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DISTORTIONS IN THE MEASUREMENT OF THE EFFICIENCY OF FINANCIAL LEVERAGE STRATEGIES IN THE AIRLINE INDUSTRY WHEN OPERATING LEASES ARE IGNORED

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ABSTRACT

The Financial Accounting Standards Board and the International Accounting Standards Board have set forth a proposal requiring companies to capitalize operating leases and include them as assets and liabilities on their balance sheets. The proposal is motivated by the fact that current methods accounting for operating leases hide a great deal of off-book leverage and thus are misleading to investors. Such a change would have a significant impact on the U.S. airline industry where aircraft and property operating leases are quite prevalent. This study utilizes an in-depth strategic management perspective in examining how well U.S. airlines pursue optimization strategies with regard to the management of financial leverage in order to achieve desired targets of growth and profitability. Such benchmarking is accomplished by utilizing the DEA model suggested by Capobianco and Fernandes (2004). This study demonstrates the distortion inherent in inter-airline benchmarking when operating leases are not capitalized on the balance sheet.

INTRODUCTION

The accounting treatment of operating leases is an ongoing subject of intense discussion by those professional bodies responsible for generally accepted accounting practices. Currently, an operating lease is treated as a mere rental agreement. The lessee records rent expense with each payment, but nothing else. The leased asset and the obligation for future payments of rent are not recorded on the lessee's balance sheet. This gives rise to the familiar phrase "off balance sheet financing." As operating leases are used in the airline industry to a significant degree, capitalizing them to the balance sheet, similar to their capital lease counterparts, would have important impacts on the measured leverage and risk positions of airlines.

Gritta (1974), Gritta, Lippman, and Chow (1994), and Gritta and Lippman (2010) provide a thoughtful and comprehensive analysis of the evolution of the reporting requirements with regard to leasing instruments on the part of the Financial Accounting Standards Board (FASB). Specifically, Gritta, Lippman, and Chow (1994), describe the change in standards (SFAS No. 13, 1976) that now require that capital leases be classified as leasehold assets and long term liabilities on the balance sheet of companies, that is, they are capitalized to the balance sheet. Any change in the reporting requirements that pertain to leasing activities significantly affects the airline industry as leasing has been and continues to be an important source of financing for air carriers. This research is significant because it highlights the impact of leasing reporting requirements on the reported financial leverage of airlines. Gritta (1974) and Gritta, Lippman, and Chow (1994) demonstrated that a change in reporting requirements for capital leases had a significant and negative impact on leverage ratios.

However, as noted above, operating leases continue to be recorded as off-balance sheet items. Operating leases are treated as mere rental

agreements. Accounting rules do however require certain disclosures in the footnotes that accompany financial statements, including a description of significant leased assets, the obligation for future lease payments for each of the next five years, and a lump sum obligation for all years thereafter. This off-balance sheet treatment of operating leases is attractive to airlines. Park, Park and Hossan (2009) note that this methodology allows operating leases to be used as substitutes for debt financing while they also attenuate the financial distress of the lessee. Depreciation allowances associated with operating leases and lease rentals also provide a "tax shield benefit." Lewellen, Long, and McConnell (1976) suggest that operating leases reduce the instant investment required to acquire an asset. This would protect an airline's liquidity. Finally, Ezzell and Vora (2001) observe that operating leases reduce external financing costs for a firm.

In 2013, the Financial Accounting Standards Board (FASB) issued an exposure draft that would significantly change the lease accounting rules in the United States. A similar proposal has been made by the International Accounting Standards Board (IASB). These accounting rule makers believe that with few exceptions, all lease contracts are in essence financing agreements, and as such, all leases should be recorded as capital leases. The proposals would all but eliminate off balance sheet financing and could have a tremendous impact on the financial statements of those companies who currently have significant amounts of operating leases. It is interesting to note that major rating agencies, including Standard & Poor's and Moody's, already adjust financial statements so as to estimate the impact of capitalizing operating leases. Gritta and Lippman (2010) demonstrate that for a set of U.S. airlines for the year 2008, capitalization of operating leases, by in large, had a negative impact on air carriers' financial leverage.

The study above does note an interesting fact. While for nearly all of the airlines in the study there was an increase in their financial riskiness, inter-firm comparisons of riskiness did not change in terms of relative rankings. The ability to make inter-firm comparisons and the articulation of financial leverage as a strategic instrument subject to managerial discretion are at the heart of the present study.

