The Effect of Capitalizing Operating Leases on the Immediacy to Debt Covenant Violations

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We investigate the effect of capitalizing operating leases on firms' immediacy to their debt covenant violations. The results of our analysis of U.S. companies indicate that the capitalization of operating leases will cause significant changes in the various financial ratios contained within firms' debt covenants. We find that, for some firms, capitalization deteriorates their financial ratios significantly and to the extent that firms will likely violate their debt covenants after such capitalization. However, our results also indicate that, for other firms, capitalizing operating leases results in the improvement of financial ratios and will help firms reduce their risk of debt covenant violation.

INTRODUCTION

Under the current U.S. lease accounting rules (ASC 840), firms have been known to favor operating leases, which provide a source of off-balance-sheet financing. To improve accounting for leases, the IASB and FASB have been conducting a long-term joint project on leases. If this new standard is adopted, an additional $1.3 - $2 trillion of leases will be reported on the balance sheets of U.S. companies (Satow, J., NY Times, 2010) through the capitalization of operating leases. If adopted, this new lease accounting standard will likely affect debt covenants, credit ratings, and investors' perceptions of U.S. and foreign firms. This study explores how the capitalization of operating leases will affect the financial ratios of U.S. firms, incorporated in their debt covenants. Evidence on the likely effects of the new standard is important. The adoption of the proposed standard may trigger many firms to be concerned with immediacy (closeness or tightness) to debt covenant violations. Our evidence provides valuable insights for U.S. companies and investors as they prepare to adopt the new lease accounting rules.

We use publicly available data from Dealscan and Compustat databases ranging from 1990 to 2011 to explore the effects of capitalizing operating leases on the immediacy to debt covenant violations of U.S. companies. To investigate this research questions, we use eight financial ratios that are included in debt covenants, such as solvency, liquidity, and interest coverage ratios. We investigate the effect of operating lease capitalization on these ratios for two consecutive years.

Our results provide evidence that the capitalization of leases will not always cause deterioration of financial ratios. As expected, for some firms, capitalization significantly deteriorates firms' financial ratios. Furthermore, some firms cross the initial covenant threshold and violate their debt covenants because of the negative effect of capitalization of operating leases on their financial ratios. However, we also find evidence that, for other firms, capitalization improves financial ratios and helps reduce the risk of debt covenant violation. This significantly different effect on financial ratios is determined by the characteristics of each financial ratio and where firms are positioned in terms of their ratios at a starting point (before the capitalization of leases).

Specifically, to investigate the effect of lease capitalization on firms' financial ratios and debt covenants, we examine changes in slack after capitalization. We define slack as the difference between firms' financial ratios and the debt covenant violation thresholds and slack difference as slack after lease capitalization minus slack prior to lease capitalization. We find evidence that operating lease capitalization negatively affects the slack differences of solvency ratios, such as Debt to EBITDA, Debt to Equity, and Debt to Tangible Net Assets, in the year of capitalization (Year 0, assuming that capitalization occurs at fiscal year-end date). That is, capitalization deteriorates firms' financial ratios, and they are now closer to the covenant violating threshold of these ratios. Furthermore, capitalization negatively affects the slack difference of these solvency ratios to a greater degree for the violation group firms (defined as firms whose financial ratios have either already violated the debt covenant before capitalization or are very close to the violating threshold due to the firms' weak financial performance) than for the non-violation group firms (defined as firms whose financial ratios are remotely away from the violating threshold because of their strong financial performance) in Year 0. On the other hand, we find that operating lease capitalization negatively affects the slack difference of the leverage ratio to a lesser degree for the violation group than for the non-violation group in Year 0. In Year 1, operating lease capitalization affects both the income statement and the balance sheet. Our results indicate that, in Year 1, capitalization negatively affects the slack differences of Debt to EBITDA and Leverage ratio for the violation group firms to a lesser degree than it does for the non-violation group.

Examining the liquidity ratios, we have found that lease capitalization negatively affects the slack differences of the Current Ratios and the Quick Ratios for both (violation and non-violation) group firms in Years 0 and 1. Furthermore, capitalization negatively affects the slack differences of the Current Ratios and the Quick Ratios for the violation group to a lesser extent than it does for the non-violation group in Years 0 and 1. Finally, our results suggest that lease capitalization negatively affects the slack differences of Interest Coverage and Cash Interest Coverage ratios to a lesser extent for the violation group in Year 1.

This study will be valuable to U.S. companies and investors by helping them better understand what to expect concerning firms' debt covenant violations given the imminent adoption of new lease accounting rules. Section 2 examines background and prior research on lease. Section 3 discusses the research questions and hypotheses. Section 4 describes the sample and the methodology. Section 5 reports the main results and Section 6 concludes.

BACKGROUND AND PRIOR RESEARCH

Overview of Lease Classification Rules

The determination of classifying a lease as a capital or operating lease has a significant impact on the financial statements of both the lessor and the lessee. In the U.S., under a capital lease, the lessee treats the lease as if the underlying asset had been purchased – the lessee places the underlying asset on its balance sheet and recognizes a liability for future lease payments. Therefore, under a capital lease, the lessee recognizes depreciation and interest expenses. However, under an operating lease, the lessee does not recognize the leased asset on its balance sheet; instead, recognizes an expense for the lease payments (U.S. GAAP, ASC 840-20, 30).

Even though U.S. GAAP (ASC 840) and IFRS (IAS 17) have the same objectives in terms of lease accounting standards, major differences exist between the two. For example, IFRS indicates that, if the lease contract transfers "substantially all" of the major aspects of the asset from the lessor to the lessee,

then the lease should be treated as a capital (finance) lease. However, IFRS does not suggest the use of any bright-line tests for lease classification while U.S. GAAP suggests that firms to use bright-line tests to determine lease classification. Specifically, U.S. GAAP requires that a lease meet at least one of four very specific criteria to be considered a capital lease. Although U.S. GAAP provides a clear principle for how leases should be classified, bright-line tests can prevent users from truly following the underlying principle or objective of this standard.[1] Additionally the sharp bright-line tests can also lead to a lack of comparability and undue complexity, which necessitates that users of financial statements adjust the amounts presented on a financial statement to reflect the assets and liabilities that arise from an operating lease.

The New Lease Accounting Project by the FASB and IASB

In March 2009, the FASB and IASB issued a discussion paper, Leases: Preliminary Views, in which they propose a new lease accounting approach. Under the proposed standard, there would no longer be a distinction between capital and operating leases. Instead, with any lease transaction, the lessee would record a "right-of-use" asset and an associated liability for the lease payments on the balance sheet. In addition, the lessee would record amortization of the "right-of-use" asset over the life of the lease.[2] The FASB and IASB released an Exposure Draft (ED) on lease accounting in the fall of 2010; this draft required the implementation of the "right-of-use" model of lease reporting. The lessee reports a "right-of-use" asset and obligation to pay rental liability, while the lessor reports a lease receivable and either records a lease liability (performance obligation approach) or derecognizes the asset over the life of the lease (de-recognition approach). In May 2013, the FASB and IASB issued a revised exposure draft on leases. The boards have not yet set a specific effective date, but it is anticipated that the final standard will be placed into effect when all feedback is received (Biondi et al 2011).[3]

Prior Research on Operating Lease Capitalization

As our study focuses on the effects of the proposed capitalization of operating leases on debt covenants, we examine findings of prior studies concerning debt covenants and lease capitalization. Concerning lease capitalization, prior research has investigated the effects of classifying leases as capital or operating on financial ratios and income. Ingberman et al. (1979) perform a study that focuses on the effect of lease classification on income. Imhoff, Lipe, and Wright (1991), Lipe (2001), Monson (2001), and Hales et. al. (2012) utilize a method to constructively capitalize operating leases to determine the impact of newly capitalized leases on the balance sheet. This method allows financial statement users to include any "off-balance sheet financing" from operating leases in financial ratios. Using the constructive capitalization method, they examine the impact of capitalization of operating leases on financial ratios. Results indicate that constructive capitalization significantly affects these ratios.

Beattie et al. (1998) perform a study in response to the, then suggested, FRS 5 Reporting the Substance of Transactions, which would have required all UK leases to be classified as capital leases. Their hypothesis is that the regulatory change will substantially affect key accounting ratios. They provide evidence that unrecorded long-term debt, due to operating leases, equals 39% of recorded long-term debt. In addition, unrecorded assets equal 6% of recorded assets. Godfrey and Warren (1995) examine the responses of Australian lessee firms to a change in accounting standards that require capitalization. Their results suggest that firms would reduce dependency on leases and switch to non-lease debt and shareholder funding if the requirement was implemented. Bennett and Bradbury (2003) measure the impact of constructive capitalization on 38 firms in the New Zealand stock exchange, using the method suggested by Imhoff et al. (1991). They find that constructive capitalization has a material impact on leverage and affects liquidity and profitability ratios. Using German data, Fuelbier et al. (2008) find that lease capitalization has a significant effect on financial ratios comprised of items from the balance sheet and the income statement. However, Bauman and Francis (2011) find that, in lessor accounting, the balance sheet effects associated with formal recognition of operating leases are not material. McConnell (2010) points out that, as a result of the new lease proposals, firms would have lower asset turnover ratios

and, usually, a lower return on capital. In addition, both current and noncurrent liabilities would increase, which would result in decreased working capital and increased debt to equity ratio.

Prior Research on Debt Covenants

The requirement of lease capitalization will affect the likelihood of a company's debt covenant violations, which will prove costly to many firms. Dichev, Beatty, and Weber (2002) investigate the relationship between accounting-based performance pricing and debt covenants. They find evidence that performance pricing provisions are typically designed to handle credit improvements, while credit deteriorations are handled with debt covenant provisions. Christensen, Lee, and Walker (2009) use reconciliations of UK GAAP earnings to IFRS earnings disclosed by UK firms upon the mandatory adoption of IFRS in 2005 to examine the effects of these mandatory changes in accounting standards on debt-contracting. The mandatory switch from UK GAAP to IFRS has altered the likelihood of technical debt covenant violations. Further, Christensen et al. find evidence of market reactions upon the announcement of IFRS reconciliations. They also find greater market reactions among those firms expected to bear higher costs upon debt covenant violation. This finding suggests that, even if reconciliations constitute pure accounting translations that are not expected to convey information on future operating cash flows, through debt-contracting effects, they will nevertheless have implications for equity valuation.

Demerjian (2007, 2010, and 2011) find that borrowers with positive earnings, high profitability, and low volatility in earnings are likely to include debt covenants measured with earnings (e.g., coverage or debt to cash flow). On the other hand, borrowers with losses, low profitability, and highly volatile earnings are likely to include covenants measured with shareholders' equity (e.g., net worth). These findings indicate that debt contracts are written with respect to a borrower's credit risk and this concern drives their inclusion in debt contracts. El-Gazzar (1993) performs an event study that examines the association between lessees' market returns and their changes in the tightness of debt covenant constraints that result from compliance with SFAS No. 13 (1976). His study uses a sample of lessees who have retroactively capitalized leases as a result of SFAS No. 13. His results suggest that retroactive capitalization of off-balance sheet leases causes significant increases in the tightness of debt covenant restrictions.

Christensen and Nikolaev (2011) find that the use of accounting-based performance covenants, relative to capital covenants, is positively associated with the financial constraints of the borrower and the extent to which accounting information portrays credit risk. Kim et al. (2011) use a sample of non-U.S. borrowers from 40 countries during 1997 – 2005, to investigate the effect of the voluntary adoption of IFRS on price and non-price terms of loan contracts and loan ownership structure in the international loan market. Their results reveal that banks charge lower loan rates to IFRS adopters than to non-adopters. In addition, their results suggest that banks impose more favorable non-price terms on IFRS adopters, particularly less restrictive covenants.

