A New Lease on Firm Behavior*

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Abstract

Firms make extensive use of operating leases, but unlike other types of debt, their balance sheet value is set by the firm. Using novel information on operating leases from new reporting requirements (ASC 842) we examine firm behavior in valuing these leases, specifically, discount rate choices. We find 20 percent of firms choose higher discount rates (report lower lease-related leverage) than expected. The discount rate chosen reflects the cost of unsecured debt instead of collateralized borrowing. We consider potential motives for these choices. We find that financially fragile and informationally opaque firms choose higher discount rates, apparently to appear healthier.

Keywords: ASC 842, Capital Structure, Discount Rate, Operating Lease, Leverage

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1 Introduction

The average firm makes economically significant use of operating leases, with operating leases representing perhaps the largest source of external finance for many firms (see, e.g., Graham *et al.* (1998) and Eisfeldt & Rampini (2009)). However, despite the prevalent use of these leases, the limited operating lease data reported has been relegated to the footnotes of financial statements. With the new reporting requirements specified in Accounting Standards Update (ASC 2016-02), Topic 842 (Leases) (ASC 842, hereafter), firms are now required as of 2019 to (1) record operating lease assets and liabilities on their balance sheets, and (2) reveal to investors the firm's own estimates of the value, average remaining life, and discount rate of their operating leases, and the presence of renewal or extension options on existing leases. The more granular disclosure on operating leases is important since the value of all types of balance sheet debt in a firm's capital structure is *objectively* determined except for the value of leases which is *subjectively* determined by the firm.

In this paper, we study the subjective choice of the discount rate that managers use in valuing their operating leases, and the array of related operating lease characteristics. Under ASC 842, managers have discretion in choosing an operating lease discount rate, although this rule does provide explicit guidelines on the discount rate choice. Specifically, when possible, firms should use the rate implicit in the lease terms. However, as these implicit rates are rarely available, the discount rate should reflect a firm's incremental borrowing rate on secured debt. That is, "the rate of interest that a lessee would have to pay to borrow on a *collateralized* [emphasis added] basis over a similar term an amount equal to the lease payments in a similar economic environment" (FASB, 2016). This guidance notwithstanding, the incentives for management seem straightforward. If a firm applies an unusually high discount rates to their lease commitments, then unusually low operating lease liabilities and therefore, lower leverage are reported on the firm's balance sheet. As such, we are particularly interested in the extent to which firms use unusually high discount rates in valuing their operating leases.

Ex-ante, it is unclear which type of firm will choose to use a high discount rate since we show that high discount rates are associated with firms that have a low-Tobin's q as well as firms that possess a high-Tobin's q. However, the possible reason(s) for the high discount rate differs with credit and default risk likely driving the high rates for low-q firms. In contrast, growth options are the likely catalyst for high-q firms choosing high discount rate.

To assess whether a firm chooses a lease-related discount rate far above (or below) its normal incremental borrowing rate, we scrape new information on operating leases from annual and quarterly reports filed with the Security and Exchange Commission (SEC) in

the EDGAR database for the universe of firms that have already adhered to the ASC 842 reporting standard. We measure the portion of the discount rate not explained by firm-level risk measures, differences in the remaining lives of operating leases, lease intensity (lease-to-asset ratios), options to extend or renew existing leases, and industry effects. Since credit rating agencies and investors made ad-hoc adjustments to account for operating leases prior to ASC 842, we also compare the actual lease-to-asset, lease-to-adjusted asset, and adjusted-leverage ratios that firms report to comply with ASC 842 with proxies implied by various methodologies proposed by Graham *et al.* (1998), Rauh & Sufi (2012), Cornaggia *et al.* (2013), and Graham & Lin (2018). We use our novel data from EDGAR to compare these ratios at both quarterly and annual frequencies.

Our evidence suggests that 20 percent of firms apply discount rates to their operating lease commitments that are likely too high compared to their normal borrowing rates. This systematically understates the operating lease measures on their balance sheets. We show that firms choose a discount rate for leases that likely reflects the unsecured (or subordinated) cost of debt even though operating lease contracts do not convey asset ownership to the lessee, and lease payments have priority in bankruptcy settings. The lessor also has the right to repossess the underlying asset in the event that the lessee enters bankruptcy.

While firms that select higher-than-anticipated discount rates can report lower lease-related liabilities on their balance sheets, we provide evidence consistent with the view that the equity market appears to recognize and penalize firms who undertake this behavior.. High discount rate firms appear to earn negative abnormal returns in the periods surrounding the revelation of their discount rates (even after holding other firm-level characteristics, such as lease intensity, leverage, and earnings surprises, constant).

Boyd Gaming, a gaming and hospitality company, offers a stark example of what we document in this paper. On March 31, 2019, the company reported a weighted-average discount rate of 9.3 percent for its operating leases. The average coupon of its last five bonds was about 6.1 percent, and the corresponding 5-year corporate yield curve for a BB rated firm at that time was about 5.23 percent (Boyd Gaming Corp had a rating of B+, and its secured debt would have been valued at approximately one notch above its unsecured rating).[1] While the calculations underlying the self-reported 9.3 percent discount rate are not disclosed, the fact that this self-reported discount rate is largely different from and higher than the other discount rates an outside investor may use to value the leasing commitments of Boyd Gaming Corp raises questions about the operating lease data disclosed under ASC 842.

Our data shows that firms, on average, choose to discount future lease payments at approximately 5.6 percent. Discount rate choices, however, mask significant heterogeneity

[1]The yield-to-worst for Boyd Gaming 6.00% 2026-08 USD was 5.58% on April 1, 2019 (S&P Capital IQ).

across firms: rates vary from 0.33% to nearly 14.5%. Similarly, firms use operating leases with remaining lives of about 8 years. Some companies rely more heavily on short-term leases than other firms, perhaps as a result of their asset composition and capital structure decisions. The data also reveal a large degree of heterogeneity *between* and *within* industries. For instance, firms in industries such as finance and utilities rely on low proportions of leases, with lease-to-asset ratios less than 2 percent. These leases are also long-lived, and discounted at relatively low rates of approximately 4.5 percent. This contrasts sharply with the high discount rates used by healthcare companies (7.6 percent), or the heavy reliance on operating leases for firms in the retail and wholesale sector with lease-to-asset ratios of about 16 percent.

For 80 percent of firms, we find that operating lease liability values based on ASC 842 closely match values estimated using approximations from the existing literature (i.e., the methods proposed by Graham *et al.* (1998), Rauh & Sufi (2012), Cornaggia *et al.* (2013), and Graham & Lin (2018)). Perhaps not surprisingly, the main difference among these approximations lies in the discount rate used to value future cash payments. For instance, Graham *et al.* (1998) use a 10 percent discount rate (and does not include a portion of lease payments due to data limitations), and relative to the ASC 842 data, this approximation underestimates lease intensity. On the other hand, Rauh & Sufi (2012) slightly overstate lease liabilities, as they use A-rated yields for all firms.[2]

We consider several motives as to why firms select a higher-than-expected discount rate. One possibility is that operational considerations rather than financial constraints could drive this decision. Jagannathan *et al.* (2016) argue that firms use higher discount rates to forego current profitable opportunities in favor of more valuable future investment opportunities. These firms are not financially constrained, but applying unusually high discount rates means they can accumulate cash in anticipation of very profitable future projects. A further plausible rationale for using a higher than expected discount rate is that these firms attempt to minimize agency and financial distress costs to preserve or increase their unused debt capacity. This might be particularly important for a firm with weak governance and minimal external monitoring (e.g., no public debt and few analysts who follow the firm). Under these circumstances, these firms may also appear to manipulate their earnings to conceal their financial distress, meaning that reported earnings are more likely to be restated. Finally, it is conceivable that firms choose higher discount rates on leases to minimize debt and thereby

[2]We also acknowledge, however, that values based on the new rule may contain distortions and misrepresent economic fundamentals in the context of leases. Therefore, market participants likely benefit from using multiple proxies for operating leases, despite potentially ad hoc assumptions. These potential benefits seem highest in highly levered, riskier, and less profitable firms, where the gains from choosing higher discount rates are likely most significant.

avoid higher equity costs.[3] Of course, these considerations are not mutually exclusive.

We find that self-reported discount rates are highly correlated with most risk measures, especially those most related to default risk (e.g. CDS spreads). Firm characteristics explain most of the differences in weighted-average discount rates. Our benchmark cross-sectional regressions explain almost 50% of the variation in discount rates, with 70% of this explanatory power coming from firm-level characteristics. Specifically, leverage, profitability, and idiosyncratic volatility alone account for 50% of this variation in discount rates. In contrast, variation in operating lease terms – lease-to-asset ratios, remaining lives, and options to renew/extend leases – appears largely to reflect industry effects. For example, while our benchmark cross-sectional regressions explain about 40% of the variation in lease intensity across firms, 87% of this explanatory power is attributed to industry fixed effects. These findings support the view that managers of low-q firms (as opposed to high-q firms) exploit the considerable flexibility in choosing discount rates, whereas the firm's other lease-related choices reflect industry-level practices.

