Firm-Specific Determinants of Off-Balance Sheet Leasing: A Test of the Smith/Wakeman Model [*]

Joanne C. Duke and David P. Franz, San Francisco State University
Herbert G. Hunt III, California State University at Long Beach
Daniel R. Toy, California State University at Chico

While operating leases continue to grow in popularity in the U.S., researchers have limited knowledge about the factors that drive some firms to lease assets and other firms to use alternative financing arrangements. This study empirically tests some of the firm-specific variables that have been theoretically linked to operating leases in prior studies. Consistent with theoretical predictions, we find a negative relation between effective tax rate and operating leases, and a positive relation between operating leases and ownership concentration, restrictive financial contracting variables and the debt/equity ratio. However, we are unable to detect a connection between operating leases and earnings-based management compensation.

INTRODUCTION

The proper method of accounting for leases has been a concern of the accounting profession for the past several decades. Accounting regulatory bodies have grappled with the issues surrounding lease accounting many times during this period, and as a result, have issued several official pronouncements specifying how and where leases should be disclosed in the financial statements of lessee companies (see Abdel-khalik, 1981, for background discussion). One of the most fundamental and significant issues in the area of lease accounting concerns when a particular lease arrangement should be capitalized (resulting in recording an asset and the associated liability), or treated as an operating lease requiring only periodic expensing of lease payments. Several accounting standards have addressed this issue in the US, culminating in the issuance by the Financial Accounting Standards Board (FASB) of *Statement of Financial Accounting Standards (SFAS) No. 13* in 1976. This statement eliminated much of the flexibility enjoyed by firms in determining whether a particular lease should be capitalized as a financial lease, or accounted for as an operating lease. *SFAS No. 13* effectively reduced firms' ability to engage in off-balance sheet financing without violating generally accepted accounting principles (GAAP).

While the accounting profession has been largely preoccupied with whether or not leases appear on the balance sheets of lessee companies, traditional finance theory suggests that leases and debt are substitutes for one another (Myers, Dill, & Baustista, 1976; Ang & Peterson, 1984), and that tax rate differences between lessors and lessees drive the decision as to whether an asset is ultimately purchased or leased (Smith & Wakeman, 1985). Some empirical studies have supported the substitution theory (Marston & Harris, 1988; Lewis & Schallheim, 1992; Beattie, Goodacre, & Thompson, 2000a), but others have not (Ang & Peterson, 1984). Smith and Wakeman (1985) and Sharpe and Nguyen (1995) have suggested that leasing is not *strictly* a tax-driven decision; instead they propose several other potential theoretical explanations for a corporation's leasing policy. These potential explanations include financial contracting costs and other positive theory based predictions, which together, suggest that managerial decisions are affected by their impact on accounting-based debt and compensation contracts (Watts & Zimmerman, 1986, 1990).

The current paper is motivated by three important observations. First, recent publicity surrounding Enron Corporation's questionable financial reporting practices has focused widespread attention on all types of off-balance sheet financing arrangements, including off-balance sheet leasing. Second, Sharpe and Nguyen (1995) point out that the lease-versus-buy decision has received scant attention in the modern corporate finance literature, and that the financial contracting factors suggested by Smith and Wakeman (1985) are some of the most interesting. We agree with that assessment, and thus, this paper explores the theoretical explanations proposed by Smith and Wakeman through an empirical examination of a large random sample of US corporations. Third, despite the tightening of the rules under *SFAS No. 13* with respect to off-balance sheet financing, the popularity and incidence of leasing continues to grow in the US. This is particularly true in the case of operating leases (Imhoff, Lipe, & Wright, 1997). For example, industry statistics show that leased equipment represented nearly one-third, or $140 billion, of the capital equipment used by businesses in this country in 1994 (Sharpe & Nguyen, 1995; Imhoff et al., 1997; Morsfield, 1998). What makes widespread leasing activity of interest to researchers, analysts and other financial statement users is the fact that operating leases can have significant effects on standard measures of risk and performance, but these effects are hidden due to the off-balance sheet nature of the lease details (Imhoff, Lipe, & Wright, 1991, 1993, 1997; Beattie, Goodacre, & Thompson, 2000b; Lipe, 2001). Concern with these potentially negative hidden effects prompted a group of national accounting standard setters (G4+1),[1] in conjunction with the International Accounting Standards Committee (now the International Accounting Standards Board), to recently propose that *all* leases be recognized on the balance sheet, rather than just finance leases (Nailor & Lennard, 2000; Beattie, Goodacre, & Thompson, 2001). By examining some of the variables theoretically linked to leasing behavior, the current study provides a more complete understanding of an important phenomenon in corporate reporting and finance.

Smith and Wakeman (1985) propose three variables that are not asset-specific that may help identify firms that have special incentives to lease or buy: (1) financial contracts, (2) compensation contracts, and (3) ownership structure.[2] The authors predict that leasing is more likely under the following conditions: (1) if corporate bond contracts contain specific financial policy covenants, (2) if management compensation contracts contain provisions

specifying payoffs as a function of the return on capital, and (3) if the firm is closely held so that risk reduction is important. This study empirically tests these predictions in conjunction with others suggested by prior theory and research. Specifically, we examine the relation between leasing policy and specific debt covenant restrictions, the debt/equity ratio, management compensation based explicitly on return on invested capital, corporate ownership structure and effective tax rate. The results show that effective tax rate, the extent to which the firm is closely held, and the existence of financial policy covenants for firms without lease-specific covenants in loan agreements are significantly related to leasing policy. The debt/equity ratio is positively related to leasing behavior in one of our models, but not in the others. The existence of a management compensation plan based on return on invested capital does not appear to be related to leasing policy in this study. The results thus provide some support for Smith and Wakeman's theoretical predictions.

The paper is organized as follows. The next section provides a background discussion, examines relevant research in the area, and discusses the variables tested in this study. The third section describes the sample selection process and the final sample of firms. The fourth section presents the results, and the last section presents concluding comments.