RESEARCH QUESTIONS AND HYPOTHESES

Research Questions

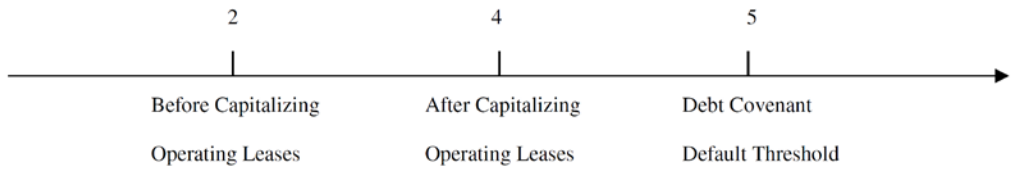
Our main research question explores how the capitalization of operating leases will affect the likelihood of firms violating their debt covenants. To investigate this research question, we first examine financial ratios included in debt covenants and how these ratios will be affected by the capitalization of leases. We examine whether certain ratios can be categorized into groups based on different characteristics. By grouping ratios, we intend to investigate the main effect of capitalization on the balance sheet and the income statement. In the investigation of the effect of capitalization, we will examine ratios (or groups of ratios) on which capitalization has a significant effect in Years 0 and 1. We will theoretically predict the effect of capitalization on financial ratios and discuss our findings empirically. For our analyses, we focus on changes in the difference between firms' financial ratios and debt covenant thresholds after capitalizing operating leases.

A second research question posited in this study asks what determines whether the capitalization of leases will negatively or positively affect the financial ratios contained in firms' debt covenants. We suggest our six case scenarios in Figure 1 below to analyze the effects of lease capitalization on debt covenant restrictions. When capitalizing operating leases, ratios may improve or deteriorate depending on where firms are positioned in terms of their ratios at a starting point (before the capitalization of leases). (Appendix A provides simple illustrations using numerical values.) Because Debt to EBITDA yields the most observations in our sample, we use this ratio to explain the six different cases illustrated in Figure 1. Cases A, B, and C are firms that have not violated debt covenants prior to the capitalization of operating leases. Cases D, E, F are firms that have violated the covenants prior to capitalization.

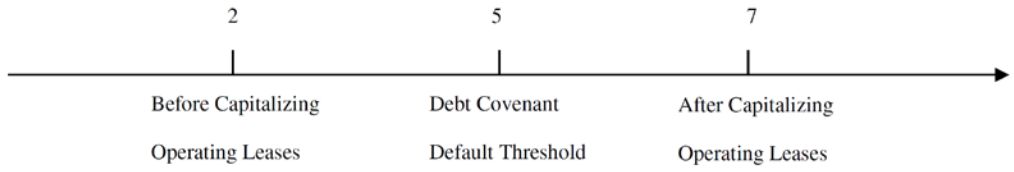
FIGURE 1
The Effect of Capitalizing Operating Leases:
Illustration of Six Different Cases Using Debt/EBITDA Ratio

I. Case A, B, and C: Firms have not violated debt covenants before the capitalization

Case A: The Typical Expected Case Scenario



Case B: The Worst Case Scenario (Violating debt covenant after the capitalization)



Case C: The Favorable Case Scenario (Ratio improves after the capitalization)

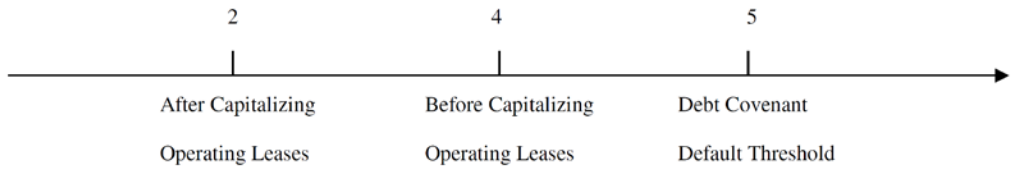
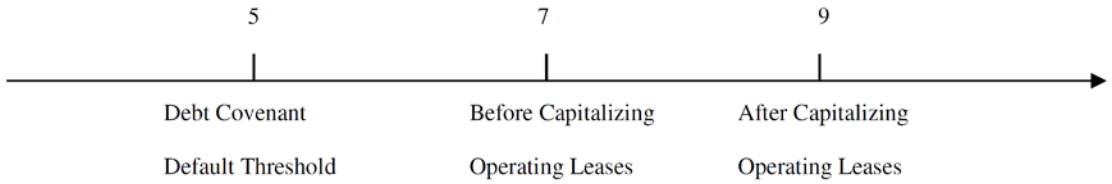


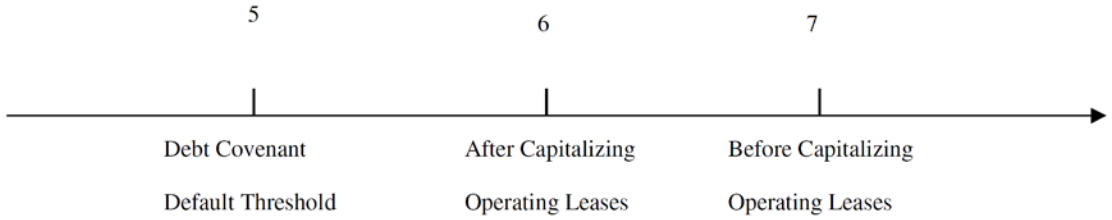
FIGURE 1 (continued)
The Effect of Capitalizing Operating Leases:
Illustration of Six Different Cases Using Debt/EBITDA Ratio

II. Case D, E, and F: Firms have violated debt covenants before the capitalization

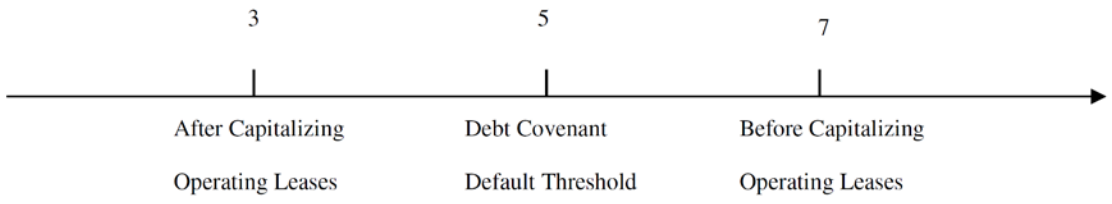
Case D: The Typical Expected Case Scenario



Case E: The Favorable Case Scenario (Ratio improves after the capitalization; but the firm is still violating the covenant)



Case F: The Best Case Scenario (Ratio improves after the capitalization; and now the firm does not violate the covenant)



Prior practical and academic research in lease accounting has found that the capitalization of operating lease will always cause a deterioration of financial ratios, as shown in our Cases A, B, and D. Case A scenario is for firms that have not violated their debt covenants prior to the capitalization and still do not violate the covenants after the capitalization, even though the capitalization causes the ratios to deteriorate. Case B shows firms that have not violated their debt covenants prior to the capitalization, but do violate the covenants after capitalizing operating leases. Case D describes firms that have already violated their covenants, and the ratios further deteriorate after capitalization.

Cases C, E, and F are firms that have not been discussed carefully in prior research. However, we believe that it is important to examine these scenarios to understand the full spectrum of the effects of capitalization. In short, Cases C, E, and F are favorable case scenarios of firms capitalizing operating leases. Case C shows firms that have not violated the covenants prior to the capitalization, and ratios improve and retreat from the covenant violation threshold after capitalization. Case E depicts firms that have violated the covenants prior to capitalization, capitalization help improve their financial ratios, but not to the extent that the firms are relieved of violating the covenants. Finally, Case F shows that capitalization of operating leases help the firms adequately enough to end their debt covenant violations.

Hypotheses

We assume that the capitalization of operating leases occurs on the balance sheet date in Year 0. The capitalization will increase firms' assets and liabilities by the present value of the future minimum operating lease payments in Year 0. As a result, there will be no effect on income statement items in Year 0. Comparatively, the effect of capitalization in Year 1 is more complex, affecting both the balance sheet and the income statement. In Year 1, EBITDA will be increased by saved operating lease payments, while EBIT will be increased by saved operating lease payments, but be reduced by depreciation on the capitalized assets. Also, the interest expense on the lease liability will further reduce net income (or EBT) in Year 1. In Year 1, the amount of capitalized leased assets on the balance sheet will be reduced by the depreciation expense, while the amount of lease liability will be reduced by the lease payment, net of interest expense for the capitalization. These effects in Year 0 and Year 1 will affect the numerators and/ or the denominators of each debt covenant ratio. As such, we develop the following hypotheses to predict the effect of operating lease capitalization on debt covenants:

First, the solvency ratios, such as Debt to EBITDA, Debt to Equity, and Debt to Tangible Net Worth (TNW), will deteriorate in Year 0. This will occur because, in Year 0, capitalization will increase debt (the numerator of these ratios), but will not affect the income statement items, nor equity. In Year 1, the amount of debt (the numerator) will be reduced by the lease payment, net of interest expense for the capitalization; however, the denominators of each of the three financial ratios will also be affected.

To develop our hypotheses, we define the violation group as firms whose financial ratios have already violated their debt covenants before the capitalization of operating leases, and the non-violation group as firms that have not yet violated their covenants before the capitalization. Furthermore, we may expand the definition of the violation group to include firms whose financial positions are weak, so their financial ratios have either already exceeded the covenant violating threshold ratios or are positioned very closely to the debt covenant violating thresholds before the capitalization, and the non-violation group to include the firms whose financial situations are strong, so their financial ratios are remotely away from the debt covenant threshold.

For the Debt to EBITDA, we expect that firms in the violation group have on average smaller EBITDA compared to firms in the non-violation group because of their poor operating performance relative to their debt level. Then, we expect that the deterioration of Debt to EBITDA as a result of capitalization will be more pronounced for the violation group compared to the deterioration for the non-violation group because a similar increase in the numerator due to capitalization will affect this ratio more for the violation group because of the smaller denominator (EBITDA) than it will for the non-violation group. In Appendix B, we use numerical examples to illustrate the derivation of the hypotheses. Therefore, we develop the following hypothesis:

Hypothesis 1: Solvency Ratios (Debt to EBITDA, Debt to Equity, Debt to TNW, and Leverage)

> ***H1-a-1:*** *The operating lease capitalization will* ***negatively*** *affect the slack differences (i.e., capitalization deteriorates firms' financial ratios) of three solvency ratios (Debt to EBITDA, Debt to Equity, and Debt to Tangible Net Assets) in Year 0. Furthermore, the capitalization will* ***negatively*** *affect the slack differences of these three solvency ratios* ***more*** *for the violation group firm than for the non-violation group in Year 0.*

Unlike the three solvency ratios in H1-a-1, the numerator and the denominator of the leverage ratio are both affected by capitalization in Year 0. The numerator of leverage ratio is a firm's total liabilities, while the denominator is the total assets. Therefore, both total liabilities and total assets should increase in Year 0 after capitalization. We predict that in Year 0, the capitalization will deteriorate leverage ratios for the non-violation group firms more considerably because these firms have relatively low initial ratios prior to capitalization compared to the violation group firms. Therefore, a similar amount of increase in the numerator (total debt) and denominator (total assets) will considerably increase the leverage ratio. (See Appendix B for numerical examples.) On the other hand, for the violation group, capitalization will deteriorate the leverage ratio to a lesser degree because the initial leverage ratio before capitalization is already large (close to one), and a similar amount of increase in the numerator (total debt) and denominator (total assets) will not (relatively) considerably increase the leverage ratio, compared to the non-violation group. This prediction for Year 0 for leverage ratio leads us to develop the following hypothesis:

> ***H1-a-2:*** *Operating lease capitalization will* ***negatively*** *affect the slack difference of the leverage ratio to a* ***lesser*** *degree for the violation group firms than for the non-violation group firms in Year 0.*

Furthermore, the capitalization will affect both the numerator and the denominator of each solvency ratio in Year 1. To specifically examine the Year 1 effect of the lease capitalization, we first examine Debt to Equity and Debt to Tangible Net Assets. These two ratios only use balance sheet items to measure solvency. We recognize that in Year 1, the denominator (equity or tangible net assets) will be reduced (see Table 2). The numerator (total liabilities) will increase by the capitalized lease liability less the lease payment, net of interest expense. For the violation group, the increase in the numerator in Year 1 will cause a greater degree of deterioration in these two ratios because the ratio has a relatively smaller denominator compared to that of the non-violation group. Therefore, in Year 1, capitalization will deteriorate Debt to Equity and Debt to Tangible Net Assets for both groups; furthermore, for the violation group firms, capitalization will deteriorate these two ratios to a greater degree. Therefore, we develop the following hypothesis:

