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# Debt Covenant Condition and the Relative Use of Operating Lease and Long-term Debt

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## ABSTRACT

**Purpose:** We investigate the relationship between off-balance-sheet (OBS) operating leases and long-term debt by analyzing firms' debt risk profiles measured by the constraints on firms in the financial ratios in their debt covenants.

**Design/methodology/approach:** We determine debt risk profiles using three measures: the ex-ante probability of covenant violation (Demerjian and Owens, 2016), firms in violation of debt covenants, and firms close to covenant violations.

**Findings:** High-risk firms according to all three measures, on average, have a significantly lower level of operating leases, indicating that these firms use OBS leases as a substitute for long-term debt. More interesting, for firms operating in industries in which leases are widely available, firms with a high probability of covenant violation have a significantly higher level of operating leases, indicating that these firms use OBS leases as a complement to long-term debt. Further analysis indicates that lease financing is less costly than debt financing is for these firms.

**Research limitations/implications:** Overall, our evidence indicates that firms facing financial constraints may attempt to lease more of their assets, but the availability of leasing is constrained by their debt covenant obligations and the strength of the leasing market in its industry.

**Originality/value:** We identify states in which risky firms may treat leases as either complements or substitutes for long-term debt, implying that the leasing decision relates to the availability of an active leasing market for a firm's assets and the firm's financial constraints. Our findings support recent research showing that debt and leases are complementary in the presence of counterparty risk providing insight into the paradoxical relationship identified in prior research between leases and long-term debt.



***Keywords****: debt covenant, covenant violation, lease, off-balance-sheet financing, financial risk.*
***Article Classification****: Research Paper*

## 1. INTRODUCTION

Over the past twenty years, operating leases became an important source of financing for U.S. companies. In fact, the mean ratio of operating leases to total debt increased 745% from 1980 to 2007 (Cornaggia *et al.*, 2013). Some attribute this increase to the lease accounting standards in effect during that period (ASC 840), which allowed companies to treat long-term operating leases as rental agreements with no balance sheet recognition of the related assets and liabilities (Imhoff and Thomas, 1988; Imhoff *et al.*, 1991; Monson, 2001).

Regardless of this off-balance-sheet (OBS) accounting treatment, there is evidence that, sophisticated investors, firms, and creditors treat operating leases as debt when assessing equity risk and structuring loan agreements (Ely, 1995; SEC OBS Report, 2005; Yan, 2006; Paik *et al.*, 2015), implying that leases are a substitute for debt. However, some evidence indicates that operating leases provide firms with a higher level of debt capacity than secured lending, and are therefore particularly valued by firms facing cash flow constraints (Sharpe and Nguyen, 1995; Eisfeldt and Rampini, 2009; Rampini and Viswanathan, 2013). This evidence is consistent with research suggesting that leases complement debt due to the unique characteristics of a lease, which provides for more direct repossession of leased assets than traditional forms of debt allow, and the ability to sell non-debt tax deductions (Ang and Peterson, 1984; Lewis and Schallheim, 1992).[1]

In this study, we investigate this seemingly contradictory evidence by examining the relationship between OBS operating leases and long-term debt by analyzing firms' debt risk profiles measured by the financial ratio-based constraints placed on firms in their debt covenants. Given the importance of leasing in the U.S. financial market, we explore the role of debt in the

[1] Several prior studies investigate the "lease versus buy" decision, such as those by Eisfeldt and Rampini (2009) and Rampini and Viswanathan (2013).

relationship between long-term debt and OBS operating leases, particularly since the Financial Accounting Standards Board (FASB) issued revised guidance on accounting for leases in 2016 (Accounting Standards Update 2016-02). This new standard, which took effect for most businesses in 2019, significantly changes the accounting for operating leases, requiring lessees to recognize the majority of their long-term operating leases on the balance sheet as right-of-use assets and lease liabilities, that is, long-term debt. Understanding the relationship between OBS leases and long-term debt provides insight into the impact of this significant accounting standard change.

Debt covenants are typically set tightly enough that frequent violations are not necessarily associated with severe financial problems and may not result in serious penalties for the firm (Dichev and Skinner, 2002; Chava and Roberts, 2008; Whitehead, 2009; Ramsay and Sidhu, 1998). Further, Dichev and Skinner (2002) show that managers "take actions to avoid debt covenant violations" (p. 1121). Therefore, debt covenants provide a distinctive opportunity to examine the relationship between OBS lease financing and debt financing. We use three measures based on debt covenants to characterize a firm's debt risk profile: the probability of covenant violation following loan inception based on Demerjian and Owens' (2016) measure, actual covenant violations, and closeness (tightness) to a covenant violation in periods subsequent to loan inception.

Overall, we find that firms use OBS operating leases and long-term debt as substitutes rather than complements. The results indicate that firms with a high probability of covenant violation use significantly fewer OBS operating leases. We also find that firms with covenant violations use OBS operating leases less frequently than do firms without covenant violations.

This finding is robust to the inclusion of firm size, measures of profitability, financial health, and firm and year-fixed effects as control variables.

Further, using a subsample of firms that are close to a violation (i.e., firms with less than 20% slack) produces virtually identical results to those from the violation sample. Thus, consistent with control-based theories (e.g., Aghion and Bolton, 1992; Dewatripont and Tirole, 1994; Roberts and Sufi, 2009), the potential transfer of control rights caused by a covenant violation or the fear of a violation leads to a measurable decrease in both OBS lease financing and long-term debt financing. This finding is consistent with the views of the Securities and Exchange Commission (SEC Staff Report, 2005) and results reported in prior research that experienced financial information users, such as creditors, consider OBS leases as a form of long-term debt (Paik *et al.*, 2015).