BACKGROUND AND PRIOR RESEARCH

Motivations for Off-balance Sheet Financing

Off-balance-sheet financing has long been of intense interest to accounting and finance researchers due to the fact that managers engage in such financing of assets despite strong theoretical arguments that it should, among other things, offer no informational advantage over the alternatives. Indeed, to the extent that there is full disclosure of all leasing (and other) arrangements in the notes to financial statements, users and managers should be indifferent as to where the information actually appears. However, both casual observation and empirical evidence suggest that this is not the case. For example, Abdel-khalik (1981, pp. 36-37) quotes from Arthur Wyatt to illustrate the widely recognized managerial practice of keeping as much debt off the balance sheet as possible:

> Regardless of the validity of it [the efficient market hypothesis], from where I sit in my little office in Chicago, it's clear to me, that business managers are unaware of the concept or they act in a manner that's directly contrary to the concept. In a significant number of instances with regard to financing schemes we get down to the bottom line, after the company has incurred several thousand dollars, tens of thousands of dollars of investment banker costs, attorney's costs and accountant's costs, and the company says, "If we can't get it off the balance sheet, we won't do the financing. We don't care what you say about it in the footnotes; we will not put it on the balance sheet."

Wyatt's observations are supported by Imhoff and Thomas (1988) who present convincing empirical evidence that firms sharply reduced their use of capitalized leases as a form of financing after *SFAS No. 13* required the inclusion of these leases on the balance sheet. Firms not only substituted operating leases and other types of nonlease financing for capital leases, but lessees also reduced book leverage by reducing conventional debt and increasing equity.

Abdel-khalik (1981) suggests several potential explanations for managers' desire to engage in off-balance-sheet financing including concern with violations of restrictive debt covenants in lending agreements, managers' beliefs about analysts' and users' perceptions of the effects of capitalized leases, and the structure of management incentive plans. These possibilities are addressed later in this paper.

Abdel-khalik (1981) also provides empirical evidence suggesting that managers are rewarded for engaging in off-balance-sheet financing. When presented with the condensed financial statements of two companies differing only in the method of accounting for a long-term lease (one firm capitalized it and the other disclosed it in footnotes, but kept it off the balance sheet), a large percentage of analysts and bank loan officers indicated their preference for the company that kept the lease off the balance sheet; the firm was perceived to have lower financial risk and better profit performance than the firm that capitalized the lease. Thus, even sophisticated financial statement users appear to put form before substance when valuing firms that differ only with respect to the method of financial lease disclosure.

Other studies have obtained results similar to those reported by Abdel-khalik. For example, Braund (1989) provides evidence that bankers and financial analysts were unable to correctly account for non-capitalized leases in their analysis of financial statements. Hartman and Sami (1989) conducted a field experiment in which commercial loan officers were required to assign a credit rating and an interest rate to companies differing only with respect to each firm's method of lease reporting. Their results indicate that the accounting treatment of lease contracts had a significant effect on the loan officers' decisions, suggesting that credit is more costly for firms that capitalize their long-term lease contracts than for firms that have similar, but noncapitalized, operating leases.

Two more recent studies provide results that are somewhat contradictory to those cited above. Both Imhoff et al. (1993) and Ely (1995) present evidence that investors appear to treat operating leases and the related obligations as assets and liabilities, respectively, in assessing the equity risk of companies with operating leases. Specifically, both studies found a significant relation between equity risk and an adjustment to the debt-equity ratio (or debt-to-assets ratio) for operating leases, despite the fact that operating leases are disclosed only in the footnotes to the financial statements.

The importance of these findings is that, despite theoretical arguments and some empirical support that the method of lease accounting should be irrelevant, given adequate disclosure, managers are justifiably concerned with lease disclosure issues. This observation is based on the fact that financial statement users who are in a position to affect the wealth of managers (including executive compensation committees, as discussed below) value off-balance-sheet financing more favorably than balance sheet financing. A number of studies have examined other issues relevant to the current study, and these are discussed in the next section.

Previous Research

Using positive accounting arguments, El-Gazzar, Lilien, and Pastena (1986) examined several factors predicted to affect managers' choices in accounting for leases prior to the implementation of *SFAS No. 13*. These factors included political costs, leverage effects and

management compensation variables. Using a sample of 41 lease capitalizers and 113 non-capitalizers in the pre-*SFAS No. 13* period, El-Gazzar et al. found: (1) a significant positive correlation between the debt/equity ratio (which was intended to proxy for financial covenant constraints) and the use of operating leases, (2) a significant positive correlation between the use of operating leases and the existence of management bonus plans based on after-tax income, and (3) a significant negative correlation between effective tax rate and the operating lease method. These results suggest that financial contracting considerations and management bonus incentives were factors in the leasing decision during a time when managers still had considerable flexibility in reporting leases. Although the negative relation between tax rate and operating leases could be interpreted to provide support for the political cost hypothesis (that firms faced with high political costs will be motivated to decrease income by capitalizing leases), other tests, including tests of firm size, failed to support this explanation. The authors concluded that the results are better explained by the Tax Savings/Reporting Incentives Hypothesis.[3] Overall, the results reported by El Gazzar et al. (1986) show that when managers still had a choice regarding lease accounting, financial and tax variables could explain a significant amount of variation, and predict with some degree of accuracy which firms chose to capitalize leases and which firms chose to use the operating method for leases.

In a follow-up to the 1986 study, El-Gazzar, Lilien, and Pastena (1989) examined in detail the 43 private lending agreements available for the 113 non-capitalizers in their earlier study to determine the flexibility that managers had to use off-balance sheet financing to circumvent restrictions in debt agreements. Their examination revealed that lending agreements generally do not require the capitalization of leases beyond that required by generally accepted accounting principles (GAAP). In fact, the authors reported that the lending agreements examined revealed minimal tailoring of GAAP to compensate for off-balance sheet financing.

El-Gazzar (1993) again used the 113 non-capitalizers and the 41 capitalizers from the 1986 study (which were reduced to 60 and 23 firms, respectively, due to additional selection criteria) to examine the relation between the tightness of debt covenant constraints resulting from compliance with *SFAS No. 13* and lessees' market returns. As expected, El-Gazzar found that retroactive application of the *SFAS No. 13* requirements would have significantly tightened debt covenant restrictions, and that affected lessees experienced negative market returns with magnitudes correlated with the tighter restrictions. More recently, El Gazzar and Jaggi (1997) conducted an examination of the early versus late adopters of *SFAS No. 13* and, as expected, found that late adopters had a higher percentage of GAAP-based debt covenants, and would have come closer to violating lending agreement restrictions had they been forced to adopt the standard early. However, the researchers failed to detect a relation between the existence of an earnings-based cash bonus plan and the timing of adoption of *SFAS No. 13*.