> ***H1-b-1:*** *Capitalization will* ***negatively*** *affect the slack differences of Debt to Equity and Debt to Tangible Net Assets* ***more*** *for the violation group than for the non-violation group in Year 1.*

Next, we examine the Debt to EBITDA ratio in Year 1. We recognize that EBITDA will increase in Year 1 because of operating lease expenses (savings). Additionally, the numerator (total liabilities) will increase by the capitalized lease liability less the lease payment, net of interest expense, as we have discussed above. In this case, for the violation group (firms who have already violated debt covenants), the deterioration of the Debt to EBITDA ratio will occur to a lesser degree in Year 1 compared to the non-violation group. This is because, in Year 1, the two groups have a similar increase in the numerator (debt), while the capitalization increases the denominator (EBITDA) of the ratios for the violation group relatively more as a result of a lower level of EBITDA prior to capitalization. Therefore, we develop the following hypothesis:

> ***H1-b-2:*** *Capitalization will* ***negatively*** *affect the slack differences of Debt to EBITDA to a* ***lesser*** *degree for the violation group than for the non-violation group in Year 1.*

Regarding leverage ratio, we recognize that in Year 1, the numerator increase (the capitalized lease liability) will be reduced by the lease payment, net of interest expense, while the denominator increase (the amount of capitalized leased assets) will be reduced by depreciation expense. In this case, the prediction that is made for leverage ratio in Year 0 is still valid for Year 1. In other words, the

capitalization will deteriorate leverage ratios for the non-violation group firms more considerably because these firms have relatively low initial ratios prior to capitalization compared to the violation group firms. Therefore, a similar amount of increase in the numerator and denominator will considerably increase the leverage ratio for the non-violation group. On the other hand, for the violation group, capitalization will deteriorate the leverage ratio to a lesser degree because the initial leverage ratio before capitalization is already large (close to one), and a similar amount of increase in the numerator and denominator will not (relatively) considerably increase the leverage ratio, compared to the non-violation group. This prediction leads us to the following hypothesis:

> ***H1-b-3:*** *Capitalization will* ***negatively*** *affect the slack differences of the leverage ratio for the violation group firms to a* ***lesser*** *degree than it will for the non-violation group firms in Year 1.*

Hypothesis 2: Liquidity Ratios (Current Ratio and Quick Ratio)

Current Ratio and Quick Ratio measure liquidity using short-term assets and short-term liabilities and are frequently included in debt covenants. The numerator of current ratio is the current assets, while the numerator of quick ratio is defined as Cash plus Receivables. We note that these numerators will not change in Year 0 as well as in Year 1 (see Table 2). Current liabilities will increase as the current portion of leased liabilities increases. Note that the debt covenant thresholds for these two ratios equal the minimum floor for these ratios. Companies must maintain ratios higher than the minimum to avoid violating debt covenants.

In Year 0, capitalization will considerably deteriorate current ratios for the non-violation group firms because these firms have relatively high initial ratios prior to capitalization. Therefore, while the numerator (current assets) does not change, an increase in the denominator (current liabilities) will reduce the value of the ratios considerably. On the other hand, for the violation group firms, capitalization will deteriorate these ratios, but to a lesser degree. This prediction for the violation group is made because the increase in the denominator will decrease the ratios to a lesser degree when the numerator is not considerably larger than the denominator initially, compared to the non-violation group. The prediction for Year 1 is similar to the prediction in Year 0. Therefore we posit the following hypothesis:

> ***H2:*** *Lease capitalization will* ***negatively*** *affect the slack differences of the Current Ratios and the Quick Ratios for both (the violation and the non-violation) groups in Years 0 and 1.*[4] *Furthermore, the capitalization will* ***negatively*** *affect the slack differences of the Current Ratios and Quick Ratios for the violation group to a* ***lesser*** *extent than it will for the non-violation group in Years 0 and 1.*

Hypothesis 3: Interest Coverage Ratios (Interest Coverage and Cash Interest coverage)

Interest coverage and cash interest coverage are two ratios that are frequently contained in debt covenants and measure a firm's ability to pay interest. Lease capitalization will not affect the income statement items in Year 0 (at the moment of capitalization). In Year 1, because of capitalization of operating leases, debt will increase, thus increasing interest (the denominator). The numerator of interest coverage ratio is EBIT (Earnings before Interest and Taxes) and the numerator of cash interest coverage ratio is defined as Cash Flows from Operating Activities + Interest + Taxes paid. These numerators will also increase in Year 1 after capitalization. This is because, in Year 1, the operating lease expense savings is greater than the depreciation expense of the capitalized lease. In Year 1 we expect that, for the non-violation group, capitalization will considerably deteriorate interest coverage ratios because these firms have relatively high initial ratios prior to capitalization. Therefore, EBIT (or cash income) increases in the numerator will have a relatively smaller effect than the interest increase in the denominator in Year 1, which will deteriorate these ratios considerably, compared to the violation group. This is because for the violation group, both the numerator and the denominator are similar in size before capitalization and the resulting increase in the numerator and the denominator are also not considerably different in Year 1, thus

these ratios will not change considerably, in comparison to the non-violation group. Therefore we develop the following hypothesis:

> ***H3:*** *The lease capitalization will* ***negatively*** *affect the slack differences of Interest Coverage and Cash Interest Coverage to a* ***lesser*** *extent for the violation group than for the non-violation group in Year 1.*

METHODOLOGY AND SAMPLE SELECTION

Methodology and Empirical Design

We investigate the effects of lease capitalization on eight selected financial ratios included in debt covenants. The first five financial ratios display the structural changes in the balance sheet of companies, such as Debt to Equity, Debt to Tangible Net Worth, Leverage Ratio, Current Ratio, and Quick Ratio. The next three ratios display changes in both the income statement and the balance sheet, such as Debt to EBITDA, Interest Coverage, and Cash Interest Coverage.

The definitions of each covenant ratio are described in Table 1. For the first four ratios in Table 1, which include Debt to EBITDA, Debt to Equity, Debt to Tangible Net Worth, and Leverage Ratio, the initial covenant ratios set by the lenders are expected to be above the firms' current financial ratios. If capitalizing of operating leases results in an increase in these ratios for firms, it is possible for the firms to violate the covenants. On the contrary, for the last four ratios including Current Ratio, Quick Ratio, Interest Coverage, and Cash Interest Coverage, the initial debt covenant ratios are expected to be set by lenders lower than the corresponding current financial ratios. For these ratios, firms will be more likely to violate their debt covenants if the capitalization of operating leases causes a decrease in their current financial ratios.

TABLE 1
DEFINITIONS OF COVENANT RATIOS

Covenant Ratios		Definition	COMPUSTAT
Solvency	**Debt to EBITDA**	Long Term Debt / Earnings Before Interest and Taxes + Depreciation +Amortization	DLTT/EBITDA
	Debt to Equity	Total Liabilities / Total Stockholders' Equity (= Total Assets - Total Liabilities)	LT / (AT - LT)
	Debt to Tangible Net Worth	Total Liabilities / Tangible Net Worth (=Total Assets-Total Liabilities-Intangible Assets)	LT/(AT-LT-INTAN)
	Leverage Ratio	Total Liabilities / Total Assets	LT / AT
Liquidity	**Current Ratio**	Current Assets / Current Liabilities	ACT/LCT
	Quick Ratio	Quick Assets / Current Liabilities	(CHE+RECT)/LCT
Interest Coverage	**Interest Coverage**	Earnings Before Interest and Taxes / Interest Expenses	EBIT/XINT
	Cash Interest Coverage	(Cash Flows from Operating Activities + Interest + Taxes paid) / Interest	(OANCF+XINT+TXPD)/XINT

Our lease capitalization is based on the Exposure Draft on Leases issued by FASB in August 2010, and the constructive capitalization model of Imhoff et al. (1991, 1997), which simulates the effects of operating lease capitalization on assets, liabilities, equity, and related income statement accounts. The off-balance sheet lease liability is estimated by calculating the present value of the future minimum lease payments. We use 10% as the discount rate to calculate the present value. This use of one fixed interest rate as the present value discount rate is supported in prior studies within lease accounting literature (e.g., Gritta, 1974: 10%; Imhoff et al., 1991: 10%; Imhoff et al., 1993: 10%; Gritta et al., 1994: 10%; Ely, 1995: 10%; Beattie et al., 1998: 10%; and Durocher, 2005: 8%).

In Table 2, we explore the effect of capitalizing operating leases on the balance sheet and the income statement of firms. We investigate the effect of capitalization for two consecutive years. Column Year 0 indicates that there is no effect on the income statement or on the equity of firms for this first year. Our assumption is that capitalization occurs on the last day of Year 0. Meanwhile, the balance sheet items will be affected by the capitalization.

TABLE 2
EFFECT OF LEASE CAPITALIZATION ON FINANCIAL STATEMENT ITEMS

	Year 0	**Year 1**
EFFECT ON BALANCE SHEET		
Total Assets	= Total Assets + Capitalized amount	= Total Assets + Capitalized amount – Depreciation
Current Assets	No Effect	No Effect
Non-Current Assets	= (Total Assets – Current Assets) + Capitalized amount	= (Total Assets – Current Assets) + Capitalized amount - Depreciation
Total Liabilities	= Total Liabilities + Capitalized amount	= Total Liabilities + Capitalized amount - (Lease payment for Yr. 1 - (Capitalized amount × interest rate))
Current Liabilities	= Current Liabilities + Lease payment for Yr. 1 – (Capitalized amount × interest rate)	= Current Liabilities + Lease payment for Yr. 2- (Capitalized amount-(Lease payment for Yr. 1 – (Capitalized amount × interest rate) × interest rate)
Long-Term Debts	= Long-Term Debts + Capitalized amount-(Lease payment for Yr. 1 -(Capitalized amount × interest rate))	= Long-Term Debts + Capitalized amount-(Lease payment for Yr. 1 -(Capitalized amount × interest rate))- (Lease payment for Yr. 2- (Capitalized amount-(Lease payment for Yr. 1 – (Capitalized amount × interest rate) × interest rate))
Equity	No Effect	= Equity + (Lease payment for Yr. 1 – (Capitalized amount × interest rate) – depreciation) × (1-tax rates)
EFFECT ON INCOME STATEMENT		
EBITDA	No Effect	= EBITDA + Lease payment for Yr. 1
EBIT	No Effect	= EBIT + Lease payment for Yr. 1 – Depreciation
Net Income	No Effect	= NI + (Lease payment for Yr. 1 – (Capitalized amount × interest rate) – depreciation) × (1-tax rates)
Interest Expense	No Effect	=interest Expense + (Capitalized amount × interest rate)
Depreciation Expense	No Effect	= Depreciation Expense + (Capitalized amount / useful life)

The total assets and total liabilities in Year 0 will be increased by the capitalized amount, equal to the present value of future minimum operating lease payments. In Year 1, the effect of capitalization will appear on the income statement as well as in the balance sheet. In Year 1, EBITDA will be increased by saved operating lease payments, while EBIT will be increased by saved operating lease payments, but be reduced by depreciation on the capitalized assets. In addition, interest expenses on lease liability will further reduce EBT in Year 1. The annual depreciations are calculated by dividing the capitalized operating lease asset value by the respective remaining lifetime. The interest adjustment is calculated by multiplying the leased liability by the discount rate. To measure the pressure from debt covenants, we calculate the tightness (distance or slack) of debt covenants before and after the capitalization of leases. For each covenant we measure tightness as the actual value of firms' financial ratios, calculated using Compustat data, less the initial threshold ratios set in the firms' debt covenants.

Regression

We use the following three regression models to investigate the effect of operating lease capitalization on the tightness of firms' debt covenants.

(Model 1) $Slack\_Diff_{it} = \alpha_0+\beta_1 DUM1_{it}+\varepsilon_{it}$
(Model 2) $Slack\_Diff_{it} = \alpha_0+\beta_1 DUM1_{it}+\beta_2 IV_{it}+\beta_3 DUM1_{it}\times IV_{it}+\varepsilon_{it}$
(Model 3) $Slack\_Diff_{it} = \alpha_0+\beta_1 DUM1_{it}+\beta_2 PRE_{it}+\beta_3 LPV_{it} + \beta_4 DUM1_{it}\times PRE_{it} + \beta_5 DUM1_{it}\times LPV_{it} + \varepsilon_{it}$

Where:

$Slack\_Diff_{it}$ = Slack Difference (slack after lease capitalization – slack prior to lease capitalization).