FOCUS OF THE CURRENT STUDY

The Work of Capobianco and Fernandes

Capobianco and Fernandes (2004) developed a model that presents a managerial approach for the optimization of an airline's capital structure. Financial leverage is a strategic control variable for airlines that is managed to positively impact operating performance. Thus, in their model, financial leverage is the independent variable that determines the levels of the dependent performance variables. The dependent performance variables in their analysis are firm size, profitability, and tangibility of assets.

Firm size is computed as the natural logarithm of net sales. In an efficiently managed firm, increases in financial leverage should be associated with the acquisition of assets that increase growth and profits. Additionally, Capobianco and Fernandes (2004) argue that large companies have more sources of capital and are more diversified. Therefore, they display a lower probability of bankruptcy than their smaller counterparts. The low expected costs of bankruptcy facilitate greater levels of financial leverage. Thus, for firms managing their probability of bankruptcy, an increase in financial leverage should be associated with an increase in size.

Profitability is computed as the ratio of net income to total assets, or ROA. Basically, what is being represented here is the relationship between financial leverage and the return on equity (ROE). The relationship between ROA and ROE can be illustrated by means of the DuPont decomposition: ROE = Profits/Sales x Sales/Assets x Assets/Equity. ROA is the first two components of the DuPont decomposition

because ROA = Profits/Sales x Sales/Assets = Profits/Assets. return on equity measures the rate of return on the ownership interest (shareholders' equity) of common stockholders. Therefore, it shows how well a company uses investment funds to generate earnings growth. Return on assets shows how profitable a company's assets are in generating revenuereturn on equity measures the rate of return on the ownership interest (shareholders' equity) of common stockholders. Therefore, it shows how well a company uses investment funds to generate earnings growth. Return on assets shows how profitable a company's assets are in generating revenue.return on equity measures the rate of return on the ownership interest (shareholders' equity) of common stockholders. Therefore, it shows how well a company uses investment funds to generate earnings growth. Return on assets shows how profitable a company's assets are in generating revenue.return on equity measures the rate of return on the ownership interest (shareholders' equity) of common stockholders. Therefore, it shows how well a company uses investment funds to generate earnings growth. Return on assets shows how profitable a company's assets are in generating revenue.Similar to Myers and Majluf (1984), Capobianco and Fernandes (2004) hypothesize that profitable firms prefer not to raise debt levels by means of internal funding. Additionally, Jensen (1986) notes that the use of debt (as opposed to equity) reduces the agency costs of free cash flow by reducing the cash flow available for spending at the discretion of managers. Therefore, the third term in the DuPont decomposition will increase. Thus, as above, for firms who use financial leverage to acquire assets to increase growth and profits, one should observe that as financial leverage increases so too should ROA and ROE increase.

Finally, "tangibility" is the ratio of fixed to total assets. This ratio is a proxy for operating leverage. Profitable firms will manage their total risk position as represented by the sum of financial and operating leverage. As financial leverage increases, it is expected that profitable firms will attempt to reduce operating leverage. Capobianco and Fernandes (2004) utilize the inverse of the ratio for tangibility (tangibility-1). Therefore, as financial leverage increases, this inverse ratio will increase.

Capobianco and Fernandes (2004) investigate inter-firm efficiencies in the management of financial leverage by means of data envelopment analysis. They utilize an eclectic sample of airlines, U.S. and international, passenger and cargo. Their pooled sample spanned the years 1993 to 1997 and initially included yearly observations for 53 companies from 32 countries. Not all companies had data for all five years. Companies that displayed negative ROA and negative stockholder equity were eliminated. Additional companies were eliminated if they displayed values for the model variables that were individually greater than three standard deviations above the average for that particular variable.

In addition to the inclusion of non-passenger airlines such as Federal Express, differences in accounting standards across countries make inter-firm comparisons difficult. Capobianco and Fernandes (2004) note that, where the financial reports of international airlines disclosed original accounting entries, they attempted to reconstruct a template that reflects a single set of accounting principles. This was done, as much as possible, in accordance with the standards set forth by the International Accounting Standard Committee and those set forth by the International Transport Association with regard to specific topics that affect the airline industry.

After generating efficiency scores from the data envelopment analysis, Capobianco and Fernandes (2004) examine the relationship between these scores and airlines' rankings on each of the analysis variables in their model. More specifically, they observe the movement of airlines over the five year period with regard to combinations of indebtedness and return on

assets and relate these movements to airlines' efficiency scores.