Our study makes several important contributions to the extant literature. In contrast to the prior literature which either uses a survey approach (see Jagannathan *et al.* (2016)) or an approximation method (Cornaggia *et al.* (2013); Graham *et al.* (1998); Graham & Lin (2018); Rauh & Sufi (2012)) to estimate the unobservable discount rate, we are able to directly observe the actual discount rate that a firm uses given the new ASC 842 filing requirement. Using this new information on operating leases, we are able to validate whether approximations in the literature for capitalizing operating leases are in close alignment to the actual amounts that firms must now disclose. We are also able to reexamine which firm and/or industry attributes account for a higher discount rate. In the process, we provide the first detailed characterization of this new operating lease data.

Most importantly, our study provides new insights into the behavior of management with respect to how they choose to represent the level of debt in their capital structure. Managers of low profitability firms who are heavily levered, are riskier, and/or have lower credit quality tend to choose higher discount rates. These same firms tend to be more opaque (followed by fewer analysts; have less institutional ownership; have a lower quality internal information environment) and have worse governance than their low discount rate peers. There is also a greater likelihood that rating agencies and stock analysts tend to underestimate the actual risk for these firms (e.g., we find that analysts produce far less accurate forecasts of the earnings of high discount rate firms). Combined, this evidence implies that firms choosing high discount

[3]Recall that the beta for a firm that has debt is $\beta_L = \beta_U \left[1 + (1-\tau)\frac{\text{Debt}}{\text{Equity}}\right]$ and the cost of equity is $k_e = R_f + \beta_L (R_M - R_f)$. As such, the higher the debt-to-equity ratio, the higher the levered beta (β_L) and in turn the higher the cost of equity, *ceteris paribus*.

rates for their operating leases are also lower quality firms along other dimensions.

A complementary contribution of our study is to assess whether the intended benefits of ASC 842 (i.e., increased transparency in reporting lease assets and liabilities) have the unintended consequence of allowing the most financially fragile firms to appear healthier. That is, we examine whether the discretion provided by ASC 842 allows firms to report significantly lower operating lease liabilities on their balance sheets than the values implied by the traditional methods for capitalizing leases. Our analysis suggests that drawing on firms' self-reported balance sheet lease liabilities should, for the most part (80% of firms), circumvent the need to apply approximations proposed in the literature. However, for the subsets of highly levered and low profitability firms, academics and practitioners may be better off relying on approximations in the literature, and thereby avoiding the effects of the subjective distortions we document in this paper.

Our work provides a new benchmark for the empirical corporate finance literature that considers the role and economic significance of operating leases in firms' capital structures. Our study also adds to a long literature on the economic consequences of changes in accounting standards.

Our paper proceeds as follows. Section 2 discusses the institutional details surrounding ASC 842 versus the approximation methods commonly used in the empirical corporate finance literature. Section 3 describes our sample and data collection methods. We also compare measures delivered by existing operating lease valuation approximations and values delivered under ASC 842. Section 4 provides an in-depth analysis of discount rate choices, the value implications for operating leases, and the role of financial contracting costs and financial distress, while Section 5 studies the determinants of other lease characteristics, while the final section contains a summary of the paper and discussion of additional future research issues.

2 Measuring Operating Leases

2.1 ASC 842: New Operating Lease Disclosure Rules

The foundation of the empirical work reported in this paper is the significant change in how firms must report the value of leases on their financial statements. Under the prior disclosure rule, ASC 840, capital (or finance) leases were reported on firms' financial statements, with data on operating lease commitments only reported in the footnotes to the financial statements. The principal impact of the new standard is that lessees must now recognize a right-of use asset and a lease liability for virtually *every* lease. Starting December 15, 2018, ASC 842 requires publicly-traded firms to report the right-of-asset asset and liabilities associated with

operating leases on the balance sheet, rather than in the footnotes of financial statements. Consequently, total assets and liabilities rise on the balance sheets prepared in accordance with ASC 842. We provide a brief history of the new accounting standard, as well as details on the tests that determine whether a lease is classified as a capital or operating lease, in Section IA.2 of the Online Appendix.

Central to our analysis is the fact that ASC 842 provides guidelines on the discount rate that firms should use to value operating lease commitments. The guidelines state that, when possible, a firm should use the rate implicit in the lease terms (previously discussed). Otherwise, the discount rate should reflect a firm's incremental borrowing rate on secured debt. Spot checks of firms' 10-K/Qs prepared in accordance with ASC 842 indicate that most firms opt to use the incremental borrowing rate when valuing their lease portfolios.[4] For instance, around 50% of these firms *explicitly* mention that the implicit lease rates associated with their operating leases are not readily determinable. Moreover, *all* firms provide broad details on how their incremental borrowing rates are computed. This widespread use of the incremental borrowing rate indicates that at least some discretion is required to value operating lease commitments. Finally, while the value of leases is bounded above by the fair market value of the leased asset, ASC 842 does not require the firm to disclose the market value of the leased asset. This potentially provides a extra degree of discretion to the firm.

With a discount rate in hand, the value of the right-of-use asset is the capitalized value of the sum of the initial measurement of the lease liability and any lease payments made to the lessor at or before the commencement date, less any lease incentives received, and any initial direct costs incurred by the lessee. Consequently, book assets and leverage should rise once the lease accounting standards are implemented (e.g., Palazzo & Yang (2019)). Typical liquidity measures are expected to deteriorate (since current liabilities now include the current portion of operating lease obligations), with no change in profitability measures (provided firms do not reclassify operating leases as finance leases).

Finally, under the new rules, the existence of either a renewal or termination option requires lessees and lessors to determine the length of the lease term at the start of the lease. If the lessee is reasonably certain to exercise the renewal option (or not exercise termination options), this extends the lease termination date and requires that any lease with a likely

[4] PWC (2019, Section 3.3.4.6) discuss the discount rate requirements under the new accounting standard. Where possible, firm should value their leases using "the rate of interest that, at a given date, causes the aggregate present value of (a) the lease payments and (b) the amount that a lessor expects to derive from the underlying asset following the end of the lease term to equal the sum of (1) the fair value of the underlying asset minus any related investment tax credit retained and expected to be realized by the lessor and (2) any deferred initial direct costs of the lessor." The same section of PWC (2019) defines the incremental borrowing rate as "the rate of interest that a lessee would have to pay to borrow on a collateralized basis over a similar term an amount equal to the lease payments in a similar economic environment."

extension period that lasts in total for more than 12 months be reported under the new accounting standards. Under ASC 842, firms must also report the weighted-average life of operating leases. Using the information on operating leases as a result of the new disclosure rules one is now able to observe for the first time the discount rate that a firm chooses, the lease payments, the value of the operating lease as well as their choice of lease terms.

2.2 Approximation Methods for Capitalizing Operating Leases

Investors and ratings agencies have long recognized the importance of operating leases. Historically these agents have approximated the balance sheet value of operating leases using limited information about lease commitments reported in the footnotes of financial statements. Consequently, the new data disclosed under ASC 842 provides us with an *ideal* setting to examine how well these widely adopted approximation methods have performed.

A number of empirical proxies for the capitalized value of operating leases arose as a result of the older ASC 840 accounting standard. This older standard only required firms to report limited information related to leases in the footnotes of their financial statements. Specifically, firms only had to report the minimal rental commitments due in (i) the current fiscal year, (ii) each of the next five fiscal years, and (iii) all fiscal years thereafter reported as a single, lump sum figure. Moreover, researchers also had to specify the discount rate used to calculate the present value of these lease payments. Consequently, by making different assumptions regarding the distribution of operating lease cash flows *and* different assumptions regarding the appropriate discount rate, these empirical proxies can arrive at significantly different estimates of operating lease liabilities.

Section IA.3 in the Online Appendix provides details on four of the most common empirical proxies for the capitalized value of operating leases. The methods we consider are those outlined by Graham *et al.* (1998), Rauh & Sufi (2012), Cornaggia *et al.* (2013), Graham & Lin (2018). Beyond describing the key differences in the assumptions underlying these methodologies in the Online Appendix, Section 3.3 provides a detailed comparison of how these empirical proxies compare to the balance sheet values of operating leases that firms are now required to disclose under ASC 842.