Slack is defined as the difference between firms' financial ratios and their debt covenant violation threshold ratios

$DUM1_{it}$ = 1 when firm *i* belongs to the violation group; 0 otherwise

IV_{it} = Initial debt covenant ratio

PRE_{it} = Financial ratio for firm *i* prior to lease capitalization

LPV_{it} = Natural log of capitalized amount of lease for firm *i*

Sample Selection and Descriptive Statistics

The sample selection process for our study has two main steps. First, we use the Compustat database to collect firms' lease and financial statement data. Second, we use the Dealscan database to obtain debt covenant data. Then, we merge these two data sets to investigate how the capitalization of operating leases affect the financial ratios included in firms' debt covenants.

We collect lease and other accounting data for companies from 1990 to 2011 from the Compustat North America database to calculate firms' financial ratios and calculate the effect of capitalizing operating leases on these ratios. To calculate financial ratios included in debt covenants, we require that our sample firms have data on Current Assets, Total Assets, Equity, Current Liabilities, Total Liabilities, EBIT, Depreciation Expense?, Interest Expense, and Net Income. Moreover, we require that our sample firms have relevant lease accounting data.

Next, we use the Dealscan database to obtain financial ratios contained in debt covenants. Firms are selected from the Dealscan to cover the sample period, 1990 to 2011. Table 3 describes our sample collected from the Dealscan database. In the table, the deals describe groups of loans. Many firms are engaged in multiple deals. We include 8,313 deals in our sample. Dealscan contains information on firms' debt covenants, which include interest rates, financial ratio covenants, and loan maturities. Then, we match these data to our Compustat data using name and ticker symbols. We choose to focus on eight key financial ratios that have a sufficient number of observations for statistical analyses. Finally, the top and the bottom one percent, a total of two percent for each covenant ratio, are eliminated from the sample as outliers. This process reduces our sample to 25,962 financial ratios.

TABLE 3
USE OF FINANCIAL RATIO COVENANTS IN THE SAMPLE

FISCAL YEAR	Debt to EBITDA	Debt to Equity	Debt to TNW	Leverage Ratio	Current Ratio	Quick Ratio	Interest Coverage	Cash Interest. Coverage	Total
1990	0	0	0	0	1	0	2	0	3
1991	0	0	0	0	1	0	1	0	2
1992	0	0	2	0	2	0	1	0	5
1993	3	0	1	3	6	0	6	1	20
1994	8	10	13	20	14	1	29	4	99
1995	61	19	88	74	79	7	99	8	435
1996	162	32	228	186	236	44	262	20	1,170
1997	279	48	338	310	332	95	348	35	1,785
1998	393	47	331	349	345	107	478	41	2,091
1999	429	38	266	329	303	100	527	40	2,032
2000	377	34	213	313	230	85	490	50	1,792
2001	358	28	181	244	187	67	441	41	1,547
2002	387	27	182	188	169	83	416	37	1,489
2003	426	24	140	146	144	63	401	22	1,366
2004	426	18	115	153	105	54	392	15	1,278
2005	520	13	102	173	83	40	449	23	1,403
2006	671	14	87	197	84	21	558	21	1,653
2007	846	9	61	196	84	17	648	21	1,882
2008	959	12	61	235	81	16	693	15	2,072
2009	974	8	59	220	87	14	673	11	2,046
2010	840	8	45	167	64	9	520	11	1,664
2011	78	0	5	11	0	1	32	1	128
Total	8,197	389	2,518	3,514	2,637	824	7,466	417	25,962

Total number of deals in the sample is 8,313 deals. We eliminated the top and bottom one percent of observations for each ratio in our sample.

RESULTS

Table 4 reports descriptive statistics for the components of financial ratios contained within debt covenants for our sample firms. In Table 4, we use the Debt to EBITDA ratio, the most often used financial ratio in debt covenants, to illustrate the differences between the violation group and the non-violation group. As discussed in the hypothesis section, the two groups (the violation vs. the non-violation group) show great differences for income statement items. Specifically, firms that have not violated debt covenants prior to the capitalization of operating leases have a mean EBITDA of 354.08 (US million dollars) while the violation group firms have a mean EBITDA of 159.10. Therefore, mean EBITDA of the non-violation group is 2.23 times greater than that of the violation group firms (354.08 divided by 159.10). As expected, this low EBITDA (the denominator) of the violation group causes firms in this group to violate the covenant ratio (Debt to EBITDA) even prior to capitalization of operating lease. Similarly, we also note significant differences between the two groups in EBIT, net income, and Adjusted Operating Cash Flows, which result in the differences in ratios even prior to the capitalization. In short, the profitability of the violation group firms is considerably poorer than that of the non-violation group, which results in the violation of covenants, and the major findings we discuss later. Un-tabulated descriptive statistics show similar findings for other seven ratios. For example, the firms that violate Cash Interest Coverage ratio or Interest Coverage ratio prior to capitalization show high interest compared to earnings, and firms that violate Current Ratio or Quick Ratio prior to capitalization show high current

liabilities relative to current assets or quick assets, compared to the firms that do not violate such ratios prior to capitalization.

TABLE 4
COMPONENTS OF FINANCIAL DEBT COVENANT RATIOS

	Before Capitalization			After Capitalization			Change from Capitalization (After - Before)		
Variables	Non-violation (A)	Violation (B)	Difference (C=A-B)	Non-violation (D)	Violation (E)	Difference (F=D-E)	Non-violation (G=D-A)	Violation (H=E-B)	Difference (I=F-C)
Balance Sheet Items									
Total Assets	2665.16	2118.97	546.19	2800.36	2208.24	592.12	135.20	89.27	45.93
Total Liabilities	1655.51	1620.54	34.97	1789.28	1708.35	80.93	133.77	87.81	45.96
Current Liabilities	596.50	361.14	235.36	615.90	373.68	242.23	19.41	12.54	6.87
Long-Term Debt	723.93	1012.28	-288.35	838.29	1087.54	-249.25	114.36	75.26	39.10
Equity	1009.65	498.44	511.21	1011.08	499.88	511.20	1.43	1.45	-0.02
Current Assets	814.46	520.70	293.77	814.46	520.70	293.77	0.00	0.00	0.00
Quick Assets	518.81	309.11	209.70	518.81	309.11	209.70	0.00	0.00	0.00
Capitalization	155.89	102.66	53.23	155.89	102.66	53.23	0.00	0.00	0.00
Income Statement Items									
EBIT	235.77	69.70	166.07	252.80	81.41	171.39	17.03	11.71	5.31
EBITDA	354.08	159.10	194.98	391.79	184.21	207.58	37.71	25.11	12.60
Net Income	97.93	-66.20	164.12	98.86	-65.25	164.11	0.93	0.94	-0.01
Interest Expense	58.16	76.89	-18.73	73.96	87.20	-13.24	15.80	10.31	5.50
Adjusted Operating Cashflow	345.31	178.77	166.54	375.91	199.48	176.43	30.60	20.71	9.89
N	6491	1663		6491	1663		6491	1663	

Table 5 summarizes the effect of capitalization of operating leases on eight debt covenant ratios. First the column, "Sample Size," indicates that Debt to EBITDA (8,154 observations for Year 1) and Interest Coverage (6,753 observations for Year 1) are the most often used financial ratios in debt covenants. On the contrary, for Year 1, Debt to Equity (346 observations), Quick Ratio (821 observations), and Cash Interest Coverage (365 observations) are sparsely used in debt covenants. Second, the column "Covenant" shows the initial financial ratios set by lenders in debt covenants. The next two columns, "Financial Ratios prior to Capitalization" and "Financial Ratios post Capitalization," show firms' current financial ratios before and after capitalization, respectively.

Because a few outliers usually significantly affect the means in the ratio analyses, our analyses are focused on the medians instead of the means. Looking at the medians, in Year 0 and Year 1, the initial covenant ratios of the first four ratios, including Debt to EBITDA, Debt to Equity, Debt to Tangible Net Worth, and Leverage Ratio, are set by lenders above the firms' current financial ratios. After the capitalization of operating leases, all ratios increase and become closer to the initially set covenant ratios. Median increases are statistically significant at the one percent level for Debt to EBITDA, Debt to Tangible Net Worth, and Leverage Ratio, and at the five percent level for Debt to Equity. Specifically, the median value of the Debt to Equity ratio after the capitalization in Year 1 (1.5249), exceeds the initial covenant value (1.5000) which means that more than a half of the sample firms (346 observations) who use the Debt to Equity ratio in their covenants will likely risk violating their covenants if firms are required to capitalize their operating leases.

Table 5 also suggests that for the last four ratios, including Current Ratio, Quick Ratio, Interest Coverage, and Cash Interest Coverage, the initial debt covenant ratios are set below the corresponding current financial ratios. Looking at the medians of these ratios, the results suggest that if firms capitalize operating leases, all ratios will decrease; becoming closer to the initial covenant threshold ratios. These decreases are statistically significant at the one percent level.

The last three columns in Table 5, Slack prior to Capitalization, Slack post Capitalization, and Slack Differences, indicate the effect of capitalization on the distance (the tightness or the slack) between the current financial ratios and initial covenant values. The column, "Slack prior to Capitalization (D)," shows the distance between firms' "current financial ratios prior to the capitalization (B)" and their "initial debt covenant ratios (A)," i.e., (A) – (B). The positive sign means that the covenant ratios are set higher than the current financial ratios. Similarly, the column "Slack post to Capitalization (E)" shows the distance between firms' "current financial ratios after the capitalization (C)" and their "initial debt covenant ratios (A)," i.e., (A) – (C). The column "Slack Differences (F)" shows the effect of capitalization on the slack and is calculated as Slack post Capitalization minus Slack prior to Capitalization, i.e., (E) - (D), or (B) - (C).

TABLE 5
EFFECT OF LEASE CAPITALIZATION ON DEBT COVENANTS

Covenant Type	Sample Size	Statistics	Covenant (A)	Financial Ratio Prior to Capitalization (B)	Financial Ratio Post Capitalization (C)	Slack Prior to Capitalization: (D)=(A)-(B)	Slack Post Capitalization: (E)=(A)-(C)	Slack Differences: (F)=(E)-(D)	t-value (p-value for signed rank test)
Year 0									
Max. Debt to EBITDA	8197	Mean	3.9939	3.0133	3.8026	0.9806	0.1913	-0.7893	-39.30***
		Median	3.5000	2.1778	2.8237	1.3222	0.6763	-0.6459	<.001
Max. Debt to Equity	389	Mean	2.0845	2.0419	2.2999	0.0426	-0.2154	-0.2580	-10.89***
		Median	1.5000	1.3724	1.5923	0.1276	-0.0923	-0.2199	<.001
Max. Debt to Tangible Net Worth	2518	Mean	1.9314	2.0730	2.3844	-0.1415	-0.4530	-0.3115	-20.53***
		Median	1.5000	1.1651	1.3902	0.3349	0.1098	-0.2250	<.001
Max. Leverage ratio	3514	Mean	0.5849	0.5845	0.6062	0.0004	-0.0213	-0.0217	-31.92***
		Median	0.6000	0.5977	0.6151	0.0023	-0.0151	-0.0174	<.001
Min. Current Ratio	2637	Mean	1.3561	2.1470	1.9876	-0.7909	-0.6315	0.1594	32.47***
		Median	1.2500	1.8349	1.7163	-0.5849	-0.4663	0.1185	<.001
Min. Quick Ratio	824	Mean	1.2701	2.4755	2.2862	-1.2054	-1.0161	0.1893	16.69***
		Median	1.2500	1.8542	1.7333	-0.6042	-0.4833	0.1209	<.001
Min. Interest Coverage	7466	Mean	2.5180	6.5850	6.5850	-4.0670	-4.0670	0.0000	N/A
		Median	2.5000	2.4934	2.4934	0.0067	0.0067	0.0000	N/A
Min. Cash Interest Coverage	417	Mean	2.0804	7.8921	7.8921	-5.8117	-5.8117	0.0000	N/A
		Median	2.0000	3.1217	3.1217	-1.1217	-1.1217	0.0000	N/A
Year 1									
Max. Debt to EBITDA	8154	Mean	3.9869	2.9575	2.8489	1.0295	1.1381	0.1086	9.14***
		Median	3.5000	2.1658	2.2468	1.3342	1.2532	-0.0810	<.001
Max. Debt to Equity	346	Mean	2.1456	2.0017	2.2186	0.1439	-0.0730	-0.2169	-8.77***
		Median	1.5000	1.3371	1.5249	0.1629	-0.0249	-0.1878	<.001
Max. Debt to Tangible Net Worth	2192	Mean	1.9434	2.0733	2.2867	-0.1299	-0.3433	-0.2134	-13.86***
		Median	1.5000	1.1457	1.3233	0.3543	0.1767	-0.1776	<.001
Max. Leverage ratio	2808	Mean	0.5747	0.5706	0.5922	0.0041	-0.0176	-0.0216	-27.52***
		Median	0.6000	0.5693	0.5920	0.0307	0.0080	-0.0227	<.001
Min. Current Ratio	2594	Mean	1.3578	2.1409	1.9961	-0.7831	-0.6383	0.1448	30.53***
		Median	1.2500	1.8370	1.7302	-0.5870	-0.4802	0.1068	<.001
Min. Quick Ratio	821	Mean	1.2687	2.4613	2.2760	-1.1926	-1.0073	0.1853	15.03***
		Median	1.2500	1.8505	1.7321	-0.6005	-0.4821	0.1184	<.001
Min. Interest Coverage	6753	Mean	2.5290	6.3632	3.7654	-3.8342	-1.2364	2.5978	18.77***
		Median	2.5000	2.5161	2.2538	-0.0161	0.2462	0.2623	<.001
Min. Cash Interest Coverage	365	Mean	2.0444	8.2058	4.9226	-6.1614	-2.8783	3.2831	4.29***
		Median	1.9500	3.0574	2.7303	-1.1074	-0.7803	0.3270	<.001