The Current Study

The model developed by Capobianco and Fernandes (2004) is important in that it provides a proactive managerial context for the strategic management of financial leverage. It is based on an extensive analysis of the finance literature. The relationships between the dependent variables of firm size, profitability, and tangibility and the independent variable of financial leverage are drawn from the Static Trade-Off Model, the Pecking Order Hypothesis and the Agency Cost Model. The authors provide a detailed summary of this literature to provide transparency to the inter-variable relationships that they adopt in their analysis.

This study extends their analysis by re-examining inter-firm efficiencies when directly accounting for operating leases. This is more than a simple academic exercise. As seen in Table 1, for the year 2008, the midpoint of the current study, many airlines had a significant proportion of aircraft financed using operating leases. As these kinds of leases are treated as off-balance sheet items, it is not immediately obvious, under current accounting rules, what the true efficacy of financial leverage strategies being practiced by airlines really is. Again, as noted above, this is an ongoing concern of both the FASB and IASB.

Interestingly, Capobianco and Fernandes (2004) mention leasing issues in passing, but implicitly recognize capital leases but not the potential impact of operating leases when they assert:

> "Yet it is possible to lease rather than purchase airplanes in the aviation industry, which would have an impact on operating costs and not on assets. Despite the apparent paradox, our tests concern efficiency and do not include a dependence relation between variables" (pp. 426-427).

This study explicitly capitalizes operating leases to the balance sheet. It then uses the DEA model of Capobianco and Fernandes to demonstrate that a failure to capitalize operating leases can

TABLE 1
PERCENTAGE OF AIRCRAFT UNDER OPERATING LEASES - 2008

AIRLINE	% UNDER OPERATING LEASES
AIRTRAN	73.53
ALASKA	35.04
ALLEGIANT	4.65
CONTINENTAL	56.83
DELTA	18.97
FRONTIER	70.59
HAWAIIAN	66.67
JETBLUE	38.46
REPUBLIC	30.00
SKYWEST	74.38
SOUTHWEST	16.40
UNITED	36.83

cause a significant distortion in the measurement of inter-firm efficiencies and therefore does not accurately capture the skill of managers in utilizing financial leverage as a strategic tool.

METHODOLOGY

Data Sample

An initial sample of 13 U.S. airlines was utilized in this study. The time period over which the sample was drawn and pooled was 2006-2010. The pooling process was done across the years in the sample and across observations both unadjusted and adjusted for the capitalization of operating leases. The sample was restricted to U.S. airlines to avoid the accounting problems encountered by Capobianco and Fernandes (2004) with regard to differences in countries' internal reporting rules. The sample was also restricted to passenger airlines. American Airlines was not in the sample because for four of the five years of the study it reported negative stockholders' equity. To be included in the pooled sample, an airline had to have the necessary data for at least two of the five years. Using this criterion, USAir was eliminated after an outlier analysis was performed.

Capobianco and Fernandes (2004) identify outliers by examining each of the DEA variables individually and eliminating those observations where a particular variable is greater than three standard deviations from the mean of that variable. In this study the Mahalanobis D^2 measure was utilized to perform a multivariate detection of outliers, as outlined in Hair, Black, Babin, Anderson, and Tatham (2006). This measure is a multidimensional assessment of each observation across a set of variables *simultaneously*. The Mahalanobis D^2 measure evaluates each observation's distance in multidimensional space from the mean center of all observations. The D^2 measure divided by the number of variables under consideration is approximately distributed as a t-value. An extremely conservative approach was taken with a threshold value of 3.00 ($p = .005$) being used. The airlines in the final dataset are listed in Table 2.

TABLE 2
AIRLINES IN POOLED SAMPLE

AIRLINE	Years
AIRTRAN	2006, 2007, 2008, 2009, 2010
ALASKA	2006, 2007, 2008, 2009, 2010
ALLEGIANT	2006, 2007, 2008, 2010
CONTINENTAL	2006, 2007, 2009, 2010
DELTA	2007, 2010
FRONTIER	2006, 2007, 2008
HAWAIIAN	2006, 2007, 2008, 2009, 2010
JETBLUE	2006, 2007, 2008, 2009, 2010
REPUBLIC	2006, 2007, 2008, 2009, 2010
SKYWEST	2006, 2007, 2008, 2009, 2010
SOUTHWEST	2006, 2007, 2008, 2009, 2010
UNITED	2006, 2007