The current study provides several improvements over the prior research. First, we examine firms in the post-*SFAS No. 13* period after managers had made their choices in compliance with the *SFAS No. 13* requirements; in this respect, our study updates and extends the studies described above. Second, we include a measure of corporate ownership structure in our model as suggested by Smith and Wakeman (1985). Only one other empirical study (Mehran, Taggert, & Yermack, 1999) has examined the potential effect of ownership structure on leasing behavior, and the results of that study have yet to be confirmed. Third, our examination

is not restricted to private lending agreements as have been many of the earlier studies; we examine debt covenant restrictions for all lending agreements for which data are available in *Moody's Industrial Manual*.[4] Fourth, our analysis utilizes a random sample of firms rather than firms chosen on the basis of leasing policy. The next section describes variable selection in more detail, and discusses the hypothesized results.

Variable Selection

We test five independent variables as possible determinants of off-balance-sheet leasing activity. As stated above, Smith and Wakeman (1985) identify three nonasset-specific variables that should theoretically provide special incentives to lease or buy: (1) financial contracts, (2) compensation contracts, and (3) ownership structure. These three variables are included in our model along with two others related to the leasing decision in past studies.

Smith and Wakeman (1985) predict that leasing is more likely if corporate bond contracts contain specific financial policy covenants. Presumably, the authors are referring to operating leases in this prediction, since in their earlier discussion they observe that corporations take steps to *limit* leasing activities through restrictive bond covenants. The limitations referred to in that discussion are assumed to be with respect to capital leases since capital leases increase balance sheet debt and the existing debt holders of a firm have a vested interest in limiting additional debt.[5] Thus, we predict that firms with debt agreements containing restrictions on leasing activity are more likely to engage in off-balance-sheet financing through the use of operating leases than firms that are not subject to such restrictive covenants.

A review of the debt covenant restrictions for our sample firms (described below) revealed that retained earnings restrictions and debt-to-equity restrictions typically contain limits on leasing behavior.[6] Thus, our first independent variable is the existence/nonexistence of either a retained earnings restriction or any of several different types of debt-to-equity restrictions.[7]

Smith and Wakeman (1985) predict that leasing is more likely if management compensation contracts reward managers based on return on invested capital. The argument is relatively straightforward; while the purchase of an asset can significantly increase the denominator of the performance function, thereby decreasing the payout to managers, off-balance-sheet leasing can yield the same operating results without increasing the asset base.[8] Of course, executive compensation committees could remove the compensation incentive of off-balance sheet leases by capitalizing all operating leases (or by uncapitalizing all capital leases) in computing earnings-based compensation. However, Imhoff et al. (1993) present evidence that these adjustments are not made; they were unable to detect a correlation between reported accounting income adjusted for operating leases and management compensation, suggesting that management compensation committees fail to adjust reported earnings to reflect these leases. Presumably, managers are free to engage in compensation-increasing leasing behavior without fear that compensation committees will undo their efforts on payday. To test Smith and Wakeman's prediction in the current study, we used the same measure used by El-Gazzar et al. (1986). An indicator variable was set equal to one if we identified the firm as having a compensation plan which rewarded managers based on income after-interest, and set equal to zero otherwise.

The third variable from the Smith/Wakeman model tested here is the ownership structure of the firm. Based on the observation that ownership of capital assets makes it difficult for a proprietor to reduce risk through diversification, Smith and Wakeman predict that leasing is more likely when the firm is closely held. By leasing some assets rather than purchasing them, owner/managers can reduce their concentration of wealth in one activity and facilitate a more efficient allocation of risk. It should be noted that the ownership structure effect predicted by Smith and Wakeman addresses the "lease versus buy" decision, rather than specifically addressing the prevalence of operating leases.[9] Therefore, even if the ownership/leasing relation predicted by Smith and Wakeman exists, it may be difficult to detect without combining capital leases and operating leases. However, the results of a recent study (Mehran et al., 1999) suggest that combining operating leases and capital leases may not be necessary. Mehran et al. (1999) reported a significant and positive relation between CEO share ownership and leasing intensity, whether measured by capitalized leases or by the share of lease payments in total capital costs. More importantly, perhaps, the authors reported that for their 176-firm sample, operating leases constituted a 21.7 percent mean share of total capital costs whereas capitalized leases constituted only a 0.6 percent mean share. In light of the prevalence of operating leases and their link with CEO ownership in the Mehran et al. (1999) study, we predict a positive relationship between operating leases and ownership concentration in the current study. In order to capture the potential effects of non-management ownership as well as managerial ownership, we use a broader definition for our ownership variable (OWN) than Mehran et al. (1999).[10] Specifically, we examined the appropriate proxy statement for each of our sample firms to determine the percent of common stock owned by officers and directors, and the percent owned by the largest single owner. We then included the larger of these two percentages as the value for OWN in the data set.

Another variable likely to affect leasing behavior is the tax rate faced by the firm. Smith and Wakeman (1985) suggest that to the extent the effective marginal tax rate differs between a lessee and a lessor, leasing can reduce the total tax liability. Unfortunately, it's difficult to test this prediction directly since any given lessee may lease assets from many different lessors whose identities and tax profiles are unobtainable. In a test of the political cost hypothesis, El-Gazzar et al. (1986) reported a significant negative correlation between lessees' effective tax rates and the operating lease method. Several more recent studies have also reported similar results (Sharpe & Nguyen, 1995; Graham, Lemmon, & Schallheim, 1998; Morsfield, 1998). These results are not surprising given the Smith/Wakeman prediction. In light of the theoretical arguments and the empirical evidence, we include the effective tax rate as a variable in the current study. We use the same definition of the variable as El-Gazzar et al. (1986): income tax expense, net of change in deferred taxes, divided by current gross margin.