More importantly, we investigate firms that operate in industries that routinely use lease financing. Prior studies indicate that firms with viable alternative sources of financing are in a better bargaining position with their creditors (Roberts and Sufi, 2009). In addition, in high-lease industries, leasing reduces market frictions arising from transaction costs and asset selling costs (Gavazza, 2011), implying that firms in industries with a strong leasing market may be able to use operating leases as complements to long-term debt. Consistent with this supposition, we find that firms in high lease industries use significantly more OBS operating leases when they have a high ex-ante probability of covenant violation than do firms in low lease industries. This result indicates that financially risky firms with access to a strong leasing market finance their assets through leasing. However, similar to our overall findings for all industries, if they violate, or are close to violating, debt covenants, then their ability to lease assets is diminished. Further analysis shows that these high-lease industry firms have significantly higher default spreads and lower

credit ratings than firms with low leases do, implying that traditional debt may be a more costly option than lease financing for these firms.

Overall, our findings and those in prior research imply that firms seeking financing options are constrained by their debt covenant obligations and the strength of the leasing market in its industry. These implications are consistent with prior research showing that the decision to lease is associated with "financial contracting costs" (Sharpe and Nguyen, 1995; Gavazza, 2011). That is, the cost of violating a debt covenant is such that firms will decrease their use of OBS leases and long-term debt. Our evidence indicates that the debt market recognizes the impact of leasing on firms' financial conditions, implying that the accounting recognition of lease liabilities that the revised lease accounting standard (Accounting Standards Update 2016-02) requires aligns the financial statements with the underlying economics more fully.

Our study empirically identifies a specific channel (debt covenants) behind the debt-financing and OBS-lease-financing link and explores the link to specific industries. We believe these findings add to the literature on the complex relationship between debt financing and leasing, providing a possible explanation for the mixed results on whether leases are substitutes or complements for debt financing (Ang and Peterson, 1984; Yan, 2006; Eisfeldt and Rampini, 2009). More importantly, by examining both the probability of covenant violations and actual violations, we identify states in which risky firms may treat leases as either complements or substitutes for long-term debt, implying that the leasing decision relates to the availability of an active leasing market for a firm's assets and the firm's financial constraints. Thus, our findings support recent research showing that debt and leases are complementary in the presence of counterparty risk; that is, the likelihood that one or more parties in a financial transaction might default on their contractual obligations (Ambrose *et al.*, 2019). Overall, our findings provide

insight into the paradoxical relationship identified in prior research between leases and long-term debt and supports the balance sheet recognition of leases.

Section 2 discusses the background and prior research on debt covenants, including studies related to capital structures and develops the hypotheses. Section 3 describes the research design we adopt to examine the effect of debt covenant violation on the relationship between OBS lease financing and debt financing. Section 4 presents the sample and descriptive statistics. Section 5 discusses the results, and we provide the conclusions in Section 6.

## 2. BACKGROUND AND PRIOR RESEARCH

### *Operating Lease Accounting Rules*

U.S. accounting standards (ASC 840) provide rules for determining whether a lease is a capital lease, representing asset and debt financing, or an operating lease. Under current rules, lease payments for operating leases represent a rental expense on the income statement with a footnote disclosure of the projected amount of the minimum lease payments for five years and no recognition of the leased asset or liability on the balance sheet. Issues related to the lease accounting rules, including the disparity in the lessees' recognition of lease obligations for capital and operating leases, led the FASB to issue new rules in February 2016. The revised rules significantly change the balance sheet recognition for operating leases, requiring lessees to recognize a right-of-use asset and a lease liability measured as the present value of the lease payments over the lease term. The new rules took effect for most calendar-year businesses in 2019, with early adoption permitted. Estimates of the impact of recognizing operating lease obligations on the balance sheets of U.S. public companies ranges from $1.5 trillion to $2.0 trillion (Rapoport, 2015).

***Prior Research on Debt Covenants***

Incomplete contract theory argues that the design of debt covenants minimizes agency costs by establishing the conditions under which control rights transfer to creditors (Aghion and Bolton, 1992; Tirole, 2006; Chava and Roberts, 2008; Emanuel *et al.*, 2003). Specifically, negotiating debt arrangements to mitigate managers' opportunistic behavior reduces "conflicts of interest between borrowers and lenders" (Emanuel *et al.*, 2003 p. 160). Common debt covenants are based on accounting information that creditors believe will provide them the ability to monitor a borrower's financial condition and to assess their risk exposure, such as leverage, interest coverage, and the current ratio (Whitehead, 2009; Gârleanu and Zwiebel, 2009). Firms are willing to accept restrictive debt covenants as doing so reduces the cost of debt (Reisel, 2009; Billett *et al.*, 2007; Bradley and Roberts, 2004).

However, violating debt covenants is costly for firms. Firms that violate a restrictive debt covenant face an increased likelihood of losing control of rights through debt restructuring or accelerated debt payments (Nini *et al.*, 2009; Ozelge, 2007). Not all consequences are severe, and some studies provides evidence that creditors frequently respond to violations by decreasing credit lines, increasing interest spreads, or requesting additional collateral (Roberts and Sufi, 2009; and Chava and Roberts, 2008).

Beyond the impact on the debt agreement itself, Roberts and Sufi (2009) conclude that covenant violations have a "large effect" on firms' financing decisions, indicating that the violators' net debt issuing activity experiences "large and persistent declines" immediately following the covenant violation. Further, both debt covenant violations and the threat of a violation affect firm investment (Chava and Roberts, 2008).[2] Given these consequences, it is not

[2] Griffin *et al.* (2014) document a significant association between the debt covenant violation disclosure and insider trading.

surprising that Dichev and Skinner (2002) demonstrate that managers are motivated to avoid debt covenant violations.