3 Data and Summary Statistics

3.1 Data Sources and Sample

We download all annual and quarterly reports (Form 10-K and 10-Q) filed with the Security and Exchange Commission (SEC) in the EDGAR database. We scrape these filings

for information related to operating leases from the Balance Sheet and the Notes to Financial Statements, which contain supplemental cash flow and balance sheet information related to leases (both operating and finance). In particular, we extract the value of the lessee's right to use the assets underlying their operating leases, the present value of the lessee's discounted operating lease payments (which includes current operating lease liabilities, and long-term operating lease liabilities), the weighted-average remaining lease term for operating leases, any option to renew or extend implicit in the lease contract, and the weighted-average discount rate for operating leases. We also gather the current portion of operating leases expensed on the income statement (for the first m months of the current fiscal year as of the filing date), and the approximate future remaining lease payments as of the filing date (in excess of one year due in the remainder of the fiscal year following the latest fiscal year).

As an example of the data we gather, Figure 1 shows the supplemental balance sheet information related to leases for Microsoft as of September 30, 2018. Operating lease liabilities (i.e. the present value of future lease payments) stood at $7,024 million, with a weighted-average remaining lease term and discount rate of 7 years and 2.8 percent, respectively.

We start with 19,586 annual and quarterly filings that report positive figures for the present value of operating leases. We then merge this operating lease data with CRSP and Compustat, which leaves us with 17,724 firm-year-quarter observations. These represent 3,795 unique firms from December 31, 2017 to April 30, 2020. We drop observations with missing values for both the weighted-average discount rates and the maturity for operating leases, and only retain the first year-quarter observation in which a firm adopts the new lease rule. This filtering procedure leaves us with 3,550 firm-year-quarter observations. Approximately 72 percent of firms adopt the new rule as of March 31, 2019. A handful of firms (e.g. Microsoft Corporation, Target Corporation, etc.) are early adopters, while about one-fourth of firms report after the first quarter of 2019. Table 1 summarizes the sample construction and timing of adoption of the new ASC 842 rule.

Stock prices and firm characteristics are obtained from CRSP and Compustat, respectively. We compute idiosyncratic volatility and stock betas using 2 years of monthly stock returns and a minimum of six observations (i.e. six months). We compute a measure of the cost of debt (K_d) using bank loan data from DealScan. Implied-CDS spreads come from Bloomberg. The number of analysts following a firm is from I/B/E/S, and we compute a measure of standardized unexpected earnings following Livnat & Mendenhall (2006). Data on institutional ownership is from Thomson-Reuters S-34, while measures of discretionary accruals and earnings announcement speed follow Kothari *et al.* (2005) and Gallemore & Labro (2015), respectively. The Online Appendix provides detailed variable descriptions.

3.2 Overview of Operating Lease Characteristics

In this section we describe the use of operating leases within our sample of 3,550 firms, and across industry groups. We focus on six key variables: (i) the capitalized values of operating leases, (ii) the right-of-use asset of operating leases, (iii) the proportion of capitalized leases to adjusted assets, which is a firm's total assets *plus* the value of the right-of-use asset associated with the firm's operating leases,[5] (iv) the weighted-average discount rate used to value operating lease commitments, (v) the weighted-average life of operating leases, and (vi) any options to renew or extend the existing operating leases. Our focus on these six variables where disclosure is now required provides us with the unique opportunity to *observe* directly the capitalized value of firm-level operating leases. Consequently, in contrast to the prior literature, we can generate insights into the use of operating leases across firms and industries without the need to *estimate* the value of leases using any of the competing methods we discussed in Section 2.

Panel A of Table 2 provides summary statistics associated with the observed values of these leasing variables across the firms in our sample. The average (median) firm relies on about \$243 (\$34) million worth of operating leases that account for 5.22% (2.66%) of the firm's total adjusted assets. This lease ratio is similar to, albeit somewhat lower, than the 8% figure reported in Graham *et al.* (1998). The mean discount rate used to compute the present values of these lease obligations is 5.66% per annum, but with a range from 0.33% to 14.45% per annum. The mean life of operating lease commitments is 8.24 years, although the reported average life of the operating leases ranges from less than one year to 53 years. Finally, 36% of firms in our sample have lease agreements that contain options to renew or extend their original terms.

While both the lease-to-assets ratio and the weighted-average life of leases are relatively right skewed, the distribution of discount rates reported by firms is more symmetric. Figure 2 plots the densities of the lease-to-asset ratio (top left panel), weighted-average discount rate (top right panel), and weighted-average life of operating leases (bottom left panel) and highlights these data features. The figure also displays the average discount rate reported by firms as a function of the average life of operating leases in the bottom right panel. The bottom right panel shows that while firms assume discount rates of approximately 7% per annum for leases with an average life of three years or less, the average discount rate is lower for longer-lived leases. For instance, the mean discount rate associated with 20- and 30-year

[5] ASC 842-20-30-5 states that at the commencement date, the value of the right-of-use asset consists of (a) the amount of the initial measurement of the lease liability, (b) any lease payments made to the lessor at or before the commencement date, minus any lease incentives received, and (c) any initial direct costs incurred by the lessee.

leases is about 5.5% (5.75%) per annum, respectively.[6]

Panel B of Table 2 describes the accounting and return-based characteristics of the firms comprising our sample. While the average firm is 23 years old and owns roughly $9.4 billion of assets, substantial heterogeneity exists with respect to both firm age and size. The smallest (largest) firm owns $9 million ($221 billion) of assets, and the youngest (oldest) firm is one year (70 years) old. While the accounting profitability of the average firm, as measured by return on assets, tends to be negative, the median leverage ratio is only 0.27. This indicates that most firms only have a moderate amount of leverage in their capital structures. The mean (median) tangibility ratio is 0.22 (0.13), and the mean (median) Tobin's q of firms is 2.07 (1.39). Lastly, firms have a median idiosyncratic volatility of 38% per annum associated with their stock.

In Table 3 we breakout the summary statistics related to the total capitalized value of operating leases, lease-to-asset ratio, weighted-average discount rate, weighted-average life of leases, and option to extend or renew existing leases *across* Fama and French 12 industry groups. The primary takeaway from this table is that there is a large degree of heterogeneity in the use, cost, and life of operating leases across industries. For instance, firms in industries such as finance and utilities tend to rely on low proportions of operating leases in their capital structures, and exhibit average lease-to-asset ratios of 0.018. The operating leases of these finance and utilities firms are generally long lived, with mean lives of 13 years, and are discounted at relatively low discount rates of 4.40% per annum and 4.78% per annum, respectively. In contrast, 16.3% of the assets of retail firms are obtained via operating leases that are shorter lived than those of financial and utility firms, lasting 8.67 years on average, and are also discounted at a higher mean discount rate of 5.69% per annum. Finally, almost half (two-fifths) of healthcare (wholesale & retail) firms in our sample rely on options to extend or renew existing leases, while only 24% in the oil & gas, and chemical industries.

Figures IA.3.3, IA.3.4, and IA.3.5 in the Online Appendix extend the previous analysis by showing the distributions of the lease ratio, weighted-average discount rate, and weighted-average life of leases *within* each industry. The primary takeaway from these figures is that in addition to the vast degrees of heterogeneity *across* industry groups, there is also a large amount of variation in each variable of interest *within* industry groups.

Overall, the summary statistics in this section show that there is a large degree of variation in lease ratios, discount rates, and lengths of operating leases both within and across industries. Since our analysis is based on the *observable* values of operating leases reported

[6]The downward sloping nature of the bottom-right panel of Figure 2 holds true when we plot median discount rates across weighted-average life buckets. However, downward slopes seem to be a feature of non-rated firms (see Figure IA.3.1 in the Online Appendix). We also find that the shape of the term structure varies across industry groups, as depicted in Figure IA.3.2 in the Online Appendix.

on firms' balance sheets in accordance with ASC 842, it is useful to consider whether our new understanding of operating lease activity in the United States aligns with, or differs from, the results of prior studies that are based on *estimated* values of operating leases, such as the work of Rauh & Sufi (2012). We will now address this question as a prelude to examining the firm's decision on which discount rate to use to capitalize operating leases.

3.3 Actual vs. Estimated Operating Lease Values

As previously noted, ASC 842 requires firms to capitalize most of their leases on their balance sheets rather than relegate them to the footnotes of financial statements as was allowed under ASC 840, the previous standard. In this section we compare *actual* lease-to-asset ratios reported by firms in accordance with ASC 842 to proxies for the lease-to-asset ratios implied by various methodologies proposed in the prior literature.

In contrast to the data on the capitalized value of operating leases considered in this study, which are drawn from the 10-K/Q filings of listed corporations, prior studies *estimated* the capitalized values of firms' operating leases by making assumptions along two main dimensions: (1) the magnitudes of the future commitments related to firms' leases, and (2) the discount rate applicable to future lease payments. Table 4 not only compares lease ratios across methodologies, but also considers how each proxy performs at both a quarterly and an annual frequency, which our *novel* data allow.