The fifth variable included in our model is the debt-to-equity ratio. This variable is included for two reasons. First, El-Gazzar et al. (1986) reported a significant positive correlation between the debt-to-equity ratio and use of operating leases in the pre-*SFAS No. 13* period. Second, prior studies (e.g., Press & Weintrop, 1990; Duke, Franz, & Hunt, 1995) show that the debt-to-equity ratio often has explanatory power in models that already include actual debt covenant provisions. We define the debt-to-equity ratio to be equal to long-term debt divided by stockholders' equity.[11]

The dependent variable of interest in this study is a measure of the relative use of off-balance sheet leases by the sample firms. Theoretically, the best measure would be the present value of minimum lease payments for all non-capitalized operating and financing leases. However, this information is not disclosed as such in financial statements or available databases. Furthermore, computing such a figure is problematic due to the assumptions necessary with respect to lease terms, interest rates, and payment patterns after year five of the firm's financial statement (Ely, 1992).[12] Therefore, the numerator of our dependent variable is the cumulative minimum rental payments due in the next five years (from the balance sheet date) under all existing non-cancelable, non-capitalized leases (*Compustat* data item #95).[13] This gross measure of off-balance-sheet leasing commitments is then divided by either total assets or purchased assets in computing the dependent variable included in the tests of the independent variables described above.

SAMPLE SELECTION AND DATA COLLECTION

Sample Selection

In order to provide generalizability of results, a large random sample of firms was selected from *Moody's Industrial Manual* (1985) (*Moody's* hereinafter).[14] *Moody's* was used as a starting point because it generally contains the details of debt covenant agreements, which are required to test some of our hypotheses. The selection process involved numbering all firms listed in the index of *Moody's* from one to 1830 (i.e., 1830 is the population size). We then searched a four-digit random number table (Snedecor & Cochran, 1980) until 232 matches were obtained between the random numbers and those assigned to the population firms. These 232 firms constituted our initial sample.

Prior to data collection, 45 of the 232 randomly selected firms were eliminated for various reasons. Nine firms were eliminated because they were listed on foreign stock exchanges and had financial statements stated in foreign currencies,[15] 13 firms were eliminated because they were missing from the 1985 *Compustat* files (which were used as a data source), another 13 were eliminated because their most recent fiscal year-end was 1983,[16] and ten firms were eliminated because they were wholly-owned subsidiaries. Of the 187 firms remaining in the sample after these deletions, 179 had fiscal year-ends in 1984, and eight had year-ends in early 1985. Data were obtained for the final sample of 187 firms as described below.

Data Collection

Four sources of data were used in this study. *Moody's* provides relatively complete details of debt covenant restrictions for public debt agreements (Begley, 1989; Duke & Hunt, 1990; Press & Weintrop, 1990), and consequently served as the principal source of covenant-related data. We also consulted *Standard & Poor's Standard Corporate Descriptions* (1985) (*Standard & Poor's* hereinafter) to provide confirmation of the data collected from *Moody's*. For ten percent of the sample firms, more information was contained in *Standard & Poor's* than in *Moody's*, and for those firms, the additional information was added to the database.

The Compustat files served as the third source of data. All financial statement variables and the information needed to compute the lease variables were obtained from these files. Corporate proxy statements were used as the fourth source of data, and these were examined

to determine corporate ownership and the details of management compensation agreements. For five of our sample firms, we were unable to obtain the appropriate proxy statement, and consequently, these firms were deleted from the sample. The remaining 182 firms constituted our final sample, and were included in the analyses discussed in the following section.

RESULTS

Table 1 presents descriptive statistics and detailed definitions of the variables examined in this study. The two versions of the dependent variable (DEP_1 and DEP_2) differ only with respect to the denominator used in their computation. In both cases, we are measuring the level of operating leases relative to total resources of the firm. In the case of DEP_1, we use total assets (*Compustat* data item # 6) as a measure of total resources, and in the case of DEP_2, we use total assets minus capitalized leases (*Compustat* data item # 84), which we refer to as purchased assets.

The two versions of the dependent variable used in this study are both ratios. This means that all values of the dependent variables must fall between zero and one. A number of the firms in our sample had a value of zero for the dependent variable ($n = 48$ or 25.9 percent). Because of these 48 firms with zeros as dependent variables, it is not appropriate to use normal least squares regression to test the hypothesized relationships. Given this characteristic of the dependent variables and the measurement scales used for the independent variables (both continuous and categorical) we elected to use two different models to assess model validity. The first of these is a specific type of logit analysis called "ordered logit." The second is called multinomial logit analysis.

To perform either of these analyses, the dependent variable must first be categorized into discrete groups. For the dependent variables in our study there was no natural or conceptual reason to use a particular binning scheme (creating ordinal variables from the original continuous variables). Our decision to categorize the variables into six groups was based on the following logic. Each of the six groups (except group number one where all values were zero) was coded so that each of the resulting groups represented a doubling of the value of the last dependent variable in each of the six categories. For example, if the last value in an ordered set was 0.02 (categorical variable = 2), we used 0.04 as the maximum value for the dependent variable for the next split (categorical variable = 3). This recoding, in the absence of any more theoretically compelling way of categorizing the data, seems to makes sense and gives us reasonable splits (See Table 2 for the recoding scheme and the number of firms in each category of the new dependent variable). Because we included six categories of the dependent variable, the new ordered variable did not lose as much information as it would have if we used fewer splits. We also ran sensitivity analyses on other binning schemes and found that our final results seemed to be robust with respect to other recoding scenarios.[17]

Ordered Logit 1

For the ordered logit analysis, the six categories shown in Table 2 were regressed on the independent variables using the maximum likelihood method logit analysis. The results of the analysis are presented in Table 3 and show that the two equations for the different versions of the dependent variable are essentially the same. This was true for all subsequent analyses,

TABLE 1
Descriptive Statistics
(n=182)

Variable[a]	Mean	Deviation	Standard Median	Minimum	Maximum
COV	0.6264	0.4851	1.0000	0	1.0000
MCP	0.4121	0.4936	0	0	1.0000
OWN	0.1758	0.1694	0.1248	0.0005	1.0000
ETR	0.0762	0.0968	0.0688	-0.2897	0.5974
DE	0.3317	1.2588	0.1985	-8.5554	11.1417
DEP_1	0.0671	0.1039	0.0316	0	0.6241
DEP_2	0.0691	0.1074	0.0322	0	0.6673

[a] The main variables are defined as follows:

COV = An indicator variable of the existence of either a retained earnings restriction or a debt/equity ratio restriction; coded as 1 for existence, 0 otherwise.

MCP = An indicator variable of the existence of a management compensation plan based on after-interest income; coded as 1 for existence, 0 otherwise.

OWN = The larger of the percentage of the common stock owned by managers and directors as a group, or the percentage owned by the largest single shareholder.

ETR = Income tax expense, net of change in deferred taxes, divided by current gross margin.