Supporting Dichev and Skinner's (2002) finding that firms work to avoid debt covenant violations, Chava and Roberts (2008) find that when covenant slack[3] falls to within 20% of a threshold, investment declines significantly. In addition, Beatty *et al.*'s (2002) study of the relationship between accounting changes and debt covenants concludes that to avoid debt covenant violations, firms are willing to accept higher interest rates to maintain the ability to adopt voluntary accounting changes.

Prior studies also provide evidence that debt covenants address agency problems through the choice of accounting-based covenants; that is, those containing balance-sheet based ratios as opposed to income-statement based ratios. Balance-sheet-based ratios are less frequent in debt covenants for financially constrained firms than income-statement-based ratios are. This structuring of debt covenants aligns the needs of creditors who want to protect their interests with the needs of firms that want to invest in profitable ventures (Christensen and Nikolaev, 2012). Paik et al. (2015) find that OBS operating leasing is "negatively related to balance sheet covenants and positively related to the use of income statement covenants," indicating that creditors treat OBS operating leases as a form of debt. These prior findings suggest that debt contracts are written with respect to borrowing firms' financial performance and credit risk. This is consistent with Dichev and Skinner's (2002) conclusion that covenants are not "boiler plate," and creditors adjust covenants to reflect the borrower's financial characteristics. This is particularly pronounced in the private debt market (Ramsay and Sidhu, 1998).

[3] Covenant slack, default distance, and covenant tightness refer to the closeness to violation of debt covenants (El-Gazzar, 1993; Chava and Roberts, 2008; Dichev and Skinner, 2002). In this study, we use covenant slack and, following prior research, measure it as the difference between the actual covenant ratio and the covenant threshold ratio.

Further, Dhaliwal *et al.* (2011) find that firms' expected cost of equity capital measures influence the capitalization of OBS operating leases. Based on analyst forecasts, they show that the ex-ante cost of equity capital is positively associated with adjustments in the firm's financial leverage (financial risk, measured as the debt-to-equity ratio) and operating leverage (operating risk, measured as the standard deviation of return on assets), when these leverages are adjusted for the capitalization of OBS operating leases.[4] Supporting this work, Yan (2006) demonstrates that OBS leases influence the cost of debt, indicating that leasing is a substitute for debt financing.

Regardless of their OBS accounting treatment, if firms and creditors treat operating leases as debt, then we would expect to see managers of firms with a high probability of covenant violations avoid taking on additional operating leases to prevent covenant violations. Hence, we predict that firms with a high probability of covenant violation will use OBS operating leases as substitutes for long-term liabilities; that is, as an alternative capital source. This prediction leads to the first part of our first hypothesis, where we measure the probability of violation following Demerjian and Owens (2016).

**H1a:** Firms with a high probability of covenant violation use OBS operating leases significantly *less* than do firms with a low probability of violation.

Existing studies indicate that a firm's industry influences its capital structure and debt covenants (Frank and Goyal, 2009; Rauh and Sufi, 2011; Paik *et al.*, 2015). Frank and Goyal (2009) conclude that a core factor determining a firm's leverage is the industry's median leverage. Rauh and Sufi (2011) include OBS leases in their analysis of capital structure and

[4] However, they do not find significant relationships when using *ex post* stock returns, defined as annual returns, as a proxy for the cost of capital.

provide strong evidence that firms in the same industry have similar capital structures, which is related to the similarity of their production assets. Gavazza's (2011) results indicate that the secondary leasing market in the commercial aircraft industry provides an efficient mechanism for reallocating assets and reducing trading frictions. In an international setting, Bazley *et al.* (1985) report that voluntary lease disclosures by Australian companies are related to the firms' industry.

Roberts and Sufi (2009) suggests that firms with attractive alternative sources of financing will not experience negative consequences when they violate their debt covenants, as would firms with limited access to alternative financing. This is consistent with Sharpe and Nguyen's (1995) argument that the advantageous treatment of leases over other forms of secured debt in bankruptcy proceedings provides additional protection to the lessor, thus acting as a supplemental form of financing for financially constrained firms.

Based on this research, we posit that when a borrowing firm operates in an industry in which leases are widely used, thereby implying the presence of a strong secondary leasing market, the firm may have additional financing options through OBS operating leases that are not available to firms in industries where leases are less common. Yan (2006) argues that firms decide between either debt or leases for financing by comparing the incremental cost of debt to the incremental cost of leasing. For firms with access to robust leasing markets, leases may mitigate market transaction costs, reducing the overall cost of leasing as compared to long-term debt.

Lessors maintain ownership of the leased asset, allowing them to repossess assets easier than lenders with a secured interest in an asset. This characteristic of leases provides additional protection to lessen their ability to provide financing to higher-risk firms. Eisfeldt and Rampini (2009) thus to argue that leasing provides financially constrained firms with additional debt

capacity as compared to secured debt. Firms with a high probability of covenant violations face severe financial constraints, increasing the cost of long-term debt. Thus, firms with OBS leasing as an available source of financing may find leases an attractive vehicle for expanding their debt capacity. Given the institutional structure surrounding leases, we argue that in high-lease industries, a complementary effect is likely to exist between leases and long-term debt; that is, these firms can increase their debt capacity using OBS leases. This discussion leads to the second part of our first hypothesis.