*, **, ***: Statistically significant at the 10%, 5%, and 1% respectively

Examining the median values of Debt to EBITDA for Year 1, we find that capitalization causes a reduction in the slack by 0.0810 (from 1.3342 to 1.2532) which means that the firms' Debt to EBITDA are now closer to the covenant violating threshold after the capitalization. The reduction in the slack is statistically significant at the one percent level using the Wilcoxon signed rank test. We find a similar

result for Debt to Tangible Net Worth for Year 1; the slack is significantly reduced after capitalization by 0.1776 (from 0.3543 to 0.1767) for the median values in Year 1. This reduction is statistically significant at the one percent level using Wilcoxon non-parametric test. Interestingly, for Debt to Equity, the median value of "Slack post Capitalization" is positive, while the median value of "Slack prior to Capitalization" is negative. This reflects that more than a half of the firms would have violated debt covenants after capitalization and their slacks are now negative after violating the covenant ratios. The last four ratios in Table 5, including Current Ratio, Quick Ratio, Interest Coverage, and Cash Interest Coverage, also suggest that slack is reduced after capitalization, which means that the firms are now closer to violating debt covenants. For example, in Year 1, the median value of the slack for Current Ratio is increased (which means a deterioration) by 0.1068 (from -0.5870 to -0.4802) after capitalization. The reduction is significant at the one percent level using Wilcoxon non-parametric test.

In Table 6, we tabulate our results for the effect of capitalization on the slack differences, using the categorization method discussed in Figure 1. In Table 6, we compare Cases A, B, and C to Cases D, E, and F. Recall that Cases A, B, and C are for firms that have not violated debt covenants prior to the capitalization of operating leases. The slack differences will be affected as ratios either improve or

TABLE 6
EFFECT OF LEASE CAPITALIZATION ON DEBT COVENANTS: THE VIOLATION GROUP VS. NON-VIOLATION GROUP (PANEL A: YEAR 0)

Covenant Type	Sample Size	Statistics	Covenant (A)	Financial Ratio Prior to Capitalization (B)	Financial Ratio Post Capitalization (C)	Slack Prior to Capitalization: (D)=(A)-(B)	Slack Post Capitalization: (E)=(A)-(C)	Slack Differences: (F)=(E)-(D)	t-value (p-value for signed rank)
Year 0: The Non-Violation Group									
Max. Debt to EBITDA	6507	Mean	3.8957	1.9300	2.6500	1.9657	1.2457	-0.7200	-35.25***
		Median	3.5000	1.6362	2.2225	1.8638	1.2775	-0.5863	<.001
Max. Debt to Equity	193	Mean	2.7518	1.2604	1.4814	1.4914	1.2704	-0.2210	-6.46***
		Median	2.0000	1.0309	1.2019	0.9691	0.7981	-0.1710	<.001
Max. Debt to Tangible Net Worth	1661	Mean	2.0917	1.0177	1.2369	1.0739	0.8548	-0.2192	-21.72***
		Median	1.7500	0.7230	0.8857	1.0270	0.8643	-0.1626	<.001
Max. Leverage ratio	1742	Mean	0.5999	0.4621	0.4926	0.1378	0.1073	-0.0305	-26.64***
		Median	0.6000	0.4677	0.5001	0.1323	0.0999	-0.0324	<.001
Min. Current Ratio	2053	Mean	1.3618	2.4853	2.2937	-1.1235	-0.9319	0.1916	31.55***
		Median	1.2500	2.1392	1.9714	-0.8892	-0.7214	0.1678	<.001
Min. Quick Ratio	631	Mean	1.2362	2.9511	2.7221	-1.7149	-1.4859	0.2290	15.90***
		Median	1.2500	2.2742	2.1444	-1.0242	-0.8944	0.1298	<.001
Min. Interest Coverage	3918	Mean	2.6479	12.3430	12.3430	-9.6951	-9.6951	0.0000	N/A
		Median	2.5000	5.8695	5.8695	-3.3695	-3.3695	0.0000	N/A
Min. Cash Interest Coverage	308	Mean	2.1146	10.5233	10.5233	-8.4087	-8.4087	0.0000	N/A
		Median	2.0000	4.2130	4.2130	-2.2130	-2.2130	0.0000	N/A
Year 0: The Violation Group									
Max. Debt to EBITDA	1690	Mean	4.3716	7.1738	8.2299	-2.8021	-3.8582	-1.0561	-18.52***
		Median	4.2500	6.1112	6.8735	-1.8612	-2.6235	-0.7623	<.001
Max. Debt to Equity	196	Mean	1.4274	2.8114	3.1058	-1.3840	-1.6784	-0.2944	-9.01***
		Median	0.9000	1.9235	2.1947	-1.0235	-1.2947	-0.2712	<.001
Max. Debt to Tangible Net Worth	857	Mean	1.6208	4.1181	4.6085	-2.4973	-2.9878	-0.4904	-12.46***
		Median	1.3500	2.7391	2.9713	-1.3891	-1.6213	-0.2323	<.001
Max. Leverage ratio	1772	Mean	0.5701	0.7048	0.7178	-0.1347	-0.1477	-0.0130	-19.11***
		Median	0.6000	0.6874	0.6992	-0.0874	-0.0992	-0.0117	<.001
Min. Current Ratio	584	Mean	1.3361	0.9577	0.9114	0.3784	0.4247	0.0463	16.74***
		Median	1.2000	0.8834	0.8408	0.3166	0.3592	0.0426	<.001
Min. Quick Ratio	193	Mean	1.3810	0.9206	0.8611	0.4604	0.5199	0.0595	15.59***
		Median	1.5000	0.9102	0.8461	0.5898	0.6539	0.0641	<.001
Min. Interest Coverage	3548	Mean	2.3745	0.2266	0.2266	2.1479	2.1479	0.0000	N/A
		Median	2.2500	0.8739	0.8739	1.3762	1.3762	0.0000	N/A
Min. Cash Interest Coverage	109	Mean	1.9838	0.4574	0.4574	1.5264	1.5264	0.0000	N/A
		Median	1.8500	0.8431	0.8431	1.0069	1.0069	0.0000	N/A

*, **, ***: Statistically significant at the 10%, 5%, and 1% respectively

deteriorate because of capitalization. Note that the table does not statistically compare changes in the slack differences between the two groups (violation vs. non-violation group); but simply reports whether the changes in slack differences are significant.

Panel A of Table 6 reports the results for Year 0 after eliminating the top and the bottom one percent for each covenant ratio from the sample as outliers. First, we find that the mean value of the slack difference of Debt to EBITDA for the non-violation group is -0.7200 (t-value = -35.25) and the slack difference of Debt to EBITDA for the violation group is -1.0561 (t-value = -18.52). This result indicates that when firms capitalize their operating leases, it deteriorates Debt to EBITDA ratio significantly in Year 0, regardless of whether the firm has already violated the debt covenants. Second, the slack difference of Debt to Equity for the non-violation group firms is -0.2210 (t-value = -6.46) and the slack difference of Debt to Equity for the violation group is -0.2944 (t-value = -9.01). The capitalization significantly deteriorates Debt to Equity of both the violation and the non-violation groups in Year 0.

TABLE 6
EFFECT OF LEASE CAPITALIZATION ON DEBT COVENANTS: THE VIOLATION GROUP VS. NON-VIOLATION GROUP (PANEL B: YEAR 1)

Covenant Type	Sample Size	Statistics	Covenant (A)	Financial Ratio Prior to Capitalization (B)	Financial Ratio Post Capitalization (C)	Slack Prior to Capitalization: (D)=(A)-(B)	Slack Post Capitalization: (E)=(A)-(C)	Slack Differences: (F)=(E)-(D)	t-value (p-value for signed rank)
Year 1: The Non-Violation Group									
Max. Debt to EBITDA	6491	Mean	3.8911	1.9209	2.0383	1.9702	1.8528	-0.1174	-19.19***
		Median	3.5000	1.6338	1.7962	1.8662	1.7038	-0.1625	<.001
Max. Debt to Equity	178	Mean	2.8107	1.2526	1.4519	1.5581	1.3587	-0.1994	-5.46***
		Median	2.0000	0.9638	1.1329	1.0362	0.8671	-0.1691	<.001
Max. Debt to Tangible Net Worth	1469	Mean	2.0914	1.0200	1.2113	1.0714	0.8801	-0.1913	-17.18***
		Median	1.7500	0.7149	0.8764	1.0351	0.8736	-0.1616	<.001
Max. Leverage ratio	1477	Mean	0.5959	0.4498	0.4795	0.1461	0.1164	-0.0297	-23.96***
		Median	0.6000	0.4531	0.4840	0.1469	0.1161	-0.0309	<.001
Min. Current Ratio	2024	Mean	1.3619	2.4717	2.2981	-1.1098	-0.9362	0.1736	29.55***
		Median	1.2500	2.1376	1.9960	-0.8876	-0.7460	0.1415	<.001
Min. Quick Ratio	628	Mean	1.2342	2.9348	2.7092	-1.7006	-1.4750	0.2256	14.33***
		Median	1.2500	2.2695	2.1110	-1.0195	-0.8610	0.1585	<.001
Min. Interest Coverage	3534	Mean	2.6802	11.9045	6.7033	-9.2243	-4.0231	5.2012	20.32***
		Median	2.7250	6.0331	4.7240	-3.3081	-1.9990	1.3090	<.001
Min. Cash Interest Coverage	267	Mean	2.0728	11.1276	6.5612	-9.0548	-4.4884	4.5664	4.41***
		Median	2.0000	4.1564	3.6648	-2.1564	-1.6648	0.4915	<.001
Year 1: The Violation Group									
Max. Debt to EBITDA	1663	Mean	4.3609	7.0034	6.0128	-2.6425	-1.6519	0.9906	20.94***
		Median	4.2500	6.0685	5.3996	-1.8185	-1.1496	0.6690	<.001
Max. Debt to Equity	168	Mean	1.4408	2.7954	3.0308	-1.3545	-1.5900	-0.2355	-7.08***
		Median	0.8500	1.8681	2.2371	-1.0181	-1.3871	-0.3690	<.001
Max. Debt to Tangible Net Worth	723	Mean	1.6426	4.2133	4.4717	-2.5707	-2.8291	-0.2584	-6.33***
		Median	1.4000	2.7552	2.9437	-1.3552	-1.5437	-0.1885	<.001
Max. Leverage ratio	1331	Mean	0.5511	0.7046	0.7173	-0.1535	-0.1662	-0.0127	-14.70***
		Median	0.5500	0.6785	0.6925	-0.1285	-0.1425	-0.0140	<.001
Min. Current Ratio	570	Mean	1.3434	0.9661	0.9235	0.3772	0.4199	0.0426	15.65***
		Median	1.2000	0.8892	0.8481	0.3108	0.3519	0.0411	<.001
Min. Quick Ratio	193	Mean	1.3810	0.9206	0.8664	0.4604	0.5146	0.0542	14.40***
		Median	1.5000	0.9102	0.8503	0.5898	0.6497	0.0599	<.001
Min. Interest Coverage	3219	Mean	2.3631	0.2796	0.5400	2.0835	1.8230	-0.2605	-12.32***
		Median	2.2500	0.8596	0.9023	1.3904	1.3478	-0.0426	<.001
Min. Cash Interest Coverage	98	Mean	1.9668	0.2453	0.4584	1.7215	1.5085	-0.2131	-2.34**
		Median	1.8500	0.7813	0.8212	1.0687	1.0288	-0.0399	0.006