Table 4 compares the mean and median values of the *actual* capitalized values of operating leases, obtained via the new ASC 842, to the *estimated* capitalized values of operating leases calculated using each of the four methodologies described in Section 2.2. This comparison allows us to determine whether our assessment of the operating lease values on the balance sheet changes as a result of the new ASC 842 accounting standard. We not only compare the standard lease-to-asset ratio across methodologies at both the quarterly and annual frequency in Panel A of Table 4, but also examine the adjusted lease ratios in Panel B and the adjusted leverage ratios of firms in Panel C. This examination of adjusted lease and leverage ratios recognizes that operating leases not only commits firms to future lease payments, but also provide firms with right-to-use assets.[7]

Panel A of Table 4 shows that when lease-to-asset ratios are computed using quarterly 10-Q data, the mean (median) lease ratios of 0.063 (0.027) obtained after ASC 842 takes effect is most similar to the ratios computed using the methodology proposed by Graham & Lin (2018), who use a time-varying firm specific discount rate (0.067 and 0.027, respectively). On average, the methodologies of Graham *et al.* (1998) and Cornaggia *et al.* (2013) underestimate

[7]We compute the adjusted leverage ratio as book leverage plus the present value of operating lease liabilities, scaled by the total value of assets plus the right-of-use asset of operating leases.

the reported lease ratio, as they discount lease commitments at very high rates (10 percent). On the other hand, the Rauh & Sufi (2012) method overestimates the reported lease ratio, as commitments are discounted at rates based on the yields on A-rated corporate debts. Panel B and C show that results related to the quarterly and annual adjusted lease ratio and adjusted book leverage are similar to those related to the standard lease ratio.

While the aforementioned traditional methods of capitalizing operating lease payments produce estimates of the values of leases that are, on average, close to those reported by firms in accordance with ASC 842, there is an important distinction to keep in mind. The traditional methods provide *objective* estimates of the balance sheet values of operating leases that only differ in terms of (i) the discount rate used to value lease payments (which is either a constant rate, or observable from market prices), and (ii) the assumptions employed to split the "thereafter" portion of operating leases into a series of future payments with a specific maturity. In contrast, the balance sheet values of operating leases self-reported by firms complying with ASC 842 are somewhat *subjective* since firms do not disclose complete details on their lease portfolio and there is discretion in choosing the discount rate used to value operating lease obligations (e.g., the incremental borrowing rates used to value leases).

Given the discretion that firms have in preparing their financial statements to comply with ASC 842, the next sections examine the relation between firm characteristics and lease contractual terms. Specifically, we investigate why are firms more likely to take advantage of the discretion granted by ASC 842 to capitalize their leases. We examine various motives for this behavior. In the process, we also investigate the degree to which firm characteristics and/or industry attributes are related to firm behavior (e.g., do less profitable firms use higher discount rates to value their leases?). These analyses provide market participants and policy makers with the first look into whether the intended benefits of ASC 842 (i.e., increased transparency in reporting lease assets and liabilities) also have an unintended cost of granting the most fragile firms with the opportunity to report significantly lower operating lease liabilities on their balance sheets than the values implied by the traditional methods for capitalizing leases.

4 Choice of the Lease Discount Rate

4.1 Basic Evidence

ASC 842 requires firms to use the rate implicit in the lease to discount future lease payments. Whenever this rate is unavailable, firms may use the incremental borrowing rate, which is the rate that a firm could borrow at on a *secured* basis with terms similar to the

terms specified in the lease contract. Although we are unable to systematically to distinguish between *implicit* and *incremental borrowing* rates, spot checks of 10-K/Q filings suggest that most firms use the latter when discounting future cash flows. For instance, in their 10-K filing for the fiscal year ended September 26, 2020, Apple states that the discount rates they use for leases "...are generally based on estimates of the Company's incremental borrowing rate, as the discount rates implicit in the Company's leases cannot be readily determined."[8]

While our spot checks of 10-K/Q filings find that (1) approximately 50% of firms *explicitly* state that the implicit lease rates underlying their lease portfolios are unavailable, and (2) essentially all firms acknowledge that they use their incremental borrowing rate to value operating leases, we also note that there is a large amount of variability associated with *how* firms arrive at their incremental borrowing rates. For instance, in their 10-K filing for the fiscal year ended December 31, 2019, Windstream Holdings, Inc. states that their incremental borrowing rates are based on "...*unsecured rates* [emphasis added], adjusted by adding the average credit spread percentage of its traded debt to the risk-free rate... ."[9] Moreover, Chipotle Mexican Grill writes that since they have no secured or unsecured debt outstanding, the company estimates its incremental borrowing rate "...based on prevailing financial market conditions, comparable company and credit analysis, and *management judgment* [emphasis added]," and that their reported value of operating lease assets and liabilities could "differ materially" if the estimated incremental borrowing rate were changed.[10]

the large amounts of discretion firms have in selecting an incremental borrowing rate to value their operating leases, we examine how these discount rates differ across firms. We begin with a simple but illustrative univariate analysis in which we consider the discount rate as a function of a single firm-level characteristic. Figure 3 depicts the mean values of weighted-average discount rates across deciles of firm characteristics. While total assets and firm age exhibit a monotonically decreasing pattern, discount rates increase with book leverage, idiosyncratic volatility, and deteriorating credit ratings. Most interestingly, Tobin's q exhibits a J-curve or smile effect: discount rates decrease with higher investment opportunities for low-q firms, and subsequently increase as we move to higher q deciles. This suggests that both low-q firms and high-q firms have high discount rates. The high discount rate for low-q is likely associated with credit and default risk. In contrast, growth options are the probable reason for the high discount rate associated with high-q firms.

[8]See Apple Inc.'s 10-K filing for the fiscal year ended September 26, 2020, at https://www.sec.gov/ix?doc=/Archives/edgar/data/320193/000032019320000096/aapl-20200926.htm.

[9]See the 10-K filing for Windstream Holdings, Inc. for the period ended December 31, 2019 at https://www.sec.gov/ix?doc=/Archives/edgar/data/1282266/000128226620000022/a201910k.htm.

[10]See the full 10-K filing for the period ended December 31, 2019 for Chipotle Mexican Grill at https://www.sec.gov/ix?doc=/Archives/edgar/data/1058090/000105809020000010/cmg-20191231x10k.htm.

To more formally examine the extent to which discount rates vary across firms, we employ the following OLS specification (with some variations):

$$Y_{i,t} = \phi_j + \lambda_t + \beta X_{i,t} + \Gamma' Z_{i,t} + \varepsilon_{i,t}. \tag{1}$$

Here $Y_{i,t}$ represents a firm's self-reported weighted-average discount rate, ϕ_j represents Fama-French 30 industry fixed effects that control for time-invariant unobservable industry-level shocks (culture, regulatory risk, etc), and λ_t represents year-quarter fixed effects that control for common shocks to firms in a given year-quarter. We also include the weighted-average remaining life, the lease-to-asset ratio, and the option flag dummy as controls ($X_{i,t}$). $Z_{i,t}$ is a vector of firm-specific controls that features the natural logarithm of total assets, book leverage, profitability, tangibility, Tobin's q, idiosyncratic volatility, the natural logarithm of firm age, S&P (Standard & Poor's) ratings, and a dummy variable that equals one if the firm is not rated, and zero otherwise. The Online Appendix provides a further description of each variable.

Table 5 reports the determinants of weighted-average discount rates in a multivariate setting. Column (1) controls for the weighted-average life of operating leases, the option dummy, and the lease-to-asset ratio. We find a positive relationship between lease characteristics and discount rates, while controlling for industry and time fixed effects.[11,12] Operating leases that include renewal or extension options are associated with higher discount rates, echoing findings in the literature on bank loan or corporate debt with embedded options. This pronounced effect translates to a 17 basis points increase in discount rates. Given the unconditional average of 5.66 percent for the weighted-average discount rates, the marginal effect of an embedded option amounts to about a 3.5 percent increase in the discount rate.

Discount rate choices are also related to firm characteristics. Echoing the results in Figure 3, larger and older firms choose lower discount rates. Highly levered firms are associated with larger discount rates: a 10% increase in leverage (e.g., from 6% to 6.6%) is associated with more than a 25% increase in the disclosed discount rate. Since the unconditional mean discount rate is 5.66%, this translates into a 1.4 percentage point increase in the discount

[11] A simple regression of discount rates on maturities and option dummies confirms the pattern of Figure 2. In fact, without controlling for industry fixed-effects and other firm variables we estimate a coefficient of about -0.023 on the weighted-average remaining life. Lease characteristics (maturities and options) explain about 3 percent of the cross-sectional variation in discount rates. When we control for industry effects, the adjusted-R^2 increases to about 22 percent.