**H1b**: Firms with a high probability of covenant violation that operate in high-leasing industries use OBS operating leases significantly *more* than those with a low probability of violation do.

Debt covenants provide an efficient contracting mechanism that reflects the firm's environment (Emanuel *et al.*, 2003). Debt covenants are initially tightly set; thus, covenant violations are common (Chava and Roberts, 2008; Roberts and Sufi, 2009; Gârleanu and Zwiebel, 2009). Gârleanu and Zwiebel (2009) attribute the tightness of initial covenants to informational asymmetry, in that creditors do not have the same level of information on future performance as do firm managers. However, when a firm violates its debt covenants, the creditor has more information and the right to renegotiate debt terms, including increasing interest spreads, demanding additional collateral, or reducing the credit capacity. If the firm does not have attractive alternative financing options, it may have difficulty obtaining new debt financing from other lenders, requiring it to accept the additional constraints (Roberts and Sufi, 2009).

We argue that a covenant violation, as opposed to the probability of violation, leads to changes in the use of OBS operating leases relative to long-term debt. A firm that

violates its covenants crosses a legal threshold that forces it to face tighter lending constraints and the threat of a transfer of control rights and creditor intervention. Thus, we predict that firms in any industry that violate their debt covenants will have difficulty finding new sources of debt financing, including leases. This discussion is the basis for our second two-part hypothesis.

**H2a**: Firms that violate their debt covenants use OBS operating leases significantly *less* than firms that do not violate their debt covenants.

**H2b**: Firms in high-leasing industries that violate their debt covenants use OBS operating leases significantly *less* than firms that do not violate their debt covenants.

The debt covenant hypothesis, as in Holthausen and Leftwich (1983), Dichev and Skinner (2002), and Beatty *et al.* (2002), predicts that firms that are *close* to violating debt covenants will make accounting choices that help them avoid covenant violations. Thus, while these firms have not yet violated their debt covenants, they may alter their financing policy to avoid violations. Since firms use OBS operating leases as one financing source, we predict that when firms are very close to violating their debt covenants due to deteriorating operating and financing conditions, they will have difficulty finding new sources of debt financing, including leases, regardless of their industry. This discussion is the basis for the third two-part hypothesis.

**H3a**: Firms that are very close to violating their debt covenants use OBS operating leases significantly *less* than firms that are not at risk of violating their covenants.

**H3b**: Firms in high-leasing industries that are very close to violating their debt covenants use OBS operating leases significantly *less* than firms that are not at risk of violating their covenants.

## 3. RESEARCH DESIGN

We investigate the relationship between OBS operating leases and long-term debt by analyzing firms' debt risk profiles measured as the constraints placed on firms through the financial ratios included in their debt covenants. We describe a firm's risk profile as a high probability of violation, covenant violation, or small slack (close to covenant violation). To test our hypotheses, we use a sample of firms that have financial debt covenants in their loan agreements (we present a detailed sample description in Section 4.) For the analysis, our sample includes two subsamples. The first is firms that violated their debt covenants (in technical default). According to Roberts and Sufi (2009), about 25 percent of firms in the *DealScan* database are in technical default.

The second subsample of firms are very close to violating their debt covenants or are small slack firms. To identify these firms, we use covenant slack, measured as the difference between the current financial ratio and the covenant threshold ratio divided by the covenant threshold ratio. We define firms close to violating their covenants as firms with less than 20 percent debt covenant slack for any one of the covenant ratios included in our sample, following Chava and Roberts (2008).

We adapted our base empirical model to test our hypotheses from Roberts and Sufi (2009):

$$PROPV_{it} = \alpha_0 + \beta_1 RiskProfile_{it}\ (PVIOL \text{ or } VIOLATION \text{ or } SMALLSLACK)_{it} + \beta_2 HighOBSL_{it} + \beta_3 Interaction_{it} + \beta_4 X_{it-1} + \varepsilon_{it} \quad (1)$$

where (see also Appendix.)

| | | |
|---|---|---|
| $PROPV_{it}$ | = | Present value of OBS operating leases divided by the sum of the present value of OBS operating leases and long-term debt |
| $RiskProfile_{it}$ | = | *PVIOL*, probability of covenant violation following loan inception, as in Demerjian and Owens (2016). We obtain *PVIOL* data from Demerjian's web site at http://faculty.washington.edu/pdemerj/data.html |
| | = | *VIOLATION*, an indicator variable equal to 1 if a firm violates its debt covenants, and 0 otherwise; covenant violation occurs when a firm's current financial ratios surpass the violation thresholds noted in the firm's debt covenants. |
| | = | *SMALLSLACK*, an indicator variable equal to 1 if a firm's debt covenant slack is less than 0.20 and 0 if the slack is greater than 0.20 |
| $HighOBSL_{it}$ | = | An indicator variable equal to 1 if a firm belongs to an industry in the top 50% of the distribution using the present value of OBS leases divided by total assets, and 0 otherwise |
| $Interaction_{it}$ | = | Interaction terms of *RiskProfile (PVIOL or VIOLATION or SMALLSLACK )* and the *HighOBSL* industry dummy variable |
| $X_{it-1}$ | = | A vector of the following five control variables ($\beta_4$ is a vector of five parameters.): |
| $LnMVE_{it-1}$ | = | Lagged natural logarithm of the market value of equity |
| $MTB_{it-1}$ | = | Lagged market-to-book ratio |
| $TGA_{it-1}$ | = | Lagged tangible assets to total assets ratio |
| $ROA_{it-1}$ | = | Lagged return on assets |
| $LOSS_{it-1}$ | = | An indicator variable equal to 1 if a firm reports loss in the prior year and 0 otherwise |

We estimate the present value of OBS operating leases consistent with the revised lease accounting standard (Accounting Standards Update 2016-02) by calculating the present value of the future minimum lease payments. We use 10% as the discount rate. Many prior studies in the lease accounting literature use a fixed interest rate as the present value discount rate (e.g., Imhoff

*et al.*, 1991, 1993; Gritta *et al.*, 1994; Ely, 1995; Beattie *et al.*, 1998; Demerjian, 2011; Paik *et al.*, 2015).