DE = Long-term debt divided by stockholders' equity.

DEP_1 = Cumulative minimum rental payments due in the five years following the balance sheet date under all non-cancelable, non-capitalized leases, divided by total assets. This is the first of two dependent variables used.

DEP_2 = Cumulative minimum rental payments due in the five years following the balance sheet date under all non-cancelable, non-capitalized leases, divided by purchased assets. This is the second of two dependent variables used.

The following were used as moderating variables in identifying the sample of firms that had explicit covenant prohibitions on leasing behavior (coded as 1 for existence, 0 otherwise):

NOL = An indicator variable of the existence of a covenant restriction on new operating leases.

MRE = An indicator variable of the existence of a covenant restriction on the magnitude of rental expense.

SLT = An indicator variable of the existence of a covenant restriction on the use of sale and leaseback transactions.

so only dependent variable number two (cumulative minimum rental payments due in the next five years divided by purchased assets) is shown for the other models.

In both ordered logit equations, the ownership variable (OWN) is the only one of the three suggested by the Smith/Wakeman model to show significance (at the 0.04 and 0.02 levels, respectively) in the predicted direction. The tax rate variable (ETR) is also highly significant ($p<0.00$ and $p<0.00$, respectively) in each of the models and the sign of the relationship (-) is in the predicted direction. However, the data and model used for this test do not support

TABLE 2
Reclassification of Dependent Variable[a]

New ordered dependent variable	N	Range based on original variables
1	48	.0000 - .0000
2	42	.0047 - .0297
3	41	.0305 - .0600
4	33	.0602 - .1203
5	11	.1341 - .2405
6	10	.2450 - .6241

[a] This table shows the results of the reclassification of the dependent variable for input into the ordered logit and multinomial logit analyses.

theories about the other three independent variables with either of the criterion measures. The signs of the relationships are consistent with hypothesized effects, but MCP, DE and COV are not significant in the ordered logit model.

Multinomial Logistic Regression

The ordinal measurement of the dependent variable and the continuous (OWN, ETR and DE) and categorical (COV and MCP) forms of the independent variables also lend themselves to modeling using a technique called multinomial logistic regression (MLR, see Agresti, 1990). This analysis is similar to the binary logistic regression technique, but can be used when the dependent variable has more than two categories. For our model, we have two factors (COV and MCP) and three covariate measures (OWN, ETR and DE). In an MLR analysis a maximum likelihood technique can be used and the analysis outputs include an overall model fit (Chi square = 41.91, $df = 25$, $p = 0.022$), a pseudo R^2 value (Cox and Snell = 0.20 and Nagelkerke = 0.207) and tests of the significance of each of the independent variables using a Chi square statistic (OWN and DE were both significant; see Table 3). It should be noted that the coefficients of this model are not in the same form as regression or ordered logit. They represent the comparison of each level of the dependent variable with all levels of the factors and for each covariate. Thus, in this model, there were 35 coefficients. Table 3 reports only the overall sign of the relationship for each of the main variables defined in Table 1.

It is interesting to note that the results of the MLR analysis differ slightly from those of our ordered logit model. The ownership variable suggested by the Smith/Wakeman model is still significant and in the hypothesized direction. Neither of the other two variables predicted by Smith/Wakeman (COV and MCP) had a significant effect on the criterion measure. Although the income tax expense (ETR) variable is no longer significant in this model, the debt equity (DE) variable is. Note that the sign of the DE variable is consistent with the hypothesized relationships presented in the paper. Also, the signs of all of the relationships (although not the significance) are in line with the anticipated results.

TABLE 3
Analysis Results

Type of Analysis	Sample	Equation Significance	Model Fit (R^2)	Dependent Variables		Independent Variables & Predicted Relationship				
				DEP[1] 1	DEP 2	COV +	MCP +	OWN +	ETR -	DE +
Ordered logit	All firms	significant	NA[2]	Model[3]		no	no	yes	yes	no
Coefficients	(N = 182)					0.40	0.19	1.55	-3.88	0.20
(Probability)		(p<.05)				(.13)	(.61)	(.04)	(.00)	(.53)
Ordered logit	All firms	significant	NA		Model	no	no	yes	yes	no
Coefficients	(N = 182)					0.44	0.22	1.74	-3.95	0.23
(Probability)		(p<.02)				(.11)	(.58)	(.02)	(.00)	(.51)
Multinomial logit	All firms	significant	.20 approx.		Model	no	no	yes	no	yes
Coefficients	(N = 182)					(+)[4]	(+)	(+)	(-)	(+)
(Probability)		(p<.02)				(.15)	(.57)	(.03)	(.13)	(.00)
Ordered logit	Sub-sample	significant	NA		Model	yes	no	yes	yes	no
Coefficients	(N = 135)[5]					0.67	0.31	1.77	-3.70	0.19
(Probability)		(<.05)				(.05)	(.51)	(.04)	(.01)	(.61)
Regression OLS	Sub-sample	significant	.12		Model	no	no	yes	yes	no
Coefficients	(N = 134)[6]					0.18	0.16	0.64	-1.28	.012
(Probability)		(<.05)				(.14)	(.20)	(.05)	(.04)	(.48)

[1] See Table 1 for variable definitions (dependent and independent variables).

[2] There is no corresponding statistic for "model fit" in ordered logit analysis.

[3] Designates which dependent variable was used in the model.

[4] The coefficients for multinomial logit analysis are too complicated for this table. The sign represents relationship between variable and dependent variable.

[5] This model is based on a subsample of the original data. Forty-seven of the sampled firms had values of 1 for some combination of the NOL, MRE or SLT variables (see Table 1 for a definition of these variables). These 47 firms were omitted from this analysis.

[6] This analysis excludes all firms (n = 48) with zero values for the dependent variable. Since the remaining data are continuous, normal OLS regression is appropriate for analyzing this subsample.

Ordered Logit 2

Examination of Table 3 indicates that COV (an indicator variable of either a covenant-based retained earnings restriction or a debt/equity ratio restriction) is not significant in the first three models. Casual observation suggests that some firms may be subject to restrictions that expressly limit their ability to enter into operating leases. To the extent that such restrictions are prevalent for our sample firms, and assuming that they may preclude the more general restrictions implied by COV, the insignificance of COV would not be surprising.[18] In order to test the possibility that the insignificance of COV is a function of more restrictive covenant provisions, we examined the covenant information for our sample firms for the existence of three types of restrictions that effectively limit leasing behavior. Specifically, we screened for restrictions on: (1) new operating leases (NOL), (2) the magnitude of rental expense (MRE), and (3) sale/leaseback transactions (SLT). To determine if these variables might have an impact, we reduced our sample by eliminating any firm that was subject to at least one of the restrictions. Of the 182 firms in our original sample, 47 were subject to at least one of the restrictions.