[12] Industry effects have long been associated with debt and leasing policy. Bradley *et al.* (1984) find persistent inter-industry differences in leverage ratios, even after controlling for other explanatory variables. Likewise, Ang & Peterson (1984) document inter-industry variation in capital lease intensity, and Sharpe & Nguyen (1995) do the same for operating leases. Graham *et al.* (1998) and Eisfeldt & Rampini (2009) also employ industry controls.

rate (from 5.66% to 7.08%). Similarly, an increase in firm leverage from the 25^{th} to the 75^{th} percentile of leverage corresponds to a two-thirds increase in the discount rate. Columns (2)-(5) control for additional firm characteristics and show that more profitable firms, and firms with more growth opportunities (higher Tobin's q) have lower discount rates. Moreover, lower rated firms, and those with higher idiosyncratic volatility, are associated with higher discount rates.

While the specification underlying column (5) of Table 5 shows that we can explain almost 50% of the variation in self-reported discount rates, the table does not report the amount of variation accounted for by each individual predictor. To provide more granularity on the determinants of discount rate choices, Table IA.3.6 in the Online Appendix reports a variance decomposition of the characteristics and fixed effects included in Table 5. The variance decomposition shows that half of the explanatory power comes from three firm-level characteristics: leverage, profitability, and idiosyncratic volatility. As we show in Section 5, this discount rate result stands in stark contrast to the determinants of the commonly studied lease-to-asset ratio. Eighty-seven percent of the variation in the lease-to-asset ratio is attributed to industry fixed effects, while only 19 percent of the variation in discount rates is explained by industry effects.

The fact that (i) variation in firms' self-reported weighted-average discount rates depends so heavily on firm-level characteristics (see Table IA.3.6 of the Online Appendix), and (ii) less profitable, more levered, and more risky firms are associated (i.e. *choose*) significantly higher discount rates when capitalizing their lease commitments to comply with ASC 842 raises a concern: the rules related to ASC 842 may provide firms with significant discretion in selecting the discount rate used to value their operating lease commitments. In particular, less profitable and more highly levered firms may value their operating leases with a significantly *higher* discount rate than outside investors and analysts use, thereby reporting significantly *lower* operating lease liabilities than might otherwise be expected. As we show in Section 4, although firms complying with ASC 842 now provide market participants with the values of their operating lease liabilities on their balance sheets, some firms appear to manipulate the valuation of these operating lease commitments to lower their reported liabilities.

Overall, the results of Table 5 (and Table IA.3.6 of the Online Appendix) show that firm characteristics have a strong correlation with the rates firms choose to discount their lease commitments. This suggests that most of the differences we observe in discount rates depend on firm attributes rather than industry- or lease-specific characteristics. As we subsequently show in Section 5, industry affiliation and lease characteristics, rather than firm characteristics, account for most of the variation we observe in weighted-average lives, option clauses, and lease-to-asset ratios. These findings highlight the significance of firm choices

in how they choose to calculate the present value of future lease payments (and therefore the balance sheet values) versus the industry-based regularities that firms mimic in other dimensions of leasing activity. As the example of Boyd Gaming discussed in our introduction suggests, at least some firms operating under ASC 842 may choose a discount rate for leases that is inconsistent with the firm's normal incremental borrowing cost.

4.2 Do (Some) Firms Discount Their Leases Too Much?

4.2.1 Measuring Abnormal Discount Rates

To assess the extent to which the firm's self-reported discount rate for operating leases deviates from the firm's latent incremental cost of borrowing, we use several measures of firm-level risk as proxies for the incremental cost of borrowing including the cost of bank debt, the cost of equity, the ratio of total interest expenses to total short- and long-term debt (XINT), and the implied-CDS spread drawn from Bloomberg. The Online Appendix describes these variables. A self-reported discount rate for operating leases that differs widely from other measures of firm level-risk is a signal that a firm might opportunistically or strategically use its significant discretion in capitalizing its operating leases. We also compute the implicit discount rate that reconciles the capitalized value of a firm's leases, as required by ASC 842, with the future operating lease commitments, as determined previously by ASC 840. We refer to this implicit discount rate as the firm's internal rate of return (IRR) because this rate is obtained as the solution to the following non-linear optimization problem:

$$OpLeases_i = \sum_{t=1}^{5} \frac{MRC_{i,t}}{(1+r_i)^t} + \frac{MRCA_i}{N_i} \times \frac{1}{r_i}\left[1 - \frac{1}{(1+r_i)^{N_i}}\right] \times \frac{1}{(1+r_i)^5}. \tag{2}$$

Here, $OpLeases_i$ represents the capitalized value of firm i's operating leases, as required by ASC 842, $MRC_{i,t}$ denotes the minimum lease commitment of firm i in year t, as required by ASC 840, $MRCA_i$ is the minimum value of all lease commitments remaining after year $t+5$, N_i denotes the remaining life of the firm's operating leases after year $t+5$, and r_i is the implicit discount rate we solve for. When computing r_i we obtain N_i by dividing $MRCA_i$ by $MRC_{i,5}$ (or the last minimum lease commitment available) and rounding the result to the nearest year, and then assuming that the remaining lease commitments are equally distributed over the remaining life of the lease.[13]

[13]Note that this IRR calculation is made possible by the fact that ASC 842 mandates that firms must now disclose the present value of their lease liabilities (the left-hand side of equation (2)). Previous accounting standards (i.e., ASC 840) only required firms to disclose their lease-related cash flows (the right-hand side of equation (2)) in the footnotes of their accounting statements, leaving the present value of lease liabilities unknown. By *expanding* the amount of lease-related information that firms must now include in their financial reports, the data underlying ASC 842 allows us to find the implicit discount rate that equates the present

Panel A of Table 6 reports summary statistics associated with these variables. The average firm has a total interest expenses as a fraction of total debt (K_d^{XINT}) of 5.65%, the cost of bank loans over the LIBOR (K_d^{Loans}) of 2.08% (2.04%), and a CDS spread of about 1.5% on 5-year corporate debt. The mean (median) cost of equity is 9.87% (9.15%). The mean (median) firm-level IRR obtained via equation 2 is 5.70% (4.89%) per annum, compared to a mean (median) weighted-average self-reported discount rate of 5.66% (5.00%) (see Table 2). Although the IRR calculation provides a simple method to obtain the discount rate that reconciles a firm's operating lease payments with the value of its operating leases, this method also has a drawback. Specifically, since the IRR calculation assumes that each cash flow is "reinvested" at the same *constant* rate, a comparison of the IRRs to self-reported weighted-average discount rates may be misleading if firms rely on different term structures of *time-varying* rates to capitalize their lease payments. For this reason, we also compare the self-reported discount rate to other market- and accounting-based measures.

Panel B of Table 6 reports pairwise correlations between discount rates and firm-level risk measures. As expected, discount rates correlate positively with all firm-level risk measures. Interestingly, the largest correlation (besides the IRR) is between discount rates and CDS spreads (0.44). This suggests that firms choose a discount rate for leases that likely reflects the *unsecured* (or *subordinated*) cost of debt, loading more heavily on credit default risk than it is the case for secured debt. This finding is of great interest since operating lease contracts represent a form of secured debt with the lessor (not the lessee) owning the asset, and lease payments have priority in bankruptcy settings.

We formally test the relationship between the weighted-average discount rate and firm-level risk measures using a regression framework. The columns of Table 7 show OLS regression coefficients, standard errors, and adjusted-R^2 across the different risk measures. Panel A reports estimates of a cross-sectional regression without firm-level controls, while Panel B controls for a wide range of firm characteristics. Panel A finds a positive and significant relationship between the weighted-average discount rate and firm-level risk measures. Moreover, the adjusted-R^2 of Panel A mirrors the unconditional correlations (ρ^2) across measures in Table 6; Panel B adds firm characteristic as controls. A positive and significant relationship continues to exist across firm-level risk measures, although (as expected) the magnitudes are smaller. Interestingly, the adjusted-R^2s across all specifications increase to comparable levels once we control for firm characteristics. The opposite is true for Panel A, where we observe more heterogeneity in explanatory power across regressions. Overall, Table 7 show that firm-level risk measures are important determinants of discount rate choices.

The previous analyses confirm that, on average, riskier firms tend to use higher discount

value of lease liabilities a firm reports to its future lease-related obligations.

rates when valuing their operating lease liabilities. *Ceteris paribus*, riskier firms tend to report a lower value for their operating lease liabilities on their balance sheets when complying with ASC 842 than less risky firms. To provide more granularity on the extent to which firms may use *significant* discretion in choosing a discount rate for operating leases that is not in accordance with the rate that an outside investor or analyst may use, we construct *abnormal* discount rate measures. By construction, our measure captures the portion of the weighted-average discount rate that is not explained by firm-level risk measures, differences in weighted-average remaining lives of operating leases, lease intensity, options to extend or renew existing leases, and industry effects. We run the following cross-sectional regression within each industry (j):

$$DR^{j}_{i,t} = \beta Risk_{i,t} + \Gamma' X_{i,t} + \varepsilon_{i,t}, \quad \text{for} \quad j \in [1, ..., 30]. \tag{3}$$

Here, $Risk_{i,t}$ is a measure of firm-level risk for firm i at time t, $X_{i,t}$ is a vector of lease-specific characteristics (e.g., a dummy variable equal to one for firms with an option to renew their leases), and $\varepsilon_{i,t}$ is the residual, i.e. the unexplained part of discount rates. By estimating this regression within each industry, we allow the sensitivities of firm-level risk and lease-specific characteristics to differ across industries (recall from Table 3 that there is a large amount of inter-industry heterogeneity in lease characteristics).