DEA Model Utilized

As in the study by Capobianco and Fernandes (2004), the input-oriented BCC data envelopment analysis model with variable returns to scale was utilized. The details of this model are provided in Appendix 1. The BCC model also provides the researcher an advantage in terms of admissible data. Capobianco and Fernandes eliminated those observations which displayed negative ROA. This followed from the fact that, in general, the utilization of DEA requires that input and output variables be greater than zero. However, as summarized in Bowlin (1998), Ali and Seiford (1990) and Pastor (1996) have demonstrated that, for a variable that is not positive, an affine displacement does not alter the efficient frontier. Thus, certain formulations of the DEA model - the additive model for both inputs and outputs and the BCC model for outputs - are translation invariant. Therefore, in this study, a positive amount was added to the negative values of ROA. It is required that the same adjustment must be made to ROA values for all firms in the dataset in order to not alter the efficiency frontier. As an aside, it might be asked as to why the additive model was not utilized which would have, in theory, allowed for the inclusion of observations with negative financial leverage values because of negative stockholder equity. However, the construction of the financial leverage variable does not allow for the utilization of a single, linear affine displacement. Additionally, the additive model does not lend itself to the same straightforward interpretation of results to which the BCC model does.

CAPITALIZATION METHODOLOGY FOR OPERATING LEASES

Expanding on the discussion above, a survey of the methodologies used by credit rating agencies to capitalize operating leases revealed two basic approaches – the first as utilized by Moody's and the second as utilized by Standard & Poor's (see Berman, 2007 and Standard & Poor's 2005 and 2008). Moody's employs the so-called factor method. A multiple of current rent expense is used to capitalize operating lease obligations. This approach is meant to capture the purchase of the whole asset as opposed to the present value of contractual obligations. The notion here is that to sustain cash flow, the firm must have the asset or some replacement thereof. The multiple utilized varies by industry sector with multiples being limited to 5x, 6x, and 8x rent expense. Airlines have the highest multiple reflecting the long economic life of assets employed.

Standard & Poor's utilizes an approach that capitalizes operating leases by calculating the present value of reported minimum lease commitments that appear in the notes of a firm's financial statements. Unlike the Moody's approach, here the objective is to capture the discounted value of future payment obligations and not to recognize the whole asset associated with the lease as though it was actually owned by the firm. This methodology, the one used in this study, is illustrated in Appendix 2. Notice that the discount rate employed is based on an estimate of the firm's actual borrowing costs and hence will be a function of inter-year changes in borrowing costs. Finally, Standard and Poor's, in reflecting on the factor method employed by Moody's suggests that:

> "The factor methods use multiples of annual expense to estimate the asset value - typically in a crude or arbitrary fashion. Also, while incorporating the equivalent of owning the entire asset, these methodologies lack the ability to differentiate between the first year of the asset's life, the last year, and all points in between. (An asset actually purchased would be depreciated over its life.) And, by putting leasing and ownership on a supposed "apples-to-apples" basis, they gloss over the potential flexibility associated with leasing only part of an asset's economic life." (Standard and Poor's, 2005, p. 5)

The means and standard deviations for the unadjusted and adjusted (capitalization of operating leases) are reported in Table 3.

RESULTS OF THE ANALYSIS

The data envelopment analysis was performed via the Efficiency Measurement System (EMS), version 1.3 which is authored by Dr. Holger Scheel of the University of Dortmund. Mean normalization was utilized to make sure the data was of the same or similar magnitude within the data set. The process to mean normalize is taken in two simple steps. The first step is to find the mean of the data set for each input and output. The second step is to divide each input or output by the mean for that specific factor.

Table 4 shows that when unadjusted and adjusted observations were pooled over time, the adjusted observations consistently displayed worse values for operating efficiency, i.e., lower values of è. In the context of the input-oriented BCC model, 1è represents the percent reduction in the input (financial leverage) necessary to move a particular observation to the efficient frontier. An observation is efficient if θ = 1.

These results are interesting, but the real question is whether on average the differences in è are statistically significant and even more important is whether these differences are of significant magnitude. To address this issue a t-test of means for a paired two-sample was performed. The expected statistically significant difference in means was found. More importantly, the percentage difference in means (θ= 0.5624 versus θ = 0.3882) was 44.87 percent.