The fourth model presented in Table 3 shows the result of running an ordered logit on this reduced sample of firms. As in the previous ordered logit models, both OWN and ETR are significant with coefficients roughly equivalent to those reported for the full sample. However, in the model with the 47 firms removed, COV is significant (at the 0.05 level), suggesting that the results reported using the full sample were sensitive to the inclusion of firms that had explicit prohibitions on additional leasing. It should be noted that the COV–Criterion relationship was close to statistical significance in earlier models. By eliminating the 47 firms, even though the model loses degrees of freedom, the relationship now proves to be significant.

OLS Regression

A final test of the data is based on an OLS regression analysis of the firms in the original sample that had positive (i.e., non-zero) values of the dependent variable. As pointed out earlier, there are important firm-specific factors in the lease/buy decision that we have not examined in this study. Since firms that choose to use no operating leases may do so primarily because of these omitted factors, it is potentially revealing to test the sensitivity of the earlier models after eliminating those firms with no operating leases.[19] As mentioned above, 48 firms had values of zero for the dependent variable. The 134 firms remaining in the sample after the elimination of those firms were analyzed using ordinary least squares regression, and the results are presented as the last model in Table 3. As the table indicates, the results of the regression analysis are consistent with the original ordered logit model with only OWN and ETR showing statistical significance.

Summary

Although each of the models presented above provides slightly different results, some general patterns emerged. First, the ownership variable (OWN) was significant in all models.[20] Second, the income tax rate variable (ETR) was significant in all but one model. It seems that both of these variables are robust to the type of model and sample used in our analysis. The existence of a retained earnings or debt/equity restriction (COV) was only a good predictor when the

moderating variables (NOL, MRE and/or SLT) were used to eliminate certain firms from the analysis. The debt/equity variable was significant, but only in the multinomial logit analysis. Finally, there was no support for the Smith/Wakeman hypothesis of a relationship between a management compensation plan and either of the criterion measures examined here.

Our analysis points to two interesting conclusions. First, there is evidence that at least some elements of the model presented in this paper have validity. Second, the analysis of these data presents an interesting paradox. If only a single analytical technique were used to assess model validity in this study, the findings would be contingent on the model selected by the researchers. Since all of the techniques used (ordered logit, multinomial logit and OLS regression) are legitimate, based on the type of measurement of the independent and dependent variables, researchers could justify using any of the analyses presented above. In this case, the results would seem clear since there would not be conflicting findings based on multiple models. However, by doing a "sensitivity analysis" (using multiple models for model validation) of the hypothesized results, we are left with a more complex results section without a clear means of explaining some of the variations caused by different modeling techniques. Our findings suggest a tradeoff: researchers using a single model will have more parsimonious results but may miss interesting relationships that multiple model approaches may illuminate; more complex modeling approaches may produce a more thorough picture of hypothesized relationships but at the expense of finding conflicting results.

Overall, our results provide empirical support for two of Smith and Wakeman's (1985) three predictions. First, the models indicate a significant relation between leasing behavior and the extent to which the firm is closely held. This finding not only supports Smith and Wakeman's prediction, but is also consistent with recent results reported by Mehran et al. (1999) of a positive and significant effect of CEO ownership on leasing behavior. Second, the results support Smith and Wakeman's prediction that the existence of restrictive financial policy covenants will lead to increased use of operating leases. However, contrary to their prediction of a positive relationship between leasing behavior and management compensation based on the return on capital, we are unable to detect any such relation. Given the poor performance of management compensation variables in accounting choice studies in the past, and in light of the multitude of variables that are likely to affect management remuneration and the various forms that it can take in the current economic environment, the lack of a significant finding with respect to MCP is not surprising. Although El Gazzar et al. (1986) did find a positive relation between an incentive compensation dummy variable and the use of operating leases, El Gazzar and Jaggi (1997) failed to detect a management compensation effect on the timing of adoption of *SFAS No. 13*. Furthermore, the fact that the 1986 study covered a time period when managers were not constrained by the requirements of *SFAS No. 13* may provide at least a partial explanation for the different results. Indeed, one interesting possibility that emerges from the current study is that *SFAS No. 13* may have effectively ended managers' use of leasing policy for their personal benefit.

The significance of the effective tax rate variable provides support for the findings of previous studies that have reported a negative relation between tax rates and the use of operating leases (El Gazzar et al., 1986; Sharpe & Nguyen, 1995; Graham et al., 1998; Morsfield, 1998) and the literature that suggests that leasing is strongly driven by tax considerations.

The significant positive relationship between the debt/equity ratio and operating leases that we obtained in our MLR model is consistent with the findings reported by El Gazzar *et al.* (1986) but inconsistent with preliminary results reported by Morsfield (1998). The failure of the debt/equity ratio to show a significant relation to the use of operating leases in our other four models suggests that more work needs to be done in this area.

CONCLUSION

Our goal in this paper was to identify economic variables that help explain differences among firms in terms of their use of operating leases in the post-*SFAS No. 13* period. In doing so, we start with a theoretical framework proposed by Smith and Wakeman (1985) that predicts that leasing activity will be positively associated with the existence of financial policy covenants, management compensation contracts that reward managers based on return on capital, and the extent to which the firm is closely held. Based on previous empirical work, and positive accounting theory, we also include the effective tax rate and the debt/equity ratio in our model.

As predicted, for a large random sample of U.S. companies, the use of operating leases is negatively related to the effective tax rate and positively related to owner concentration and restrictive financial contracting variables. Contrary to predictions, the existence of management compensation schemes based explicitly on return on capital does not appear to be related to the use of operating leases. While some evidence emerged here of a positive relation between the debt/equity ratio and operating leases, the results are unclear as are those reported in previous studies. The seeming inconsistencies may simply be the result of different time periods examined, and/or be an indication that *SFAS No. 13* has significantly affected the way that managers engage in and report their leasing activities. Either way, resolution of these discrepancies is left for future studies.