We do not explicitly control for leverage in Equation 3 for two reasons. First, as we explain below, we are interested in exploring the conditional association between firm-level characteristics (e.g., leverage) and abnormal discount rates. Thus, by explicitly controlling for leverage in Equation 3, we are unable to examine the distribution of abnormal discount rates as a function of leverage (or other firm-level characteristics such as distance-to-default). Second, although leverage is not *explicitly* included in Equation 3, the effects of debt are *implicitly* reflected in the firm-level risk measures included on the right-hand side of the regression. This is because more indebted firms typically have higher costs of debt and CDS spreads.

To highlight the economic content of *abnormal* discount rates, consider the top-left panel of Figure 4. The figure shows how the abnormal component of the self-reported discount rate evolves as a function of leverage after removing both industry- and time-specific effects, and controlling for the IRR implicit in the firm's leasing schedule.[14] For firms in the 5^{th} percentile of leverage, a 1% increase in leverage is associated with an abnormal discount rate

[14] We perform conditional quantile regressions on the residuals from Equation 3 as a function of a specific firm characteristic (e.g. leverage) and rely on the bootstrap method with 1,000 draws to estimate standard errors. Figure 4 plots quantile regression estimates of slope coefficients for q = [.05, .10, .20, .25, .50, .75, .80, .90, .95]. The shaded blue area depicts 90 percent confidence intervals for the quantile regression estimates.

that is less than 1% higher than predicted. In contrast, for firms in the 95^{th} percentile of leverage, the same increase in leverage is associated with an abnormal discount rate that is about 3% higher than predicted. Thus, more highly levered firms discount their lease liabilities at *abnormally* higher than anticipated discount rates relative to their less levered peers. Since ASC 842 allows firms with abnormally high discount rates for leases to add abnormally understated operating lease liabilities to their balance sheets, this figure identifies an issue for researchers who might rely on the new data. Operating lease liabilities reported by firms complying with ASC 842 *may* differ markedly from the value of leases implied by other conventional methods for capitalizing leases. These differences may be particularly pronounced for lower-quality firms. We obtain the same conclusion when we use multiple measures of firm-level risk, and when we partition our sample into quantiles based on the distance-to-default rather than leverage metric (see Figure 5).

4.2.2 Characteristics of High (Abnormal) Discount Rate Firms

Firms' discount rate choices are directly linked to the self-reported and estimated values of firms' operating lease liabilities. More specifically, we show that about 20 percent of firms use *abnormally high* discount rates to value their operating lease liabilities. *Abnormally understated* lease liabilities are consequently reported on their balance sheets vis-à-vis the estimated values of lease liabilities based on the methods of Rauh & Sufi (2012) and Graham & Lin (2018).[15] In contrast, there are no systematic differences between the self-reported and estimated values of operating leases for the remaining 80 percent of firms in our sample.

To arrive at this result, we first partition our sample of the first-time adopters of ASC 842 into quintiles based on each firm's *abnormal* discount rate, which we estimate using Equation 3. To reduce estimation errors, we average the abnormal discount rate obtained using three different risk measures (cost of bank loans, cost of equity, and interest expenses). We refer to this average abnormal discount rate as $\overline{\varepsilon_{i,t}^{q}}$. Next, we compare the lease ratios computed using the *actual* capitalized value of operating leases (from ASC 842) to two *estimates* of the balance sheet value of operating leases.

Estimation results are reported in Panel A of Table 8. The panel reports the mean value of the lease-to-asset ratio and the lease-to-adjusted asset ratio across the quintiles of *abnormal* discount rates. To assess whether the average self-reported lease liability differs from the average imputed lease liability according to each methodology, we report t-statistics that control for industry effects in square brackets. The main conclusion from Panel A of Table 8 is that the lease-to-asset and the lease-to-adjusted asset ratios computed using Rauh & Sufi

[15] We focus on these two methodologies as they employ time-varying and/or risk-adjusted discount rates, rather than a fixed rate as in Graham *et al.* (1998) and Cornaggia *et al.* (2013) (recall Table 4).

(2012) and Graham & Lin (2018) are only statistically different from the ratios reported by firms preparing their financial statements in accordance with ASC 842 values only for the top quintile of *abnormal* discount rate firms. This suggests that approximately 20 percent of firms apply discount rates to their operating lease commitments that are probably too high compared to their *normal* borrowing rates. Since firms with abnormally high discount rates are typically those with high leverage and low distances-to-default (recall Figures 4 and 5), this analysis delivers a dire takeaway: the most financially fragile firms may be systematically understating the value of their operating lease liabilities on their balance sheets.

The fact that the self-reported operating lease liabilities of the most fragile firms appear undervalued is not driven by differences in lease characteristics across the abnormal discount rate quintiles. That is, the large difference between the reported and estimated lease-to-asset ratios of the 20% of firms with the most abnormal discount rates does not arise because these firms have fundamentally different operating leases from the 20% of firms with the least abnormal discount rate. Our measure of abnormal discount rates in Equation 3 not only controls for numerous lease characteristics, but we also verify that there are no differences in characteristics such as lease life or the option to extend leases between quintiles. Moreover, we verify that there are no differences across quintiles one and five in terms of asset tangibility, the intensity of capital lease usage, and the cost of capital leases. This highlights that the abnormal discount rate measure is unlikely to be correlated with heterogeneity in the types of assets held across firms (e.g., the possibility that firms with more abnormal discount rates own more intangible assets that are difficult to value).

To provide greater insight into the types of firms that choose abnormally high discount rates, the bottom portion of Table 8 reports some of the characteristics of the firms underlying each abnormal discount rate quintile. There are a number of stark differences between lessees that choose low versus high abnormal discount rates. For example, the managers of firms that use a relatively higher discount rate are significantly more entrenched (according to the "E" index of Bebchuk *et al.* (2009)), and use significantly more discretionary accruals. These high discount rate firms not only have less *internal* oversight, but they also have less *external* oversight than firms that use a low discount rate: institutions investor own 17% less of the equity of high discount rate firms relative to low discount rate firms, and these same firms are followed by *half* the number of analysts as their low discount rate counterparts. Moreover, this smaller set of analysts produce significantly inferior earnings forecasts for the high discount rate firms relative to the low discount rate firms. The average standardized unexpected earnings (SUE) of the high discount rate quintile provides evidence of this with a SUE that is greater in magnitude than the average SUE associated with the low discount rate quintile. Finally, high discount rate firms have a lower quality *internal* information

environment; these firms take roughly two extra weeks to report their quarterly earnings to the market (see, e.g., Gallemore & Labro (2015)).

These findings reinforce the concern that the latitude ASC 842 provides firms in valuing their operating leases has an unintended consequence of providing firms with already weak balance sheets an additional means to appear healthier by reporting lower lease liabilities.

4.2.3 Value Implications of High Discount Rates

A natural question which arises is whether the market recognizes and penalizes this type of firm behavior especially since we earlier noted that credit rating agencies and investors made ad-hoc adjustments to account for operating leases prior to ASC 842. A potential problem with directly addressing this issue is that the information on discount rates is reported in 10-K/Q filings which also contains the disclosure of other information which might mitigate against any adverse stock price reactions. Although we are unable to disentangle and isolate the effect of the discount rate revelation from the effects of other information released to the market as part of the same 10-K/Q filings, we nevertheless perform an event study to get a better sense of the potential value implications of reporting high (abnormal) discount rates. As such our results represent circumstantial evidence at best.

To implement the event study, we first compute the cumulative abnormal returns (CARs) of firms over the 11-day period surrounding their first accounting disclosure prepared in accordance with ASC 842. The CARs for firm i at time t, which we denote by $CAR_{i,t}$, are calculated relative to the CAPM. We then project the CARs of each firm on (i) a measure of each firm's (abnormal) discount rate, and (ii) a comprehensive set of control variables proposed by the prior literature as predictors of abnormal returns surrounding accounting releases. The specific regression we estimate is

$$CAR_{i,j,t} = \phi_j + \lambda_t + \beta DR_{i,j,t} + \mathbf{\Gamma}' Z_{i,j,t} + \varepsilon_{i,j,t}, \tag{4}$$

where $DR_{i,t}$ denotes the reported (or abnormal) discount rate of firm i on filing date t, ϕ_j (λ_t) represent industry (date) fixed effects, and $Z_{i,j,t}$ is a comprehensive set of controls. The control vector includes lease intensity, the weighted-average life of operating leases, the natural logarithm of total assets, book leverage, Tobin's q, tangibility, and the SUE associated with each firm's 10-K/Q filing. We report these results in Table 9.

