each of these airlines also has a significant international presence.

Southwest Airlines is generally considered a low-cost regional provider, operating in 45 cities across 24 states primarily in the western region of the country.

USAir Group provides passenger air service to approximately 145 cities in the United States. The airline also has some international routes.

[C1] TWA and Continental, airlines excluded from the sample because of data limitations, were also bankrupt during the period examined in this research.

VITA

Richard Anthony Riley, Jr. was born on April 18, 1962 in Wheeling, West Virginia. He graduated from Bridgeport High School (Bridgeport, Ohio) in 1980. He immediately entered Wheeling Jesuit University (formerly Wheeling College) and graduated with a degree in accounting in May 1984. Proceeding to graduate school, he received his masters in professional accountancy from West Virginia University. After marrying Shelley Hedy Samuel on April 23, 1994, he was returned to higher education complete his academic training in the doctoral program at the University of Tennessee at Knoxville. After graduation in May 1998, he and his family, including son Connor, moved to Morgantown, West Virginia, where he has a position as an assistant professor of accounting at West Virginia University.