We use the *PVIOL* data developed by Demerjian and Owens (2016) to measure the probability of covenant violation across the entire set of covenants included in a loan. Their measure estimates the probability of covenant violation during the first quarter following loan inception. Their dataset covers all *DealScan* loan packages, with adequate information, as of December 2015 (Demerjian and Owens, 2016). In their analyses, Demerjian and Owens (2016) demonstrate that their measure of the probability of violation outperforms common alternative measures, concluding that their measure has significantly greater *predictive* ability of covenant violations following a loan's inception. We obtained *PVIOL* data from Demerjian's website (http://faculty.washington.edu/pdemerj/data.html).

The coefficients of interest are $\beta_1$ and $\beta_3$. $\beta_1$ implies the effect of the borrowing firms' risk profiles; that is, a high probability of covenant violation, covenant violation, or close to covenant violation, on the use of OBS operating leases (i.e., the treatment effect). We expect that $\beta_1$ will be *negative*, as in hypotheses, H1a, H2a, and H3a. The sample sizes in our regression models vary based on the proxy for firms' risk profiles. For the regressions using the independent variable *PVIOL*, which is the *ex-ante* probability of violation, and *Violation*, an indicator variable for those firms that violated their covenants, we use the entire sample of firms. However, for the regression using the independent variable *SmallSlack*, an indicator variable for firms within the 20% threshold of violating their covenants, we exclude firms that violated their debt covenants.[5]

[5] *SmallSlack* measures the closeness to violation. Therefore, we exclude firms that already violated their debt covenants from the regressions that include *SmallSlack*.

The coefficient $\beta_3$ implies the incremental effect of firms in high-lease industries on the relationship between high probability of violation (*PVIOL*), covenant violation (*Violation*), or closeness to covenant violation (*SmallSlack*), of using OBS operating leases. We expect that $\beta_3$ will be *positive,* as in hypothesis H1b, which relates to a high probability of violation, while $\beta_3$ will be *negative,* as in hypotheses H2b, which relates to firms in violation, and H3b, which relates to small-slack firms. We present our predicted signs for these coefficients in Table 1.

(Insert Table 1 here)

$X_{it-1}$ is a matrix of five control variables drawn from previous research showing that they influence covenant violation and reflect financing constraints (Rajan and Zingales, 1995). *X* includes the lagged natural logarithm of the market value of equity, the lagged market-to-book ratio, lagged tangible-to-total assets ratio, ROA, and an indicator variable for loss. We also control for firm and year fixed effects in the regressions.

## 4. SAMPLE AND DESCRIPTIVE STATISTICS

We extract our initial sample of 10,093 loan deals from *Compustat* and the 2013 release of the Loan Pricing Corporation's (LPC) *DealScan* database. *DealScan* contains data for private loans by bank and non-bank lenders, together with data for high-yield bonds. According to the LPC, most of the data covers private loans made to U.S. corporations obtained from SEC filings, with the remainder of the data obtained directly from participating banks in the credit industry. The sample covers 1996 to 2013.[6]

[6] Information on financial debt covenants is limited prior to 1996 in *DealScan*.

Kahan and Tuckman (1995) find that private loans contain relatively more financial covenants than public debt issues do.[7] Moreover, financial covenants in private loans are tighter (i.e., the gap between the covenant threshold and the current accounting measure is smaller) compared to public debt. Therefore, we observe the most technical defaults in private debt issues. Accordingly, the DealScan database provides data suitable for our study on the effect of covenant violations on firms' financing policies.

DealScan provides information on many aspects of the loan (e.g., loan amount, maturity, interest rate, etc.), including data on financial ratio covenants. We do not restrict our sample to covenants containing specific financial ratios; instead, we include all ratios for which we have sufficient sample observations. This allows us to include the eight covenant ratios listed in Table 2 used in the loan deals in our sample.

(Insert Table 2 here)

The sample selection process starts with obtaining all non-financial industry firms' accounting and lease data from the Annual *Compustat North America* database. We then merge the *DealScan* debt covenant data with the lease and firm accounting data using company names and ticker symbols. Loans are often grouped together into deals, and financial debt covenants generally apply to all loans in a deal. Table 2 presents the sample of loan deals and describes the eight covenant ratios collected from this *DealScan-Compustat* merged database. Finally, we remove the top and the bottom one percent to eliminate the effect of outliers. This merge process results in 16,160 financial ratios for 10,093 deals between 1996 and 2013. We use this sample to test H2 and H3. To test H1 on the ex-ante probability of violation, we further merge the data with

[7] Bharath *et al.* (2008) note that private loans also contain stricter non-price terms (collateral and loan maturity) compared to public bonds.

Demerjian and Owens' (2016) dataset to determine the *PVIOL* estimates. This results in a sample size of 10,093 deals to test H1.

The frequency analysis by year reported in Table 2 indicates that the number of covenants and loan deals decreased considerably over time. In addition, the number of financial ratio covenants that use balance sheet information only, such as the Leverage Ratio, Debt to Equity, Debt to Tangible Net Worth, Current Ratio, and Quick Ratio, decreased significantly over time, as in Demerjian (2011), Christensen and Nikolaev (2012), and Paik *et al*. (2015).