The results indicate that firms that disclose higher (abnormal) discount rates appear to earn significantly lower abnormal returns in the period surrounding their accounting reports. This negative association between CARs and discount rates may, for example, arise if investors interpret a higher-than-anticipated discount rate as a higher than expected cost

of capital for the firm. Specifically, the first three columns (last three columns) show that a 1% higher discount rate (abnormal discount rate) is associated with a 27 to 38 basis points (22 to 33 basis points) lower abnormal return in the 11-day period surrounding the firm's first 10-K/Q filing prepared in accordance with ASC 842 on average.

Columns (3) and (6) show that the economic magnitude and statistical significance of these effects remains relatively invariant even after controlling for a battery of control variables (e.g., size, Tobin's q, profitability, and leverage). Most notably, the negative association between discount rates and valuation does *not* arise from the fact that firms that report high discount rates are expected to have negative earnings surprises since we control for SUE. Moreover, the fact that we control for lease intensity suggests that we are not simply capturing the negative relation between lease intensity and CARs documented by Milian & Lee (2020). While the negative association between lease intensity and CARs may arise as a result of investors paying close attention to lease-related leverage on the balance sheet, the *incremental* impact of (abnormal) discount rates indicates that investors are particular concerned about firms with high lease-related discount rates. That is, holding lease intensity (and other characteristics, such as leverage) constant, investors tend to attribute lower valuations to firms with higher discount rates.

Overall, the evidence in Table 9 indicates that lease-related discount rates provide investors with value-relevant signals of firm fundamentals. In particular, we find that the equity valuations of firms with abnormally high discount rates decline over the period in which they report their first accounting statements prepared in accordance with ASC 842. This indicates that markets appear to take note of, and react to, these lease-related disclosures. As a previously mentioned caveat, we recognize that this finding is subject to the possibility that other information disclosed in the 10K/Q for these firms could also be negative in nature.

Next, we consider several motives for why firms may select higher-than-expected discount rates when valuing their leases. Our focus is to determine which, if any, of these motives can help to explain why certain firms discount their operating leases with abnormally high rates.

4.3 Potential Explanations for High Discount Rates

4.3.1 Agency Cost and the Cost of Financial Distress

Agency costs and the cost of financial distress play a role in a firm's financial policies and choice of capital structure (Jensen & Meckling (1976), Eisfeldt & Rampini (2009); Graham *et al.* (1998)). These costs constrain the levels of debt that firms can incur, providing an incentive for firms to lease, rather than buy, assets. Since lenders and analysts recognize operating leases as additional leverage , we expect managers to choose higher discount rates

(thus recognizing lower lease liabilities) when financial distress costs are higher, *ceteris paribus*.

Agency costs vary with monitoring costs. Since shareholders can only imperfectly monitor the decisions of managers, monitoring costs are incurred to limit the aberrant behavior of managers. As we have previously discussed, the bottom portion of Table 8 suggests that less monitoring is associated with high discount rate firms. In particular, these firms have relatively lower institutional ownership, a smaller analyst following, inferior earnings forecast from these fewer analysts, and a lower quality internal information environment.

Our empirical analysis of the marginal impact of bankruptcy risk on lease-related discount rates in Panel A of Table IA.3.8 of the Online Appendix reports the results of cross-sectional regressions that add distress risk to Equation 1. We measure distress risk using the structural model of Merton (1974). The table shows that a 1% increase in the probability of default corresponds to a 0.70% higher discount rate. This evidence is consistent with the notion that firms that tend to benefit the most from reducing their balance sheet liabilities (i.e., those closer to default) discount their lease obligations using higher discount rates.

4.3.2 Financial Constraints

Firms might also ration capital due to financial constraints (Eisfeldt & Rampini (2009); Sharpe & Nguyen (1995)). As such, financial constraints could offer another explanation as to why firms use a high discount rates in capital budgeting especially the closer the firm is to their financial constraints boundary.

To document how financial constraints are related to operating leases, we first construct the financial constraint index of Hadlock & Pierce (2010). We also examine how the constraints measure is related to operating lease discount rate choices in cross-sectional regressions. Estimation results are presented in Panel A of Table IA.3.9. Consistent with the notion that more levered firms *choose* higher discount rates when valuing their leases, we find that more financially constrained firms also choose higher discount rates when valuing their operating leases, even after controlling for leverage. All else equal, firms that are *more* financially constrained appear to add *lower* lease-related leverage than less financially constrained peers.

4.3.3 Operational Constraints

Jagannathan *et al.* (2016) argue that firms use higher discount rates to limit investment in the face of operational, rather than financial, constraints. More specifically, firms may apply unusually high discount rates to accumulate cash, forgoing current profitable opportunities in anticipation of even more profitable future projects. The use of higher discount rates thus acts as a form of capital rationing. We expect that if this reasoning is accurate, firms choosing

higher discount rates are more likely to have a high Tobin's q, potentially low tangibility, and limited cash relative to their investment opportunities.

The results in Table IA.3.2 are somewhat inconsistent with this story, since firms with higher investment opportunities (as proxied by Tobin's q) tend to choose *lower* discount rates, it is important to highlight a distinction between our analysis and Jagannathan *et al.* (2016). While Jagannathan *et al.* (2016) focus on a firm's WACC to evaluate its projects, we focus on the discount rate applied to operating lease cash flows, which is closely related to a firm's cost of (secured) debt only.

In summary, we find that firms who are less well monitored, in financial distress and/or are financially constrained have a motive to choose a higher discount rate. In contrast, we do not find evidence that firms facing operational constraints tend to use a higher discount rate.

5 Determinants of Lease Contractual Terms

In Section 4, we have shown that most of the variation in the discount rate used to capitalize lease commitments is attributable to firm-level characteristics such as leverage, profitability, and idiosyncratic volatility. We now consider the extent to which firm attributes also act as the primary catalyst in determining other contractual terms of operating leases. In particular, we study the role of firm characteristics as the main drivers of the variation in (i) leasing intensity (lease-to-asset ratios), (ii) the average life of operating leases (duration of lease contracts), and (iii) the presence of an option to renew/extend leases.[16]

To identify the major source of variation in each of the other salient lease terms, we first consider each lease term in separate estimations of Equation 1. More specifically, we estimate the equation using one of the three lease characteristics noted above as the dependent variable in place of the weighted-average discount rate. We also perform a variance decomposition analysis that partitions the total variation of each lease characteristic into the proportions attributable to industry and time fixed effects, and lease- and firm-level characteristics.

5.1 Leasing Intensity (Lease-to-Asset Ratio)

In our leasing intensity specification, we control for the firm's investment opportunity set (this recognizes the under-investment problem that results from conflict between equity and debt-holders). Ex-ante, we expect firms that have significant growth options to use proportionally fewer fixed claims relative to operating leases in their capital structure. We

[16] ASC 842 does not require disclosure of the contract extension or renewal option details, so we summarize this data with a dummy variable which is set to one if a firm can extend or renew its leases and is zero otherwise.

also anticipate that the age and size of the firm and the tangibility of the firm's assets should impact on the operating lease intensity. Firms making more intense use of fixed assets in the production process should use more lease financing. We also expect smaller firms to make more intense use of operating leases versus debt financing.[17]

Table 10 shows how operating lease intensity (defined as the present value of operating lease liabilities divided by total existing assets) is linked to various firm characteristics.[18] Columns (1)-(5) sequentially control for additional lease and firm characteristics. Firms that use leases with embedded options are heavier users of operating leases (0.01 larger ratios) than firms that do not. Moreover, larger, younger, more profitable firms, and those with more investment opportunities have lower lease ratios. Younger firms with smaller employment numbers lease smaller physical spaces. These firms may also find it is easier to control proprietary information about production and service methods if they not only have strong investment opportunities but also own rather than lease their equipment.[19]

Interestingly, we find that lease ratios are not related to lease length, discount rates, credit ratings, or idiosyncratic volatility. This suggests that leases are not necessarily used to obtain long-lived assets. This also indicates that the number of leases per unit of assets is unrelated to common measures of firm-level risk. However, lease intensity is associated with leverage: levered firms have significantly higher lease ratios.

5.2 Weighted-Average Life of Operating Leases

Table IA.3.3 presents our empirical findings on the determinants of the weighted-average life of operating leases. We find that the weighted-average life is positively correlated to lease options. This suggests that, on average, renewal and extension options are features of longer-lived leases, such as rental agreements on real estate assets.[20] Notably, larger, more

[17] As Graham *et al.* (1998, p. 138) notes "This may be true because large companies are more diversified and, thus, have more stable cash flows. Additionally, large firms may be able to exploit economies of scale in issuing securities. Because of information asymmetries, smaller firms also are likely to face higher costs for obtaining external funds. Sharpe & Nguyen (1995) suggest that leases mitigate these information problems and provide lower financing costs. Thus, lease usage should be inversely related to firm size."