The changes observed in financial leverage efficiency, as captured by θ, is a function of two factors. The first is the relative change due to the capitalization of operating leases to the balance sheet - unadjusted versus adjusted observations. This accounts for part of the shift in θ. The second is a magnification effect. This magnification effect is due to differences in the intensity of use of operating leases. We measure this intensity by the percentage of operating leases relative to total adjusted assets where total adjusted assets include operating leases (OPL/TA). Thus, the second factor is the relative change between unadjusted and adjusted observations and within the adjusted group of observations themselves.

This latter factor is explored in tables 6 and 7. The values for θ (from lowest to highest) were divided into quartiles. Table 6 displays the movement of airlines between worst and best quartile values for θ and their associated values

TABLE 3
MEANS AND STANDARD DEVIATIONS OF VARIABLES

UNADJUSTED

VARIABLE	FINANCIAL LEVERAGE	(LN) SIZE	ROA	TANGIBILITY^{-1}
MEAN	6.918	14.936	0.049	1.787
STDEV	7.984	1.109	0.045	0.540

ADJUSTED

VARIABLE	FINANCIAL LEVERAGE	(LN) SIZE	ROA	TANGIBILITY^{-1}
MEAN	10.561	14.936	0.037	1.440
STDEV	12.481	1.109	0.038	0.283

TABLE 4
POOLED DEA RESULTS – UNADJUSTED AND ADJUSTED

AIRLINE	θ - UNADJUSTED	θ – ADJUSTED
AIRTRAN 2006	0.4411	0.1878
AIRTRAN 2007	0.4088	0.2030
AIRTRAN 2008	0.2264	0.1127
AIRTRAN 2009	0.4288	0.2222
AIRTRAN 2010	0.4836	0.2416
ALASKA 2006	0.4454	0.3167
ALASKA 2007	0.4424	0.3484
ALASKA 2008	0.2669	0.2181
ALASKA 2009	0.3426	0.2770
ALASKA 2010	0.4441	0.3660
ALLEGIANT 2006	0.9580	0.9264
ALLEGIANT 2007	1.0000	0.9180
ALLEGIANT 2008	0.9795	0.9106
ALLEGIANT 2010	1.0000	0.9619
CONTINENTAL 2006	0.0803	0.0409
CONTINENTAL 2007	0.6840	0.1858
CONTINENTAL 2009	0.1179	0.0651
CONTINENTAL 2010	0.6556	0.3563
DELTA 2007	1.0000	0.8452
DELTA 2010	1.0000	0.8136
FRONTIER 2006	0.4116	0.2063
FRONTIER 2007	0.3558	0.1646
FRONTIER 2008	0.2189	0.1291
HAWAIIAN 2006	0.4668	0.1093
HAWAIIAN 2007	0.7726	0.1831
HAWAIIAN 2008	0.2596	0.0575
HAWAIIAN 2009	1.0000	0.1831
HAWAIIAN 2010	0.7759	0.2829
JETBLUE 2006	0.3694	0.2818
JETBLUE 2007	0.3531	0.2797
JETBLUE 2008	0.4051	0.3307
JETBLUE 2009	0.4533	0.3784
JETBLUE 2010	0.4897	0.4079
REPUBLIC 2006	0.3813	0.2798
REPUBLIC 2007	0.2745	0.2059
REPUBLIC 2008	0.2658	0.2129
REPUBLIC 2009	0.2122	0.1609
REPUBLIC 2010	0.2660	0.2028
SKYWEST 2006	0.6069	0.3733

TABLE 4 (Continued)
POOLED DEA RESULTS – UNADJUSTED AND ADJUSTED

AIRLINE	θ - UNADJUSTED	θ – ADJUSTED
SKYWEST 2007	0.6040	0.3846
SKYWEST 2008	0.6164	0.3954
SKYWEST 2009	0.5944	0.3860
SKYWEST 2010	0.6083	0.4033
SOUTHWEST 2006	1.0000	0.8829
SOUTHWEST 2007	0.9279	0.8241
SOUTHWEST 2008	0.8140	0.7275
SOUTHWEST 2009	0.8677	0.7551
SOUTHWEST 2010	1.0000	0.8807
UNITED 2006	0.3442	0.2551
UNITED 2007	1.0000	0.5701
MEAN	0.5624	0.3882

TABLE 5
T-TEST: PAIRED TWO SAMPLE FOR MEANS (θ)