REFERENCES

Abdel-khalik, R. (1981). *The economic effects on lessees of FASB Statement 13, accounting for leases*. Stamford, CT: Financial Accounting Standards Board.

Agresti, A. (1990). *Categorical data analysis*. New York: John Wiley and Sons.

American Bar Foundation. (1971). *Commentaries on indentures*. Chicago American Bar Foundation.

Ang, J., & Peterson, P. (1984). The leasing puzzle. *The Journal of Finance, 39*, 1055-1065.

Beattie, V. A., Edwards, K., & Goodacre, A. (1998). The impact of constructive operating lease capitalization on key accounting ratios. *Accounting and Business Research, 28*(4), 233-254.

Beattie, V. A., Goodacre, A., & Thomson, S. (2000a). Operating leases and the assessment of lease-debt substitutability. *Journal of Banking and Finance, 24*, 427-470.

Beattie, V. A., Goodacre, A., & Thomson, S. (2000b). Recognition versus disclosure: An investigation of the impact on equity risk using UK operating lease disclosures. *Journal of Business Finance and Accounting, 27*, 1185-1224.

Beattie, V. A., Goodacre, A., & Thomson, S. (2001). *Lease accounting reform and economic consequences: The views of preparers and users*. Unpublished manuscript, University of Sterling.

Begley, J. (1989). *The use of accounting and non-accounting based covenants in public debenture agreements: An empirical investigation.* Unpublished manuscript, University of Rochester.

Braund, S. L. (1989). Leasing—A review of the empirical studies. *Managerial Finance, 15,* 13-20.

Collins, D. W., & Dent, W. T. (1979). The proposed elimination of full cost accounting in the extractive petroleum industry. *Journal of Accounting and Economics, 1,* 3-44.

Duke, J. C. (1987). *Debt covenant restrictions and accounting technique choice: An empirical study.* Unpublished doctoral dissertation, Pennsylvania State University.

Duke, J. C., Franz, D. P., & Hunt, H. G. (1995). An examination of debt-equity proxies vs. actual debt covenant restrictions in accounting choice studies. *Journal of Business Finance and Accounting, 22,* 615-635.

Duke, J. C., & Hunt, H. G. (1990). An empirical examination of debt covenant restrictions and accounting-related debt proxies. *Journal of Accounting and Economics, 12,* 45-63.

El-Gazzar, S. M. (1993). Stock market effects of the closeness to debt covenant restrictions resulting from capitalization of leases. *The Accounting Review, 68,* 258-272.

El-Gazzar, S. M., & Jaggi, B. L. (1997). Transition period of mandated accounting changes— Timing of adoption and economic consequences: The case of SFAS No. 13. *Journal of Business Finance and Accounting, 24,* 293-307.

El-Gazzar, S. M., Lilien, S., & Pastena, V. (1986). Accounting for leases by lessees. *Journal of Accounting and Economics, 8,* 217-237.

El-Gazzar, S. M., Lilien, S., & Pastena, V. (1989). The use of off-balance sheet financing to circumvent financial covenant restrictions. *Journal of Accounting, Auditing and Finance,* 217-231.

Ely, K. M. (1992). *The relation between operating lease accounting and the market's assessment of equity risk.* Unpublished manuscript, University of California at Los Angeles.

Ely, K. M. (1995). Operating lease accounting and the market's assessment of equity risk. *Journal of Accounting Research, 33,* 397-315.

Financial Accounting Standards Board. (1976). *Statement of financial accounting standards no. 13, accounting for leases.* Stamford, CT: Financial Accounting Standards Board.

Foster, G. (1986). *Financial statement analysis.* Englewood Cliffs, NJ: Prentice-Hall.

Graham, J. R., Lemmon, M. L., & Schallheim, J. S. (1998). Debt, leases, taxes, and the endogeneity of corporate tax status. *Journal of Finance, 53,* 131-162.

Hartman, B. P., & Sami, H. (1989). The impact of the accounting treatment of leasing contracts on user decision making: A field experiment. *Advances in Accounting, 7,* 23-35.

Imhoff, E. A., Jr., Lipe, R., & Wright, D. W. (1991). Operating leases: Impact of constructive capitalization. *Accounting Horizons, 5,* 51-63.

Imhoff, E. A., Jr., Lipe, R., & Wright, D. W. (1993). The effects of recognition versus disclosure on shareholder risk and executive compensation. *Journal of Accounting, Auditing and Finance, 8,* 335-368.

Imhoff, E. A., Jr., Lipe, R., & Wright, D. W. (1997). Operating leases: Income effects of constructive capitalization. *Accounting Horizons, 11,* 12-32.

Imhoff, E. A., Jr., & Thomas, J. K. (1988). Economic consequences of accounting standards: The lease disclosure rule change. *Journal of Accounting and Economics, 10,* 277-310.

Lewis, C. M., & Schallheim, J. S. (1992). Are debt and leases substitutes? *Journal of Financial and Quantitative Analysis, 27*, 497-511.

Lipe, R. C. (2001). Lease accounting research and the G4+1 proposal. *Accounting Horizons, 15*, 299-310.

Marston, F., & Harris, R. S. (1988). Substitutability of leases and debt in corporate capital structures. *Journal of Accounting, Auditing and Finance, 3*, 147-164.

Mehran, H., Taggert, R. A., & Yermack, D. (1999). CEO ownership, leasing and debt financing. *Financial Management, 28*, 5-14.

Moody's Investors Service. (1985). *Moody's industrial manual.* New York: Moody's Investors Service, Inc..

Morsfield, S. G. (1998). *The impact of tax and financial reporting concerns on lessee firms' lease-type decisions: Capital, operating, and synthetic leases.* Unpublished manuscript, University of Arizona.

Myers, S., Dill, D., & Bautista, A. (1976). Valuation of financial lease contracts. *Journal of Finance, 31*, 799-819.

Nailor, H., & Lennard, A. (2000). *Leases: Implementation of a new approach.* Financial Accounting Series No. 206-A. Norwalk, CT: Financial Accounting Foundation.

Press, E. G., & Weintrop, J. B. (1990). Accounting-based constraints in public and private debt agreements: Their association with leverage and impact on accounting choice. *Journal of Accounting and Economics, 12*, 65-95.