*, **, ***: Statistically significant at the 10%, 5%, and 1% respectively

Third, the slack difference of Debt to Tangible Net Worth for the non-violation group firms is -0.2192 (t-value = -21.72) and the slack difference of this ratio for the violation group is -0.4904 (t-value = -12.46). This result indicates that when firms capitalize their operating leases it deteriorates Debt to Tangible Net Worth ratio significantly, regardless of whether the firm has already violated the debt covenants. Fourth, the slack difference of Leverage ratio for the non-violation group firms is -0.0305 (t-value = -26.64) and the slack difference of Leverage ratio for the violation group is -0.0130 (t-value = -19.11). This result suggests that when firms capitalize their operating leases, it deteriorates Leverage ratio significantly for both types of firms. Fifth, the slack difference of Current Ratio for the non-violation group firms is 0.1916 (t-value = 31.55) and the slack difference of Current Ratio for the violation group is 0.0463 (t-value = 16.74). As noted in the Hypothesis section, for the liquidity ratios (Current Ratio and Quick Ratio) and interest coverage ratios (Interest Coverage ratio and Cash Interest Coverage ratio), the signs need to be interpreted as opposite compared to the signs of the four solvency ratios. Therefore, the results indicate that capitalization deteriorates Current Ratio significantly for both groups. Sixth, the slack difference of Quick Ratio for the non-violation group firms is 0.2290 (t-value = 15.90) and for the violation group is 0.0595 (t-value = 15.59).

This result suggests that when firms capitalize their operating leases, it deteriorates the Quick Ratio significantly for both types of firms. Because the income statement items are not affected by lease capitalization in Year 0, we do not report results for the two interest coverage ratios. In sum, for Year 0, all six financial ratios that we have examined deteriorate after the capitalization regardless of where firms are positioned in terms of their financial ratios at a starting point before the capitalization.

Panel B of Table 6 reports the results for Year 1. First, in Year 1, the slack difference of Debt to EBITDA for the non-violation group is -0.1174 (t-value = -19.19) and the violation group is 0.9906 (t-value = 20.94). This result provides evidence that the capitalization significantly deteriorates Debt to EBITDA for the non-violation group in Year 1, but significantly improves the ratio for the violation group. Second, the slack difference of Debt to Equity for the non-violation group in Year 1 is -0.1994 (t-value = -5.46) and the violation group is -0.2355 (t-value = -7.08). Therefore, Debt to Equity ratio significantly deteriorates in Year 1 for both group types.

Third, Year 1 results for Debt to Tangible Net Worth and Leverage ratio are similar to those of Year 0. The results indicate that capitalization significantly deteriorates Debt to Tangible Net Worth and Leverage ratio in Year 1, regardless of whether the firm has already violated the debt covenants. Fourth, likewise, Year 1 results for Current Ratio and Quick Ratio are similar to those of Year 0. Recalling that the signs need to be interpreted as opposite of the signs for the four solvency ratios, the results indicate that the capitalization deteriorates Current Ratio and Quick Ratio of both group firms significantly in Year 1. Fifth, the slack difference of Interest Coverage for the non-violation group is 5.2012 (t-value = 20.32) and the violation group is -0.2605 (t-value = -12.32). This result indicates that capitalization deteriorates the Interest Coverage Ratio of the non-violation group significantly in Year 1, but improves for the violation group in Year 1. Likewise, Year 1 results for Cash Interest Coverage Ratio suggest that operating lease capitalization deteriorates Cash Interest Coverage Ratio significantly in Year 1, but the ratio improves for the violation group in Year 1. Therefore, we find that for the violation group firms, of which their financial performances are usually weak, Debt to EBITDA, Interest Coverage Ratio, and Cash Interest Coverage Ratio improve in Year 1 after the capitalization of operating leases.

Table 7 reports the multivariate regression results to test our hypotheses. The dependent variable for all three regression models is $Slack\_Diff_{it}$ (Slack Difference), which is defined as "Slack post-Lease Capitalization" minus "Slack prior to Lease Capitalization." The first model includes only the intercept and a dummy (dichotomous) variable. The dummy variable denotes each of the two groups, taking the value of 1 for the violation group and zero for the non-violation group. This model is used to test whether capitalization of operating leases results in a significant difference between the two group's slack differences. The next two models include other control variables that may affect the slack difference. Panel A in Table 7 reports the regression results for Year 0 and Panel B reports Year 1 results.

TABLE 7
REGRESSION RESULTS FOR THE EFFECT OF FINANCIAL RATIOS AND DEBT COVENANTS ON SLACK DIFFERENCES (PANEL A: YEAR 0)

	Dependent Variable = Slack Difference for Debt to EBITDA			Dependent Variable = Slack Difference for Debt to Equity			Dependent Variable = Slack Difference for Debt to TNW			Dependent Variable = Slack Difference for Leverage ratio		
Intercept	-0.7204	-0.8061	0.0051	-0.2396	-0.2201	0.0386	-0.2468	-0.0989	0.0340	-0.0361	-0.0332	-0.0434
	(-32.03***)	(-12.73***)	(0.10)	(-6.61***)	(-4.06***)	(0.71)	(-12.01***)	(-2.82***)	(1.15)	(-32.63***)	(-5.62***)	(-13.27***)
DUM1	-0.3370	-0.6936	0.7120	-0.1039	-0.0564	0.1418	-0.3313	-0.1008	0.1199	0.0187	-0.0232	-0.0120
	(-6.80***)	(-5.04***)	(5.57***)	(-2.00**)	(-0.79)	(1.54)	(-9.26***)	(-1.67*)	(2.15**)	(11.63***)	(-2.92***)	(-2.12**)
PRE			0.0662			-0.0070			-0.1025			0.1086
			(5.10***)			(-0.24)			(-5.48***)			(15.94***)
LPV			-0.2466			-0.1169			-0.1093			-0.0122
			(-21.16***)			(-8.05***)			(-11.07***)			(-25.95***)
IV		0.0220			-0.0069			-0.0709			-0.0049	
		(1.45)			(-0.48)			(-5.15***)			(-0.50)	
DPRE			-0.1268			-0.0527			0.0049			-0.0259
			(-7.73***)			(-1.68*)			(0.25)			(-2.91***)
DLPV			-0.1739			0.0197			-0.0243			0.0069
			(-6.49***)			(0.91)			(-1.53)			(9.47***)
DIV		0.0792			-0.0396			-0.1588			0.0755	
		(2.63***)			(-1.68*)			(-5.69***)			(5.56***)	
Adj R-Sq	0.0055	0.0073	0.0921	0.0086	0.0213	0.2822	0.0371	0.0847	0.2299	0.0458	0.0641	0.3093
No. Obs.		8197			389			2518			3514	

	Dependent Variable = Slack Difference for Current Ratio			Dependent Variable = Slack Difference for Quick Ratio			Dependent Variable = Slack Difference for Interest Coverage	Dependent Variable = Slack Differ for Cash Int. Coverage
Intercept	0.1923	-0.0816	-0.2185	0.2293	-0.1419	-0.1581	N/A	N/A
	(35.46***)	(-4.57***)	(-20.13***)	(18.11***)	(-3.64***)	(-7.89***)		
DUM1	-0.1455	0.0405	0.1864	-0.1698	0.1320	0.1366		
	(-12.59***)	(1.20)	(8.83***)	(-6.50***)	(1.56)	(2.88***)		
PRE			0.1261			0.1229		
			(38.40***)			(30.04***)		
LPV			0.0485			0.0121		
			(21.21***)			(2.11**)		
IV		0.2012			0.3003			
		(16.04***)			(10.02***)			
DPRE			-0.0654			-0.0446		
			(-3.99***)			(-1.15)		
DLPV			-0.0365			-0.0072		
			(-7.27***)			(-0.65)		
DIV		-0.1355			-0.2500			
		(-5.69***)			(-4.16***)			
Adj R-Sq	0.0567	0.1435	0.4308	0.0477	0.1504	0.5478		
No. Obs.		2637			824			

*, **, ***: Statistically significant at the 10%, 5%, and 1% respectively

(Model 1) $Slack\_Diff_{it} = \alpha_0 + \beta_1 DUM1_{it} + \varepsilon_{it}$

(Model 2) $Slack\_Diff_{it} = \alpha_0 + \beta_1 DUM1_{it} + \beta_2 IV_{it} + \beta_3 DUM1_{it} \times IV_{it} + \varepsilon_{it}$

(Model 3) $Slack\_Diff_{it} = \alpha_0 + \beta_1 DUM1_{it} + \beta_2 PRE_{it} + \beta_3 LPV_{it} + \beta_4 DUM1_{it} \times PRE_{it} + \beta_5 DUM1_{it} \times LPV_{it} + \varepsilon_{it}$

Where: $Slack\_Diff_{it}$ = Slack Difference (slack after lease capitalization – slack prior to lease capitalization). Slack is defined as the difference between firms' financial ratios and their debt covenant violation threshold ratios

$DUM1_{it}$ = 1 when firm *i* belongs to the violation group; 0 otherwise

IV_{it} = Initial debt covenant ratio

PRE_{it} = Financial ratio for firm *i* prior to lease capitalization

LPV_{it} = Natural log of capitalized amount of lease for firm *i*

First, the section in the upper-left corner of Panel A reports the results of the three regression models that are used to test the slack difference of Debt to EBITDA between the two groups. For the first model that has only the intercept and a dummy variable, the intercept has the coefficient of -0.7204 (t-value = -32.03), which means that the slack difference of the non-violation group is significantly negative. This intercept value is the mean value of the slack difference of non-violation firms, Cases A, B, and C (when $DUM1_{it}$ = zero), which is reported in Panel A of Table 6. Furthermore, the coefficient of the dummy variable is -0.3370 (t-value = -6.80). This result indicates that the slack difference for the violation group firms is significantly more negative than that of the non-violation group. The sum of the two coefficients (-0.7204 and -0.3370) is -1.0574, which is the slack difference for the violation group, as suggested in Panel A of Table 6 (-1.0561 is slightly different from -1.0574 due to rounding). Therefore, together with the results reported in Panel A of Table 6, the multi-regression model results provide evidence that the capitalization of leases significantly and negatively affects the Debt to EBITDA to a greater extent for the

violation group than for the non-violation group in Year 0. The results for Debt to Equity and Debt to Tangible Net Worth, as reported in Panel A of Table 7, are similar to the results of Debt to EBITDA. Therefore, our Hypothesis H1-a-1 is supported.

Second, the first model used to test the slack difference of Leverage ratio indicates that the intercept has a coefficient of -0.0361 (t-value = -32.63), which means that the slack difference for the non-violation group is significantly negative, which is consistent with our finding in Panel A of Table 6. However, the coefficient of the dummy variable is positive (0.0187, t-value = 11.63). This result suggests that the slack difference for the violation group is significantly less negative than that of the non-violation group. The sum of the two coefficients (-0.0361 and 0.0187) is -0.0174, which is consistent with our findings in Panel A of Table 6 (-0.0130 is slightly different from -0.0174 due to rounding). Therefore, capitalization of leases significantly and negatively affects the Leverage ratio of the violation group to a lesser extent than the non-violation group in Year 0. This result supports Hypothesis H1-a-2.