	UNADJUSTED	ADJUSTED	% DIFF
MEAN	0.5624	0.3882	44.87%
VARIANCE	0.0802	0.0750	
OBSERVATIONS	50	50	
PEARSON CORRELATION	0.8408		
HYPOTHESIZED MEAN DIFFERENCE	0		
DF	49		
T STAT	7.824		
P(T d" t) ONE-TAIL	1.7749E-10		
T CRITICAL ONE-TAIL	1.6766		
P(T d" t) TWO-TAIL	3.5498E-10		
T CRITICAL TWO-TAIL	2.0096		

TABLE 6
UNADJUSTED AND ADJUSTED QUARTILES/ OPERATING LEASES AS A PERCENTAGE OF TOTAL ADJUSTED ASSEST (RANK)

Quartile 1: 0.0409 d" θ < 0.2484
Quartile 2: 0.2484 d" θ < 0.3853
Quartile 3: 0.3853 d" θ < 0.7413
Quartile 4: 0.7413 d" θ d" 1.000

AIRLINE	θ - UNADJ	QUART	θ – ADJ	QUART	OL/TA	RANKOL/TA
AIRTRAN 2006	0.4411	3	0.1878	1	57.41%	1
AIRTRAN 2007	0.4088	3	0.2030	1	50.34%	3
AIRTRAN 2008	0.2264	1	0.1127	1	50.03%	4
AIRTRAN 2009	0.4288	3	0.2222	1	46.16%	9
AIRTRAN 2010	0.4836	3	0.2416	1	48.48%	7
ALASKA 2006	0.4454	3	0.3167	2	24.54%	27
ALASKA 2007	0.4424	3	0.3484	2	21.26%	31
ALASKA 2008	0.2669	2	0.2181	1	18.15%	37
ALASKA 2009	0.3426	2	0.2770	2	18.19%	36
ALASKA 2010	0.4441	3	0.3660	2	15.00%	41
ALLEGIANT 2006	0.9580	4	0.9264	4	1.86%	50
ALLEGIANT 2007	1.0000	4	0.9180	4	4.70%	47
ALLEGIANT 2008	0.9795	4	0.9106	4	4.52%	48
ALLEGIANT 2010	1.0000	4	0.9619	4	3.81%	49
CONTINENTAL 2006	0.0803	1	0.0409	1	48.91%	6
CONTINENTAL 2007	0.6840	3	0.1858	1	46.95%	8
CONTINENTAL 2009	0.1179	1	0.0651	1	44.54%	10
CONTINENTAL 2010	0.6556	3	0.3563	2	38.54%	14
DELTA 2007	1.0000	4	0.8452	4	15.48%	40
DELTA 2010	1.0000	4	0.8136	4	18.64%	34
FRONTIER 2006	0.4116	3	0.2063	1	49.88%	5
FRONTIER 2007	0.3558	2	0.1646	1	53.73%	2
FRONTIER 2008	0.2189	1	0.1291	1	41.01%	12
HAWAIIAN 2006	0.4668	3	0.1093	1	38.01%	16
HAWAIIAN 2007	0.7726	4	0.1831	1	35.19%	20
HAWAIIAN 2008	0.2596	2	0.0575	1	43.60%	11
HAWAIIAN 2009	1.0000	4	0.1831	1	39.64%	13
HAWAIIAN 2010	0.7759	4	0.2829	2	36.38%	17
JETBLUE 2006	0.3694	2	0.2818	2	23.72%	30
JETBLUE 2007	0.3531	2	0.2797	2	20.79%	32
JETBLUE 2008	0.4051	3	0.3307	2	18.38%	38
JETBLUE 2009	0.4533	3	0.3784	2	16.52%	39
JETBLUE 2010	0.4897	3	0.4079	3	16.71%	38