Table 3 reports the characteristics of the sample firms. In our sample, the mean of the covenant violation variable, *VIOLATION,* is 0.3600, indicating that approximately 36 percent of the sample firms violated covenants. Likewise, the mean probability of covenant violation, *PVIOL*, is 0.3700, consistent with Demerjian and Owen's (2016) mean of 0.373 based on their 1984 – 2004 sample. The mean of *SMALLSLACK* is 0.2253, indicating that approximately 23 percent of the sample firms have tight covenant slack, which is consistent with the findings of previous studies (e.g., Roberts and Sufi, 2009).

The mean total assets (*TA*), total liabilities (*TL*), long-term debt (*LTDT*), market value of equity (*MVE*), and present value of operating leases (*PVL*) are all larger than the median values, indicating right-skewed distributions. *LOSS* is an indicator variable equal to 1 if a firm reports a loss, and 0 otherwise. The mean *LOSS* is 0.2200, indicating that approximately 22 percent of the sample firms reported losses.

Next, for each covenant ratio, we identify firms with and without covenant violations. Panel A in Table 4 compares the firm characteristics of violating and non-violating firms. We also compare firms with small and large covenant slack. Panel B in Table 4 reports the descriptive statistics of the small versus large slack firms.

(Insert Table 4 here)

In columns (1), (3), and (5) in Panel A of Table 4, the mean *PROPV*, defined as the present value of OBS operating leases divided by the sum of the present value of OBS operating leases and long-term debt for violating firms (0.1394), is significantly smaller ($p<.01$) than that for non-violating firms (0.2824). This difference indicates that violating firms have a significantly smaller amount of OBS operating leases than do non-violating firms. The mean *PROPV* difference is -0.1430 in column (5).

In addition, the violating firms are significantly smaller ($p<.01$) in terms of market value of equity (*LnMVE*, 6.3856 vs. 6.5067). Furthermore, violating firms are significantly less profitable in terms of return on assets (ROA, $p<.01$) and are more likely to be making a loss (*LOSS*, $p<.01$) than non-violating firms are. However, violating firms have significantly more ($p<.01$) tangible assets (*TGA*).

In Panel B of Table 4, small-slack firms have a significantly ($p<.01$) lower level of *PROPV*. This difference indicates that small-slack firms have a significantly smaller amount of OBS operating leases than non-small-slack firms do. The mean difference in column (5) is -0.1406. We also find significant differences in other firm characteristics between the two groups. The small-slack firms are significantly larger ($p<.01$) in terms of market value of equity (*LnMVE*) and have significantly higher ($p<.01$) tangible asset ratios (*TGA*). These results suggest that to investigate the relationship between OBS operating leases and debt, we must control for variation in these confounding firm characteristics. Similarly, in Panel C of Table 4, we compare the firm characteristics of the high and low *PVIOL* groups. We use *PVMD*, the median value of *PVIOL*, to separate the sample firms into high and low *PVIOL* groups.

Table 5 presents the results of the Pearson and Spearman correlations for the model variables. We report Pearson correlations in the upper right diagonal and Spearman correlations in the lower-left diagonal. As hypothesized, *PROPV* has a significant negative ($p<.01$) relationship with *VIOLATION* and *PVIOL*. *VIOLATION* and *PVIOL* are also significantly correlated with the firm performance variables *ROA* ($p<.01$) and *LOSS* ($p<.01$).

(Insert Table 5 about here)

## 5. RESULTS

Table 6 reports the results of three model specifications to test whether firms with a high probability of violating their loan covenants will use operating leases less than firms with a low probability of covenant violation (H1a) and whether the availability of leases affects the results (H1b). Model (1) presents the results from the model specification with *PVIOL*, which measures the probability of covenant violation following loan inception, including the five control variables (*LnMVE*, *MTB*, *TGA*, *LOSS*, and *ROA*) and firm and year fixed effects. The adjusted-$R^2$ of Model (1) is 0.1781. The variable of interest, *PVIOL* has a coefficient of -0.0246 ($p<.01$), meaning that on average, the relative use of OBS leases (*PROPV*) decreases by 2.46% as *PVIOL* (the probability of violation) increases by 1. This result supports Hypothesis 1a; that is, firms with a high probability of violating debt covenants use operating leases significantly less than low-probability firms do. These high probability of violating firms use leases as a substitute for debt.

(Insert Table 6 here)

Model (1) also incorporates *HighOBSL* with an interaction term (*PVIOL* × *HighOBSL*) to test H1b related to high-lease industries. *HighOBSL* is an indicator variable equal to 1 if a firm

belongs to an industry in which leasing is common; that is industries in the top 50 percent of the distribution using the present value of OBS leases divided by total assets, and 0 otherwise.

In Model (1), the coefficient on the interaction variable *PVIOL* × *HighOBSL* is 0.0339 and significant at the 0.05 level. This positive coefficient means that if a firm operates in an industry in which OBS leases are common, then as the probability of violation increases by 1, the relative use of OBS operating leases increases by 0.0093 (the sum of the two coefficients, 0.0339 and -0.0246). This result supports H1b that firms with a high probability of covenant violation following loan inception in high-lease industries use OBS leases significantly more than low-probability firms do, implying that these firms use leases as a complement to debt. This result is consistent with Eisfeldt and Rampini's (2009) conclusion that "for more financially constrained agents, the benefit of the higher debt capacity of leased capital outweighs the costs due to the agency problem induced by the separation of ownership and control" (p. 1651).