Sharpe, S. A., & Nguyen, H. H. (1995). Capital market imperfections and the incentive to lease. *Journal of Financial Economics, 39*, 271-294.

Smith, C. W., Jr., & Wakeman, L. W. (1985). Determinants of corporate leasing policy. *The Journal of Finance, 40*, 895-908.

Snedecor, G. W., & Cochran, W. C. (1980). *Statistical methods.* Ames, IA: Iowa State University Press.

Standard & Poor's Corporation. (1985). *Standard corporate descriptions.* New York: Standard & Poor's Corporation.

Watts, R. L., & Zimmerman, J. L. (1986). *Positive accounting theory.* Englewood Cliffs: Prentice-Hall.

Watts, R. L., & Zimmerman, J. L. (1990). Positive accounting theory—A ten-year perspective. *The Accounting Review, 65*, 131-156.

ENDNOTES

[1] G4+1 (Group of Four Plus One) is comprised of national accounting standard setters from Australia, Canada, New Zealand, the United Kingdom and the United States.

[2] Smith and Wakeman also identify several asset-specific variables likely to affect the lease/buy decision such as the sensitivity of the value of the asset to use and maintenance decisions, whether the asset is specialized to the firm, and the expected period of use of the asset relative to its useful life.

[3] El Gazzar et al. (1986, p. 227) explain the Tax Savings/Reporting Incentives Hypothesis as follows:

> A low effective tax rate surrogates for reporting incentives to use the operating method. A high effective tax rate surrogates for tax incentives for lease capitalization. Low-tax-rate firms are more likely to use the

operating method, while high-tax firms are more likely to capitalize leases. Also, low-tax firms will be more intensive lessees.

[4] *Moody's Industrial Manual* contains information on both private and public debt agreements. However, the descriptions of debt covenant restrictions are more extensive and complete for public debt agreements than for private debt agreements (Begley, 1989; Duke & Hunt, 1990; Press & Weintrop, 1990).

[5] Imhoff et al. (1993) report that incorporating operating leases into the debt-to-asset ratio for firms in the airlines and grocery industries increases the leverage ratio by approximately 12 percent. Thus, for these two industries, the potential impact of capitalizing operating leases is significant, and would be expected to put a strain on the firms' debt agreements, riskiness, and cost of capital. Furthermore, Imhoff et al. (1991) present evidence that the debt-to-equity ratios for a small sample of firms would have been dramatically increased if the firms' operating leases were capitalized.

[6] Retained earnings restrictions typically require the maintenance of a minimum level of retained earnings, and debt-to-equity restrictions generally prohibit any actions that have the effect of increasing the debt-to-equity ratio. American Bar Foundation (1971), Duke (1987) and Duke and Hunt (1990) contain more complete descriptions of these and other common debt covenant restrictions.

[7] Duke and Hunt (1990) identified eight different types of debt-to-equity restrictions involving four different definitions of debt (funded, secured, senior funded or total) and two different definitions of equity (net assets or net tangible assets). We screened for the existence of all eight types in this study.

[8] For example, Imhoff et al. (1991) report that if McDonald's Corporation had capitalized its operating leases in 1988, its return on assets would have been 9 percent less, and its debt-to-equity ratio would have been 30 percent higher. For the 14-firm sample examined in that study, capitalization of operating leases resulted in an average decrease in return on assets of 10 percent for low lessees and 34 percent for high lessees; the average increase in the debt-to-equity ratio was 47 percent for low lessees and 191 percent for high lessees

[9] The authors thank an anonymous reviewer for pointing this out.

[10] Smith and Wakeman (1985) do not limit their discussion of ownership structure to managerial ownership. Their focus is on ownership concentration, rather than managerial ownership *per se*. In other words, a non-manager owner has an incentive to allocate and reduce risk, much the same as the manager/owner, especially if their ownership position in the firm represents a significant portion of their wealth. Therefore, we examine both management and outside ownership in this study.

[11] Duke and Hunt (1990) included seven versions of the debt-to-equity ratio (including the one used in the current study) in their examination of the ratio's usefulness as a proxy for the existence and closeness of restrictive debt covenants. The different versions of the ratio were highly correlated and all produced similar results, suggesting that research outcomes should not be sensitive to the exact definition of the debt-to-equity ratio.

[12] *SFAS No. 13* requires that minimum lease payments under operating leases be disclosed by year for the first five years, but only in aggregate for years thereafter (FASB, 1976, par. 16).

[13] Admittedly, our measure of off-balance-sheet lease commitments is *ad hoc*. However, evidence presented by Ely (1992) suggests that banks commonly estimate the present value of operating leases by simply multiplying the first year's lease payment by some

constant. Using 6 as a constant, Ely obtained a correlation of .935 between the resulting measure and a sophisticated estimate of the present value of operating leases. She also reports similar results in a more recent paper (Ely, 1995). Our measure of lease commitments is likely to be very close to the result we would have obtained if a constant of 5 had been used with the *ad hoc* bank formula, and accurate enough for our purposes in this study .

[14] Our use of 1985 data for this study stems from the fact that the starting point for the data set used here is the sample of firms and debt covenant-related data used in Duke and Hunt (1990). While we collected several additional pieces of information for the sample firms for the current study, the original 1985 data contain a rich set of hand-collected information related to debt covenant restrictions that would have been difficult and expensive to retrieve for an updated sample period. Given our objectives in this study, we feel confident that the use of this archival data has not compromised the contributions of this research.

[15] See Collins and Dent (1979) for an explanation of why foreign firms should be excluded.

[16] See Foster (1986) for a discussion of the problems created by nonsynchronous reporting periods in a cross-sectional analysis .

[17] Specifically, we ran an "equal" binning model that included 5 or 6 bins of equal size, and the results were not appreciably different than the ones reported in Table 3. Thus, the results do not appear to be sensitive to differences in the number of observations in each category.

[18] We are indebted to an anonymous reviewer for pointing this out.

[19] We thank an anonymous reviewer for suggesting this.

[20] Because OWN does not distinguish between managerial ownership and outside ownership, an anonymous reviewer of this journal suggested that we perform a sensitivity analysis using only managerial ownership. We ran tests of the models by substituting the percentage ownership by managers and directors for OWN (greater of percentage ownership by managers and directors or percentage ownership by largest single shareholder). The results did not change in any of the analyses from those reported in Table 3. This is not surprising since the correlation between the two variables used to define OWN is .82.