TABLE 6 (Continued)
POOLED DEA RESULTS – UNADJUSTED AND ADJUSTED

AIRLINE	θ - UNADJ	QUART	θ – ADJ	QUART	OL/TA	RANKOL/TA
REPUBLIC 2006	0.3813	2	0.2798	2	26.63%	23
REPUBLIC 2007	0.2745	2	0.2059	1	24.99%	26
REPUBLIC 2008	0.2658	2	0.2129	1	19.90%	33
REPUBLIC 2009	0.2122	1	0.1609	1	24.18%	28
REPUBLIC 2010	0.2660	2	0.2028	1	23.78%	29
SKYWEST 2006	0.6069	3	0.3733	2	38.50%	15
SKYWEST 2007	0.6040	3	0.3846	2	36.33%	18
SKYWEST 2008	0.6164	3	0.3954	3	35.85%	19
SKYWEST 2009	0.5944	3	0.3860	3	35.07%	21
SKYWEST 2010	0.6083	3	0.4033	3	33.71%	22
SOUTHWEST 2006	1.0000	4	0.8829	4	11.71%	44
SOUTHWEST 2007	0.9279	4	0.8241	4	9.79%	46
SOUTHWEST 2008	0.8140	4	0.7275	3	10.62%	45
SOUTHWEST 2009	0.8677	4	0.7551	4	12.97%	42
SOUTHWEST 2010	1.0000	4	0.8807	4	11.93%	43
UNITED 2006	0.3442	2	0.2551	2	25.89%	24
UNITED 2007	1.0000	4	0.5701	3	25.66%	25

of operating leases as a percentage of total adjusted assets. Table 7 displays the Pearson correlation coefficients between the values of OPL/TA and the difference between the unadjusted value for θ and the adjusted value for θ (DIFF) as well as the absolute value of the percentage difference between the unadjusted value for θ and the adjusted value for θ (PDIFF). In both cases, the correlation is statistically significant at the .01 level.

These relationships are explored in more detail in another manner in Table 8.

The values of OPL/TA across the total sample (from lowest to highest) were divided into quartiles. To investigate the statistical significance of the differences in DIFF and PDIFF between the quartiles, the Tukey-Kramer method (Tukey 1953, Kramer 1956) was utilized. The original Tukey test (1952) was designed specifically for pair-wise comparisons based on the studentized range ratio (see formula below) and controls the maximum experiment-wise error rate (MEER) when the sample sizes are equal. Tukey (1953) and Kramer (1956) independently proposed a modification for unequal cell sizes and it is the Tukey-Kramer method that was used in this study. Hayter (1984) provided proof that the Tukey-Kramer procedure controls the MEER and it has also fared well in Monte Carlo studies (Dunnett 1980). Specifically, for two groups *yi* and *yj*, with *ni and nj* observations in each group respectively and *s* being the root mean square error based on *í* degrees of freedom, their means $\overline{y_i}$ and $\overline{y_j}$ are considered significantly different by the Tukey-Kramer criterion if:

$$|\overline{y}_i - \overline{y}_j| / s\sqrt{(1/n_i + 1/n_j)/2} \geq q(\alpha;\kappa,\nu)$$

where *q(á;ê,í)* is the *á*-level critical value of a studentized range distribution of ê independent normal random variables with í degrees of freedom. The software utilized is the GLM (General Linear Model) procedure in the SAS (2002) statistical package, which calculates

TABLE 7
PEARSON CORRELATION COEFFICIENTS

	DIFF	PDIFF	OPL/TA
DIFF	1.0000***		
PDIFF	-0.7679***	1.0000***	
OPL/TA	0.4443***	-0.8470***	1.0000***

*****: Significant at the .01 level**
DIFF = Difference between the unadjusted value for θ and the adjusted value for θ
PDIFF| = Percentage difference between the unadjusted value for θ and the adjusted value for θ
OPL/TA = Operating leases as a percentage of total adjusted assets

TABLE 8
TUKEY STUDENTIZED RANGE TESTS BY QUARTILES FOR OPL/TA

Quartile 1: 0.0186 d" OL/TA < 0.1671
Quartile 2: 0.1671 d" OL/TA < 0.2533
Quartile 3: 0.2533 d" OL/TA < 0.3964
Quartile 4: 0.3964 d" OL/TA d" 0.5741

QUANTILE COMPARISON VARIABLE: DIFF	DIFFERENCE IN MEANS	
1 versus 2	0.0062	
1 versus 3	-0.1983	**
1 versus 4	-0.1508	**
2 versus 3	-0.2044	**
2 versus 4	-0.1570	**
3 versus 4	0.0475	

****: Statistically significant at the .05 level**

QUANTILE COMPARISON VARIABLE: PDIFF	DIFFERENCE IN MEANS	
1 versus 2	-0.1057	
1 versus 3	-0.3389	**
1 versus 4	-0.4506	**
2 versus 3	-0.2332	**
2 versus 4	-0.3450	**
3 versus 4	-0.1118	

****: Statistically significant at the .05 level**

significance for the Tukey-Kramer statistic at the 5% level. As can be seen in table 8, the differences in the mean values of DIFF and PDIFF for all of the non-adjacent quartiles (1 versus 3 and 4, 2 versus 3 and 4) are statistically significant at the .05 level.