Hypothesis H1-b-1 predicts that, in Year 1, capitalization will negatively affect the slack differences of Debt to Equity and Debt to Tangible Net Assets to a greater extent for the violation group than it will for the non-violation group. Panel B in Table 6 provides evidence that the slack differences of these two ratios are significantly negative for both groups in Year 1. In Panel B of Table 7, we report the results of the regression models for Year 1. We find that the dummy variables for Debt to Equity and Debt to Tangible Net Assets are not statistically significant, which implies that there is no statistically significant difference between the slack differences of the two groups in Year 1. Therefore, Hypothesis H1-b-1 is not supported.

The upper-left corner of Panel B in Table 7 reports results of the regression models to test whether capitalization significantly affects the slack differences of Debt to EBITDA between the two groups. Our Hypothesis H1-b-2 predicts that capitalization will negatively affect the slack differences of Debt to EBITDA for the violation group to a lesser degree than for the non-violation group in Year 1. Panel A indicates that the intercept of the first model has a coefficient of -0.1174 (t-value = -9.69), which means that the slack difference of the non-violation group is significantly negative. Moreover, the coefficient of the dummy variable is 1.1080 (t-value = 41.32), which provides evidence that the slack difference for the violation group firms is significantly more positive (i.e., less negative) than that of the non-violation group. The sum of the two coefficients (-0.1174 and 1.1080) is positive 0.9906, which is consistent with our findings in Panel B of Table 6 provides evidence to support Hypothesis H1-b-2.

This improvement of some financial ratios after the capitalization is a striking finding in our study which has not been discussed in prior research. Intuitively, if a firm has already violated the debt covenants prior to capitalization (firms in Cases D, E, and F), the firm likely already possesses poor financial ratios (PRE). Therefore in Year 0, capitalization will degrade the ratios of the firm as discussed above. However, this effect will be reversed in Year 1 for the violation group because, while the numerator (debt for the Debt to EBITDA ratio) increases (this increase is less compared to the increase in Year 0 due to debt amortization), the denominator (EBITDA) also increases, and the net effect on this ratio is an ***improvement*** of the ratio in Year 1.

Hypothesis H1-b-3 predicts that capitalization will negatively affect the slack differences of Leverage ratio for the violation group firms to a lesser degree than for the non-violation group firms in Year 1. Panel B of Table 7 reports the coefficient of the intercept for the first Leverage regression model as -0.0297 (*t*-value = - 27.97), which means that the slack difference of the Leverage ratio for the non-violation group is significantly negative. The coefficient of the dummy variable is 0.0170 (t-value = 11.02), which suggests that the slack difference of the Leverage ratio for the violation group firms is (significantly) less negative by 0.0170 compared to the ratio for the non-violation group. This finding provides evidence to support Hypothesis H1-b-3.

Hypothesis 2 predicts that the lease capitalization will negatively affect the slack differences of the two liquidity ratios (i.e., Current Ratio and Quick Ratio) for both the violation and the non-violation group firms in Year 0 and Year 1. Furthermore, the hypothesis predicts that the capitalization will negatively affect the slack differences of Current Ratio and Quick Ratio to a lesser extent for the violation group than it will for the non-violation group in Years 0 and 1.

TABLE 7
REGRESSION RESULTS FOR THE EFFECT OF FINANCIAL RATIOS AND DEBT COVENANTS ON SLACK DIFFERENCES (PANEL B: YEAR 1)

	Dependent Variable = Slack Difference for Debt to EBITDA			Dependent Variable = Slack Difference for Debt to Equity			Dependent Variable = Slack Difference for Debt to TNW			Dependent Variable = Slack Difference for Leverage ratio		
Intercept	-0.1174	-0.5036	-0.1217	-0.1994	-0.1836	0.0491	-0.1913	-0.0870	0.0428	-0.0297	-0.0328	-0.0347
	(-9.69***)	(-14.74***)	(-5.84***)	(-5.78***)	(-3.54***)	(0.90)	(-10.18***)	(-2.66***)	(1.49)	(-27.97***)	(-6.03***)	(-11.17***)
DUM1	1.1080	0.7029	-1.6160	-0.0361	-0.0935	0.0541	-0.0671	-0.1110	-0.1485	0.0170	-0.0132	-0.0137
	(41.32***)	(9.46***)	(-30.02***)	(-0.73)	(-1.38)	(0.58)	(-2.05**)	(-1.97**)	(-2.77***)	(11.02***)	(-1.77*)	(-2.60***)
PRE			0.1399			0.0065			-0.0677			0.0997
			(25.92***)			(0.22)			(-3.78***)			(15.47***)
LPV			-0.0762			-0.1114			-0.1012			-0.0117
			(-15.90***)			(-7.65***)			(-10.64***)			(-25.85***)
IV		0.0992			-0.0056			-0.0499			0.0052	
		(12.05***)			(-0.41)			(-3.89***)			(0.58)	
DPRE			0.2196			-0.0153			0.1063			-0.0213
			(31.27***)			(-0.49)			(5.68***)			(-2.55**)
DLPV			0.1415			0.0258			-0.0287			0.0066
			(12.64***)			(1.19)			(-1.87*)			(9.35***)
DIV		0.0822			0.0344			0.0131			0.0551	
		(5.02***)			(1.53)			(0.50)			(4.35***)	
Adj R-Sq	0.1730	0.2031	0.5628	-0.0014	0.0009	0.1962	0.0015	0.0086	0.1222	0.0411	0.0557	0.3050
No. Obs.		8154			346			2192			2808	

	Dependent Variable = Slack Difference for Current Ratio			Dependent Variable = Slack Difference for Quick Ratio			Dependent Variable = Slack Difference for Interest Coverage			Dependent Variable = Slack Differ for Cash Int. Coverage		
Intercept	0.1736	-0.0618	-0.2217	0.2256	-0.1337	-0.2479	5.2012	0.4975	-5.5506	4.5664	3.6634	-5.5693
	(33.16***)	(-3.55***)	(-20.50***)	(16.34***)	(-3.07***)	(-11.43***)	(28.01***)	(0.88)	(-42.00***)	(5.15***)	(1.76*)	(-7.15***)
DUM1	-0.1310	0.0235	0.1899	-0.1713	0.1156	0.2202	-5.4617	-0.7692	5.3887	-4.7794	-4.3483	5.2565
	(-11.73***)	(0.71)	(9.06***)	(-6.02***)	(1.23)	(4.30***)	(-20.31***)	(-1.00)	(30.33***)	(-2.79***)	(-1.04)	(3.97***)
PRE			0.1197			0.1366			0.7880			0.7394
			(36.30***)			(30.51***)			(255.22***)			(46.33***)
LPV			0.0488			0.0355			0.3894			0.5480
			(21.56***)			(5.71***)			(12.04***)			(2.93***)
IV		0.1728			0.2911			1.7550			0.4356	
		(14.13***)			(8.65***)			(8.78***)			(0.48)	
DPRE			-0.0643			-0.0599			-0.4344			-0.4234
			(-4.01***)			(-1.43)			(-18.37***)			(-1.68*)
DLPV			-0.0368			-0.0292			-0.4522			-0.5405
			(-7.35***)			(-2.43**)			(-9.79***)			(-1.47)
DIV		-0.1126			-0.2387			-1.7503			-0.1957	
		(-4.86***)			(-3.58***)			(-6.12***)			(-0.10)	
Adj R-Sq	0.0500	0.1203	0.4107	0.0412	0.1203	0.5517	0.0574	0.0678	0.9120	0.0183	0.0136	0.8592
No. Obs.		2594			821			6753			365	

*, **, ***: Statistically significant at 10%, 5%, and 1% respectively

(Model 1) $Slack\_Diff_{it} = \alpha_0 + \beta_1 DUM1_{it} + \varepsilon_{it}$

(Model 2) $Slack\_Diff_{it} = \alpha_0 + \beta_1 DUM1_{it} + \beta_2 IV_{it} + \beta_3 DUM1_{it} \times IV_{it} + \varepsilon_{it}$

(Model 3) $Slack\_Diff_{it} = \alpha_0 + \beta_1 DUM1_{it} + \beta_2 PRE_{it} + \beta_3 LPV_{it} + \beta_4 DUM1_{it} \times PRE_{it} + \beta_5 DUM1_{it} \times LPV_{it} + \varepsilon_{it}$

Where: $Slack\_Diff_{it}$ = Slack Difference (slack after lease capitalization – slack prior to lease capitalization). Slack is defined as the difference between firms' financial ratios and their debt covenant violation threshold ratios

$DUM1_{it}$ = 1 when firm *i* belongs to the violation group; 0 otherwise

IV_{it} = Initial debt covenant ratio

PRE_{it} = Financial ratio for firm *i* prior to lease capitalization

LPV_{it} = Natural log of capitalized amount of lease for firm *i*

As noted in the hypothesis section, we should be careful in interpreting the signs of the slack differences regarding these two ratios. The positive (negative) sign means a negative (positive) effect of capitalization on slack differences. In Panel A of Table 7, we find that in Year 0, the coefficient of the intercept of the first regression for Current Ratio is 0.1923 (t-value = 35.46), which means that the slack difference for the non-violation group is significantly negative (i.e., capitalization deteriorates the Current Ratio of the non-violation group). Additionally, the coefficient of the dummy variable is -0.1455 (t-value = -12.59) and the sum of the two coefficients is 0.0468. In addition, for Year 1, we find that the coefficient of the intercept of the regression for Current Ratio in Panel B of Table 7 is 0.1736 (t-value = 33.16), which means that the slack difference for the non-violation group is significantly negative (i.e., capitalization deteriorates this ratio) in Year 1. The coefficient of the dummy variable is -0.1310 (t-value = -11.73) and the sum of the two coefficients is 0.426 for Year 1. These results provide evidence that capitalization significantly deteriorates the slack differences of Current Ratio for the non-violation group in Years 0 and 1. Conversely, the deterioration of Current Ratio for the violation group firms is

significantly less negative than that of the non-violation group in Year 0 and Year 1. The results for Quick Ratio are consistent with those for Current Ratio. These results support Hypothesis 2.

Hypothesis 3 predicts that the capitalization will negatively affect the Interest Coverage and Cash Interest Coverage ratios to a lesser extent for the violation group firms than it will for the non-violation group firms Year 1. Similar to the liquidity ratios, the positive (negative) sign of the slack difference for these two ratios means a negative (positive) effect of capitalization on the slack differences of these two ratios. In Panel B of Table 7, we find that the coefficient of the intercept of the first regression for Interest Coverage Ratio is 5.2012 (t-value = 28.01) in Year 1, which means that capitalization significantly deteriorates Interest Coverage Ratio for the non-violation group. In addition, the coefficient of the dummy variable is -5.4617 (t-value = -20.31) and the sum of the two coefficients is -0.2605 for Year 1. The deterioration of Interest Coverage Ratio for the violation group is significantly less than that of the non-violation group in Year 1. The results for Cash Interest Coverage Ratio are consistent with those of Interest Coverage Ratio. Therefore, these results support Hypothesis 3.

Models 2 and 3 in Table 7 include other independent variables and the dichotomous variable for the model. Model 2 includes a dummy variable, $DUM1_{it}$, and IV_{it}, which is the initial debt covenant ratio threshold of the firm (collected from the DealScan database). The model also includes the interaction variable, $DUM1^{*}\ IV_{it}$, between the two independent variables. The interpretation of the intercept and coefficient of the dummy variable is no longer straightforward when we include other continuous variables as independent variables in the multiple regression model. Thus, we do not attempt to interpret the intercept and dummy variable for the remaining multiple regressions, such as Models 2 and 3.