Models (2) and (3) in Table 6 incorporate alternative measures for the probability of violation, *PVMD*, and *LOGPVIOL*. *PVMD* is an indicator variable equal to 1 if a firm's *PVIOL* is above the median *PVIOL*, and 0 otherwise. *LOGPVIOL* is the natural logarithm of *PVIOL*. The results from these alternative specifications are qualitatively consistent with those from Model (1).

Table 7 presents the results of Models (4) and (5). Model (4) tests Hypotheses 2a and 2b, and Model (5) tests Hypotheses 3a and 3b. H2a and H2b relate to firms in violation of their debt covenants, and H3a and H3b relate to small-slack firms that are within 20% of debt covenant violation. Model (4) presents the results from equation (1) with the *VIOLATION* variable. The adjusted-$R^2$ is 0.2128. The significant coefficient on *VIOLATION* is -0.0750 (-11.01, $p < .01$), meaning that on average, the relative use of OBS operating leases decreases by 7.50% for firms

that violated covenants. This result supports Hypothesis 2a that firms that violated their debt covenants use OBS leases significantly less than non-violating firms do, and thus treat leases as a substitute for debt.

(Insert Table 7 here)

The interaction variable (*VIOLATION* × *HighOBLS*) represents the incremental effect of belong into an industry in which OBS leases are common on a firm's use of operating leases when a firm violates covenants. The significant ($p<.01$) coefficient on *VIOLATION* × *HighOBLS* is -0.0663, meaning that the relative use of OBS operating leases decreases by 0.1413 (the sum of -0.0663 and -0.0750) as a firm violates its debt covenants if a firm is in a high lease industry. Therefore, the result supports Hypothesis 2b that firms in high lease industries that violated their debt covenants use OBS operating leases as a substitute for debt.

Model (5) presents the results from the model to test H3a and H3b relating to small-slack firms that are within 20% of debt covenant violation. Model (5) incorporates the *SMALLSLACK* variable in equation (1). The adjusted-$R^2$ is 0.1708. The coefficient on *SMALLSALCK* represents the effect of a small covenant slack on a firm's relative use of operating leases. The significant ($p<.01$) coefficient on *SMALLSLACK* is -0.0715, which means that on average, the relative use of OBS operating leases decreases by 7.15% if a firm has small debt covenant slack. This result supports H3a that firms with small slack use OBS leases significantly less than firms that are not at risk of covenant violation.

Model (5) also includes *HighOBSL* and an interaction term identifying firms with small slack in high lease industries (*SMALLSLACK* × *HighOBLS*) to test H3b. The coefficient of *SMALLSLACK* × *HighOBLS* is -0.0498 ($p< 0.01$), indicating that the use of OBS leases decreases further by 0.1213 (the sum of -0.0498 and -0.0715) for small slack firms in an industry

in which operating leases are common. This result supports Hypothesis 3b that firms in high-leasing industries that are very close to violating their debt covenants use OBS operating leases significantly *less* than firms that are not at risk of violating their covenants do. These results are consistent with our findings for firms that are in violation of debt covenants; that is, firms that are close to debt covenant violation use leases as a substitute for debt, regardless of whether they are in an industry in which lease financing is common or not. This is in contrast to our findings that firms in high lease industries that are at risk of violation (i.e., the high *ex-ante* probability of violation) use leases as a complement to debt. This finding supports our argument that a covenant violation or the threat of a violation acts as the stimulus leading to changes in the use of OBS operating leases relative to long-term debt. The ex-ante probability of violation does not appear to invoke the same firm behavior[8,9]

***Additional Analyses***

To gain a fuller understanding of our results for firms in high-lease industries, we compare the characteristics of these firms to those of low-lease industry firms. As Panel A in Table 8 shows, high-lease industry firms have significantly lower market value and tangible assets than do firms in low lease industries ($p<.01$). In addition, there are significantly more firms running a loss in high-lease industries than in low-lease industries ($p<.01$).

(Insert Table 8 here)

[8] We repeated our main analyses after including a *Tax* dummy variable equal to 1 if the net operating loss (NOL) carryforward is greater than zero and 0 if the NOL carryforward is zero. The results of the regressions *with* the *Tax* variable are qualitatively consistent to the results without the *Tax* variable reported in Tables 6 and 7.

[9] To address the potential endogeneity concern, we repeated our main analyses using the Heckman two-step estimation procedure. The results in Tables 6 and 7 are all qualitatively consistent. Specifically, the Inverse Mills Ratio in the Heckman estimation procedure is not statistically significant (p-value = 0.1144, t-value = 1.58), suggesting that potential endogeneity is not a significant concern in our cross-sectional models.

Further, these high-lease industry firms have significantly higher debt default spreads and significantly lower credit ratings (Panel B of Table 8). The variable *Spread 1* denotes the default spreads that go with the "synthetic" credit ratings. Adding default spreads to the risk-free rate should yield the firm's pre-tax cost of borrowing.[10] We also use an additional measure of default spreads, *Spread 2*, based on the ranked order of a firm's default spread. The analysis provides evidence of the low credit ratings of high-lease industry firms compared to firms with low leases. This result implies a higher debt cost for high-lease industry firms, which coupled with the availability of leases, may make asset leasing an attractive financing option for these firms.

To understand our measure of covenant violation more thoroughly, in Table 9, we compare the measure of the probability of covenant violation (*PVMD*), the ex-ante measure of violation, to *Violation*, the actual measure of violations, for the overall sample (Panel A), and for firms in the high lease industry (Panel B). We use the *PVMD* indicator variable for this analysis, which equals 1 if a firm's probability of violating its debt covenants (*PVIOL*) is above the median, and 0 otherwise.