CONCLUSION

The model developed by Capobianco and Fernandes (2004) describes the strategic decision process on the part of managers with regard to an airline's chosen capital structure. The framework chosen draws upon the substantial finance literature pertaining to the optimization of said capital structure. Furthermore, the efficacy of a given manager's strategic decisions with regard to the nature and sources of capital for a given airline can be benchmarked against those of peer airlines. This is done by means of data envelopment analysis.

However, this study demonstrates that any such benchmarking results that are generated need to be called into question when operating leases are "hidden" by not capitalizing them to the balance sheet. This is a source of ongoing debate for both the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB). The variables that are central to the Capbianco and Fernandes model are compromised when operating leases are not capitalized to the balance sheet because both the operating and net income of the firm will be lowered, the debt and capital for the firm will be understated, and the return on equity and capital will be much higher (Damodaran, 2006, pp. 86-88).

Thus, not capitalizing operating leases to the balance sheet creates significant distortions in the perceptions and assessment of the abilities of managers to utilize financial leverage to make investments that enhance firm profitability. This is very much noted by Standard & Poor's (2008, pp. 22-23) who note that:

> "…We view the accounting distinction between operating and capital leases as substantially artificial. In both cases the lessee contracts for the use of an asset, entering into a debt-like obligation to make periodic rental payments…"

They further add with regard to their own adjustment methodology:

> "…The operating-lease-adjustment model is intended to bring companies' financial ratios closer to the underlying economics and more comparable, by taking into consideration all financial obligations incurred, whether on or off balance sheet. The model improves our analysis of how profitably a company employs its leased and owned assets…"

This then is the underlying rationale that motivates the empirical investigation undertaken in this paper. The results suggest an approach to better understanding the economic consequences of managerial behavior as it relates to the efficacy of financial leverage strategies.

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APPENDIX 1
THE BCC INPUT-ORIENTED MODEL

$$\underset{\theta,\lambda s^+,s^-}{\text{minimize}}\ \theta - \epsilon \cdot e^T s^+ - \epsilon \cdot e^T s^-$$

subject to $Y\lambda - s^+ = Y_0,$

$\theta \mathbf{X_0} - \mathbf{X}\boldsymbol{\lambda} - \mathbf{s}^- = \mathbf{0},$

$e^T \lambda \geq 1,$

ë, s^+, s^- e" 0.

where X is the input vector utilized, Y is the output vector produced, ϵ represents a non-archimedean constant which is smaller than any positive real number that ensures no input or output is given a zero weight, e^T is a row vector of 1s, and s^+ and s^- are the slack vectors for outputs and inputs. è represents the level of efficiency of the firm defined by (X_0,Y_0). A firm is efficient if è = 1 and $s^+ = s^- = 0$. The optimal value of ë forms a composite unit outperforming the decision making unit (DMU) under consideration and provides targets for the DMU in the identification of the sources of its inefficiency.

APPENDIX 2
S&P METHODOLOGY FOR CAPITALIZATION OF OPERATING LEASES*
EXAMPLE OF ALASKA AIRLINES 2006 (000s)

		2006	2005
TOTAL REPORTED DEBT		1,150,800	1,082,600
TOTAL INTEREST (INCLUDING CAPITALIZED INTEREST)		78,000	63,000
IMPLIED INTEREST RATE		6.98%	
ACTUAL RENT EXPENSE		320,600	324,800
FUTURE MINIMUM LEASE COMMITMENTS			
	2007	246,800	
	2008	237,300	
	2009	218,200	
	2010	207,700	
	2011	177,400	
	THEREAFTER	680,600	
	TOTAL LEASE OBLIGATIONS	1,768,000	
S&P - PRESENT VAKUE OF LEASE COMMITMENTS		1,326,229	
TOTAL REPORTED DEBT AND CAPITALIZED LEASES		2,477,029	

***To compute the present value of the lease obligations, a judgment is made with regard to the lump sum commitment in year 6. Based on the average annual lease commitment over the first 5 years ($217,480) an annuity of 3 years is arrived at ($680,600/217,480) = 3.13 or 3 using the integer component (Damodaran, 2006).**

All data is taken from the relevant 10-K reports.

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