However, some findings regarding these additional variables are still of interest. For example, Model 2 (the second model) in Debt to EBITDA regression presented in Panel A of Table 7, shows the coefficient of IV_{it} (initial debt covenant threshold) is 0.0220 in year 0, which is insignificant. This means that as the covenant ratio threshold increases by 1, the slack difference increases on average by 0.0220 for the non-violation group, though it is not significant. The interaction between $DUM1_{it}$, and IV_{it} ($DUM1_{it} * IV_{it}$) is significant (coefficient of 0.0792), which implies that IV_{it} affects the slack difference between the two groups differently (the non-violation group versus the violation group). The sum of the coefficient of IV_{it} (0.0220) and the coefficient of the interaction $DUM1_{it} * IV_{it}$ (0.0792) is 0.1012. This means that, as the covenant ratio threshold increases by 1, the slack difference increases by 0.1012 for firms in the violation group. Considering both the significance of $DUM1_{it} * IV_{it}$ (0.0792) and the slope of the violation group (0.1012), the increase in the covenant threshold increases the slack difference significantly for the violation group, while such an effect does not occur for the non-violation group. One plausible explanation for this result is, for the non-violation group, IV_{it} (the covenant threshold) is not closely related to the slack difference because the covenant threshold may not be harsh enough for the capitalization of operating leases to influence the risk of violating debt covenants. On the other hand, for the violation group, IV_{it}, adversely affects firms in terms of debt control because PRE_{it} (financial ratio prior to lease capitalization) is already violated compared to IV_{it}. Thus, the slack differences can be significantly affected by IV_{it}. For all other financial ratio regressions presented in Table 7, similar interpretations can be made for the control variables included in Model 2 and Model 3.

CONCLUSION AND LIMITATIONS

Under the new lease standard proposed by the IASB and the FASB, it is likely that leases that are currently classified as operating leases under U.S. GAAP will be classified as capital leases, and will now appear on the balance sheet to provide increased transparency. The new lease accounting will have significant implications for U.S. and foreign firms on their debt covenants. In this study, we investigate the effect of proposed lease accounting rule changes on financial ratios contained in firms' debt covenants. Our study provides evidence that capitalization of leases will not always cause deterioration of financial ratios. In some cases, capitalization actually improves financial ratios.

The implication of this study is limited due to the restricted scope of debt covenant data. Dealscan, the database that we used for the study, does not provide information on how banks and borrowing firms

actually re-negotiate debt covenant terms, including changes in covenant ratios. It only provides financial ratio data contained in the initial debt covenants. In our future studies, we can perform similar investigations on firms in other countries. We also want to investigate the performance of lease firms before and after covenant violations. Finally, we feel it would prove beneficial to investigate the relationship between changes in debt covenants due to changes in lease accounting rules and changes in firms' credit ratings.

ENDNOTES

1. Even if U.S. GAAP provides a clear principle for how leases should be classified, more than 250 U.S. firms disclosed that the operating lease accounting methods they had been using violated GAAP beginning in late 2004 through mid-2006. (Acito et al, 2009). Such errors may have effect on the errors in financial statement analysis in estimating equity value. (Boatsman and Dong, 2011)
2. Jennings and Marques (2012) compare straight-line amortization with present value amortization for amortizing capitalized operating leases. They find no evidence for favoring straight-line amortization over present value amortization as the default method.
3. Almost 800 comment letters were received in response to the ED. The proposed rule creates a large non-cash expense, which consisting of the amortization of the capitalized lease asset plus the recognition of imputed interest expenses on the capitalized lease obligation, which exceeds the cash paid for rent in the first half of the lease term. Credit Suisse (August, 2012) published an article entitled, Leases Landing on Balance Sheet, and estimated that $549 billion of off-balance sheet lease liabilities (i.e., operating leases) would be recognized on the balance sheets of S&P 500 companies (Zion and Varshney, 2010, p. 1).
4. Note that the sign for the slack difference of Current Ratio and Quick Ratio will be positive when lease capitalization negatively affects the slack difference.

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APPENDIX A

When capitalizing operating leases, ratios may improve or deteriorate depending on where firms are positioned in terms of their ratios at a starting point (*before*) the capitalization of leases. This Appendix A provides simple illustrations using numerical values:

1. Case #1: Debt/EBITDA = 10/4 = 2.5

If Debt increases by 5, and EBITDA increases by 1, the new Debt/EBITDA = (10 + 5) / (4 +1) = 15/5 = 3 (which is a larger increase than Case #2)

2. Case #2: Debt/ EBITDA = 100/40 = 2.5

If Debt increases by 5, and EBITDA increases by 1, the new Debt/ EBITDA = (100 + 5) / (40 +1) = 105/41 = 2.56 (which is a smaller increase than Case #1)

3. Case #3: Debt/Equity = 100/40 = 2.5

If Debt increases by 50, and Equity increases by 50, the new Debt/Equity = (100 + 50) / (40 +50) = 150/90 = 1.67 (which is a decrease, in contrast to Case #4)

4. Case #4: Debt/Equity = 1000/400 = 2.5

If Debt increases by 50, and Equity increases by 50, the new Debt/Equity = (1000 + 50) / (400 +50) = 1500/450 = 3.33 (which is an increase, in contrast to Case #3)

APPENDIX B: Illustration of Hypothesis Derivation Using Numerical Examples

H1-a-1: Assume that a firm in the violation group has EBITDA of 2 while a firm in the non-violation group has EBITDA of 10 when the debt of the two group firms is 10. Let's assume that Debt increases by 5 due to capitalization in Year 0. If the covenant ratio is 3 for both group firms, then the slack difference for a firm in non-violation group is –0.5 { -0.5 = [3 – (10+5)/10] – [3 – (10/10)]}, which is a deterioration of the ratio. On the other hand, the slack difference for a firm in violation group, in this case, is -2.5 { -2.5 = [3 – (10+5)/2] – [3 – (10/2)]}, which is a greater deterioration of the ratio.

H1-a-2: We assume that for the non-violation group firms, total liabilities is 10 and total assets is 20; and that for the violation group, total liabilities is 18 and total assets is 20. Also, we assume that total assets and total liabilities increase by 5 in Year 0 and that the debt covenant threshold for the leverage ratio is 0.8. Companies must maintain a ratio lower than 0.8 to avoid violating the covenants.
In our numerical example, the slack difference for a firm in the non-violation group is -0.1 {-0.1 = [0.8 – (10+5) / (20+5)] – [0.8 – (10/20)]}, which is a deterioration of the ratio. On the other hand, the slack difference for a firm in the violation group in this case is -0.02 {-0.02 = [0.8 – (18+5) / (20+5)] – [0.8 – (18/20)]}, which is a LESSER deterioration of the leverage ratio.

H1-b-1: Using a numerical example, we assume that debt increase is now 4.5 in Year 1 (5 minus 0.5; 0.5 is the lease payment in Year 1, net of interest expense for the capitalization), and that equity decreases by

0.5 for both groups. This decrease in equity is caused by a decrease in Net Income in Year 1. We assuming that the covenant threshold ratio is 2, the slack difference for a firm in non-violation group in Year 1 is -0.53 {-0.53 = [2 – (10+4.5) / (10-0.5)] – [2 – (10/10)]}. This yielded a deterioration of the ratio. On the other hand, the slack difference for a firm in the violation group in this case is -4.67 {-4.67 = [2 – (10+4.5) / (2-0.5)] – [2 – (10/2)]}, which is an even more substantial deterioration in Year 1.

H1-b-2: Using the previous numerical example, we assume that Debt increase is now 4.5 in Year 1 (5 minus 0.5; 0.5 is the lease payment in Year 1, net of interest expense for capitalization), and EBITDA increases by 1 for both group firms. Then the slack difference for a firm in the non-violation group in this case is –0.32 { -0.32 = [3 – (10+4.5) / (10+1)] – [3 – (10/10)]}, which is a deterioration of the ratio. The slack difference for a firm in the violation group is 0.17 { 0.17 = [3 – (10+4.5) / (2+1)] – [3 – (10/2)]}, which is actually an improvement of the ratio.

H1-b-3: Illustrating with a numerical example for Year 1, we assume that, for the non-violation group, total liabilities in Year 1 is 10, total assets is 20, and that for violation group total liabilities is 18 and total assets is 20. We also assume that total liabilities increase by 4.5 in Year 1, total assets increase by 4, and that the debt covenant threshold for the leverage ratio is 0.8. The slack difference for a firm in the non-violation group is -0.11 {-0.11 = [0.8 – (10+4.5) / (20+4)] – [0.8 – (10/20)]}, which is a deterioration of the ratio. Meanwhile, the slack difference for a firm in the violation group -0.04 {-0.04 = [0.8 – (18+4.5) / (20+4)] – [0.8 – (18/20)]}, which is a lesser deterioration of the leverage ratio.

H2: Using a numerical example, we assume that for non-violation group firms current assets are 6 and current liabilities are 2 and that, for violation group, current assets are 4 and current liabilities are 6. In addition, we assume that current liabilities increases by 1 in Year 0, and that the debt covenant threshold ratio is 2.5. The slack difference for a firm in the non-violation group, in our numerical example, is 1.00 {1.00 = [2.5 – 6 / (2+1)] – [2.5 – (6/2)]}, which is a deterioration of the ratio. It is important to note that the signs of these ratios are opposite compared to those of the solvency ratios because the thresholds for liquidity ratios are minimum floor values. On the other hand, the slack difference for a firm in the violation group 0.10 {0.10 = [2.5 – 4 / (6+1)] – [2.5 – (4/6)]}, which is a lesser deterioration of the ratio.

H3: Using a numerical example, we assume that the amount of interest before capitalization is 2, and after capitalization is 2.5. In addition, we assume that EBIT for the non-violation group firms is 10 prior to capitalization, while EBIT for violation group is 2. We also assume that operating lease expenses (savings) is 1.2, and that amortization expenses in Year 1 is 1. In this case, EBIT will increase by 0.2 after capitalization.
Note, for these two ratios, the debt covenant threshold ratios act as the floor (minimum). Assuming the debt covenant ratio is 3, the slack difference for a firm in the non-violation group is 0.92 {0.92 = [3 – (10+0.2) / (2+0.5)] – [3 – (10/2)]}, which is a deterioration of the ratio. On the other hand, the slack difference for a firm in the violation group is 0.12 {0.12 = [3 – (2+0.2) / (2+0.5)] – [3 – (2/2)]}, which is a lesser deterioration.

Appendix B: Numerical Examples of Hypotheses

Hypotheses	Financial Ratios	Year	Firm Type	Debt Covenant Threshold	Pre-Capitalizaton Slack	Post-Capitalizaton Slack	Slack Difference
H1-a-1	Debt to EBITDA	Year 0	Non-Violation Group	3	3-(10/10) = 2	3-[(10+5)/10] =1.5	-0.5
	& Debt to Equity		Violation Group	3	3-(10/2) = -2	3-[(10+5)/2] = -4.5	-2.5
	& Debt to TNW						
H1-a-2	Leverage	Year 0	Non-Violation Group	0.8	0.8-(10/20) = 0.3	0.8 -[(10+5)/(20+5)] = 0.2	-0.1
			Violation Group	0.8	0.8-(18/20) = -0.1	0.8-[(18+5)/(20+5)] = -0.12	-0.02
H1-b-1	Debt to Equity	Year 1	Non-Violation Group	2	2-(10/10) = 1	2-[(10+4.5)/(10-0.5)] = 0.47	-0.53
	& Debt to TNW		Violation Group	2	2-(10/2) = -3	2-[(10+4.5)/(2-0.5)] = - 7.67	-4.67
H1-b-2	Debt to EBITDA	Year 1	Non-Violation Group	3	3-10/10 = 2	3-[(10+4.5)/(10+1)] = 1.68	-0.32
			Violation Group	3	3-(10/2) = -2	3-[(10+4.5)/(2+1)] = -1.83	0.17
H1-b-3	Leverage	Year 1	Non-Violation Group	0.8	0.8-(10/20) = 0.3	0.8-[(10+4.5)/(20+4)] = 0.19	-0.11
			Violation Group	0.8	0.8-(18/20) = -0.1	0.8-[(18+4.5)/(20+4)] = -0.14	-0.04
H2	Current Ratio	Year 0	Non-Violation Group	2.5	2.5 - (6/2) = - 0.5	2.5 - [6/(2+1)] = 0.5	1
	& Quick Ratio	& Year 1	Violation Group	2.5	2.5 - (4/6) = 1.83	2.5 - [4/(6+1)] = 1.93	0.1
H3	Interest Coverage	Year 1	Non-Violation Group	3	3 - (10/2) = -2	3 - [(10+0.2)/(2+0.5)] = -1.08	0.92
	& Cash Int Coverage		Violation Group	3	3 - (2/2) = 2	3 - [(2+0.2)/(2+0.5)] = 2.12	0.12