(Insert Table 9 here)

In Panel A of Table 9, for the overall sample, 35.62% of firms have debt covenant violations. For the high-lease industry firms, as in Panel B, 29.25% have debt covenant violations. Further, examining only the violating firms, Panel A of Table 9 reports that *PVMD*, the ex-ante measure, predicts that 64.56% of all violating firms would have debt covenant violations. This probability jumps to 73.43% for high-lease industry firms, as in Panel B. *PVMD* may identify firms with a higher debt cost. We believe this supports our results in Table 6. Firms with a high probability of covenant violation in high-lease industries use OBS leases as a

[10] We obtained the data for the default spreads from http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ratings.htm.

complement to debt. The combination of high debt cost and the availability of a leasing market provides firms with incentives to seek out leasing as an additional source of financing beyond traditional debt.

## 6. CONCLUSIONS

Prior research indicates that firms use OBS leases both as a substitute for and complement to debt. We investigate this paradox by examining the relationship between OBS leases and long-term debt by analyzing firms' debt risk profiles measured by the constraints in the financial ratios included in their debt covenants. We identify a channel between leases and long-term debt. We measure firms' risk profiles using the probability of covenant violation, covenant violations, and closeness to covenant violations in periods subsequent to loan inception. Our sample consists of firms that violated their debt covenants, are very close (within 20%) to debt covenant violation, and firms not at risk of covenant violation.

Our results provide evidence that the use of leases is related to the availability of lease financing in a firm's industry. In general, firms facing financial constraints; that is, a high probability of covenant violation, covenant violations, or close to covenant violations, use OBS operating leases significantly *less* than firms not facing these constraints do, indicating that firms use leases as a *substitute* (an alternative source of financing) for long-term debt. However, for firms operating in industries in which operating leases are common, firms with a high probability of covenant violation use OBS operating leases significantly *more* than firms without these constraints do. That is, these high-risk profile firms use leasing as a *complement* (an additional source of financing) to long-term debt. This finding provides further evidence that counter-party risk influences the relationship between debt and leases, as Ambrose *et al.* (2019) hypothesize.

Comparing these high-lease industry firms to low-lease industry firms shows that firms in industries with strong leasing markets have significantly lower market values, lower tangible assets, and higher debt default spreads than firms in industries in which leases are uncommon do, implying that these high-lease industry firms face higher traditional debt costs. In this case, when considering financing options, leases are an attractive option compared to traditional debt. However, once a firm triggers its debt covenants or is close to violating those covenants, leases are no longer an available option, acting as a substitute for debt. This result supports prior research that finds that managers act to avoid debt covenant violations (Dichev and Skinner, 2002).

The finding that firms operating in industries that actively use leases have a higher level of OBS leases when they have a higher probability of covenant violation provides additional evidence to the accounting and finance literature that documents the significant impact of moral hazard and incentive conflicts between firms and their creditors on their debt financing policy. Further, we empirically identify a specific channel (debt convents) for the debt financing and OBS-lease-financing link.

Our results imply that firms facing financial constraints will attempt to lease more of their assets, but the availability of leasing is constrained by their debt covenant obligations and the strength of the leasing market in its industry. Overall, this evidence indicates that the debt market recognizes the impact of leasing on firms' financial conditions, implying that the accounting recognition of lease liabilities required by the revised lease accounting standard (Accounting Standards Update 2016-02) more fully aligns the financial statements with the underlying economics.

Our results are limited to the U.S. market with its institutional structure. In future studies, it would be interesting to perform a similar analysis of firms in other countries. Additionally, it would be helpful to investigate the relationship between operating leases and long-term debt by analyzing firms' debt risk profiles after the full implementation of the revised leasing standard ASU 2016-02.

## APPENDIX

| | | |
|---|---|---|
| *PVL* | = | Present value of off-balance-sheet (OBS) operating leases |
| *PROPV* | = | Present value of OBS operating leases divided by the sum of the present value of OBS operating leases and long-term debt |
| *Independent Variables* | | |
| *PVIOL* | = | Probability of covenant violation following loan inception, defined following Demerjian and Owens (2016) |
| *VIOLATION* | = | An indicator variable equal to 1 if a firm violates its debt covenants, and 0 otherwise |
| *PVMD* | = | An indicator variable equal to 1 if a firm's *PVIOL* is above the median *PVIOL*, and 0 otherwise |
| *LOGPVIOL* | = | Natural logarithm of *PVIOL* |
| *SMALLSLACK* | = | An indicator variable equal to 1 if a firm's debt covenant slack is less than 0.20 and 0 if the slack is greater than 0.20 |
| *HighOBSL* | = | An indicator variable equal to 1 if a firm belongs to an industry in the top 50% of the distribution using the present value of OBS operating leases divided by total assets, and 0 otherwise |
| *INTERACTION* | = | Interaction terms between *VIOLATION*, *PVIOL*, or *SMALLSLACK* and *High OBSL* industry dummy variable |
| *Other Control Variables* | | |
| *TA* | = | Total assets |
| *TL* | = | Total liabilities |
| *LTDT* | = | Long-term debt |
| *LEVERAGE* | = | Long-term debt divided by total assets |
| *LnMVE* | = | Natural logarithm of the market value of equity |
| *MTB* | = | Market-to-book ratio |
| *TGA* | = | Tangible assets to total assets ratio |
| *ROA* | = | Return on assets |
| *LOSS* | = | An indicator variable equal to 1 if a firm reports a loss and 0 otherwise |

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