[18] Note that while the definition of the lease-to-asset ratio we employ differs from that in Graham *et al.* (1998), Tables IA.3.2 to IA.3.5 in the Online Appendix show that all of our results are robust to using the Graham *et al.* (1998) definition of lease intensity instead.

[19] In an interview, one textile manufacturing firm described a strategy for acquiring physical capital that relied solely on purchased gear, and even then, larger machinery was split into separate parts that were subsequently put together by the firm's own production engineers. The stated aim was to prevent information about the production process being leaked to competitors by equipment providers.

[20] Real estate leases tend to be long term in nature, minimally five years, and often more than 10 years for office space in attractive locations. Equipment leases are typically shorter than this, often with clauses that require the lessor to substitute newer equipment in the event of significant changes in technology during the lease. Interviews with industry participants indicated that managing technology improvements was a primary motivation of lessees who acquire computing equipment and instrumentation on operating leases. Operating

profitable, and tangible-based firms use longer-lived leases which we believe reflects heavier use of rented space. Leverage, growth opportunities, age, and rating status of a firm do not seem to account for the cross-sectional variation in maturities. On the other hand, riskier firms, as proxied by their stock's idiosyncratic volatility, are associated with shorter-lived leases. Since most leases are non-cancellable, this may indicate an aversion towards long-term rental commitments.

5.3 Option to Extend or Renew Leases

The results from a linear probability model (LPM) estimated via OLS to ascertain whether firm characteristics influence the presence of options to extend or renew leases are reported in Table IA.3.4. Echoing previous results, longer-lived leases are more likely to include option clauses. Firms that rely more on operating leases, younger firms, and firms with more investment opportunities, are also more likely to include renewal options. Neither credit ratings, firm size, tangibility, nor the idiosyncratic volatility of a firm's stock are significantly related to option use. These findings indicate that option clauses are a feature of the existing leased-asset base, rather than of each firm's credit standing or riskiness.

5.4 Variance Decomposition

As an alternative approach to our OLS specification, described above, we also perform a variance decomposition analysis for each salient lease characteristic. For this analysis, we decompose the total variation of each of the four lease characteristics into the proportions of variation explained by industry fixed effects, time fixed effects, and lease and firm-level characteristics. Tables IA.3.6 and IA.3.7 in the Online Appendix report the results of the four variance decomposition analyses. The main takeaway from these analyses is that industry fixed effects explain most of the variation in lease-to-asset ratios, the average life of operating leases, and the presence of an option to renew/extend leases.

5.5 Connection to the Prior Literature

In addition to documenting how each lease-related characteristic varies with industry, time, and firm-specific effects, we also analyze whether lease characteristics vary in the ways predicted by prior studies. Specifically, we examine whether the predicted associations between lease intensity and financial distress, financial constraints, and tax considerations help explain differences in lease-to-asset ratios within our cross-section of firms. We also

leases contracts typically require regular replacement of computing gear, for example, with newer models.

examine whether these financial distress, financial constraints, and tax considerations are useful for explaining the cross-section differences in other lease-related characteristics.

Financial Distress. As firms in financial distress are more likely to arrange favorable lease agreements as opposed to issuing debt (see Graham *et al.* (1998, p. 137)), we expect a positive relationship to exist between financial distress and lease intensity. Similarly, Eisfeldt & Rampini (2009) recognize that in bankruptcy, lessors can regain control of leased assets far easier than secured lenders can achieve repossession. However, they reason that differences in distress probabilities across firms are unlikely to explain the cross-sectional variation in lease intensity. This is because distress probabilities are likely low, and do not exhibit as much cross-sectional variation as lease ratios.[21] While distress considerations may play a secondary role to financial constraints in determining lease intensity, a firm's degree of financial distress can still have an *incremental* impact on its lease intensity.[22]

Panel B, C, and D of IA.3.8 of the Online Appendix show the results of cross-sectional regressions of distress risk on lease characteristics. The table shows that a 1% increase in the probability of default corresponds to a 10% lower probability of using leases with options to renew/extend the lease. Firms with higher distress metrics ex-ant also use short-lived lease arrangements. Contrary to the prediction in Graham *et al.* (1998), a *higher* likelihood of financial distress is associated with *lower* lease intensity. On average, a 1% increase in the probability of default is associated with a 3% decrease in lease intensity among the first-time adopters of ASC 842.

Financial Constraints. A central idea in earlier research was that leases economized on expensive fixed capital, particularly for firms with high external funding costs that might arise from under-investment (Myers (1977); Stulz & Johnson (1985)), asymmetric information (Stewart *et al.* (1984)), or from agency problems that produce costly monitoring (Smith Jr & Warner (1979)). To study this hypothesis, Sharpe & Nguyen (1995) identify firms substituting leases for fixed capital as those who pay little or no dividends, have small current cash flow, or have low credit ratings since, they assume, these firms pay relatively high premiums for external funds. Among the predictions that they derive are that leasing intensity is

[21] Specifically, Eisfeldt & Rampini (2009, pg. 1623) note that their "... model shows that variation in available internal funds affects the leasing decision, even after controlling for the probability of bankruptcy (which is held constant in the model). Empirically, variation in the amount of internal funds across firms is likely to be larger than variation in bankruptcy probabilities and, thus, this variation has the potential to generate a quantitatively important effect on the leasing decision. As a result, we stress the effect of leasing on debt capacity rather than on bankruptcy costs, which has been emphasized previously."

[22] In untabulated analyses we show this is the case. Although we focus on the effect of distress risk *without* controlling for financial constraints in Table IA.3.8 of the Online Appendix, including financial distress *and* financial constraints in the same regression shows that both characteristics tends to have a statistically significant impact on determining lease characteristics. That is, financial constraints do not drive out the effects of distress risk among the first-time adopters of ASC 842.

decreasing in available internal funds (to assets), dividends (to assets), cash, and cash flow (to assets), and increasing in Tobin's q and outstanding debt (to assets). Accordingly, available internal funds (to assets) measures such as cash (to assets) and cash flow (to assets), should be negatively related to the leasing intensity.[23] Also, debt (to assets) should be positively related to the fraction leased, to the extent that outstanding debt reduces available internal funds. Similar intuition underlies the empirical work in Sharpe & Nguyen (1995). Eisfeldt & Rampini (2009) focus on the impact of financial constraints on leasing decisions. The core of their argument is that the ease with which a lessor (rather than a secured lender) can repossess an asset "allows a lessor to implicitly extend more credit than a lender whose claim is secured by the same asset. The debt capacity of leasing thus exceeds the debt capacity of secured lending. This makes leasing valuable to financially constrained firms" (Eisfeldt & Rampini, 2009, p. 1621). Motivated by this key prediction, we investigate how financial constraints impact lease intensity, as well as other operating lease characteristics, among the first-time adopters of ASC 842.

Panels B to D of Table IA.3.9 provide evidence on the role of financial constraints on lease characteristics. Consistent with the predictions of prior studies, more financially constrained firms tend to lease with greater frequency. Specifically, a 1% increase in financial constraints increases lease intensity by 1% to 2%. Financial constraints also interact with the length of a firm's leases, as well as the firm's use of lease-related options. Firms that are more constrained tend to rely on leases that are, on average, two years shorter-lived than less constrained firms, and are also 17% less likely to rely on options to renew/extend their operating leases.

Marginal Tax Rates. Research of taxation and leasing extends back nearly 50 years. Graham *et al.* (1998) provide an influential study on the role of taxation, owing in part to the authors' marginal tax rate data. The main prediction from this literature is that firms with a low tax rate tend to lease more, since the tax advantages of debt payments are relatively low. In effect, operating leases transfer tax shields from firms with low tax rates to firms for whom the value of the tax deduction is particularly high.[24] Graham *et al.* (1998, p. 153) find compelling results in their empirical analysis, namely a negative correlation between marginal tax rates and lease intensity.

Motivated by these predictions we consider how marginal tax rates influence lease intensity, as well as other operating lease characteristics, among the first-time adopters of ASC 842. We examine these associations using updated firm-level marginal tax rate data from Graham *et al.* (1998),[25] and employ both the before- and after-interest measures of marginal tax rates.

[23] Untabulated results support these predictions.
[24] See Myers *et al.* (1976), Smith Jr & Wakeman (1985), Ross *et al.* (2005), and Eisfeldt & Rampini (2009).
[25] We thank John Graham for making this data available to us.

Table IA.3.10 shows the relation between lease intensity and marginal tax rates is negative, suggesting that high-tax firms lease less. However, only the relation between after-interest expense marginal tax rates and lease-to-asset ratios is statistically significant. When we use a similar specification and controls as Graham *et al.* (1998), we find evidence of a strong, statistically significant, relation between before-financing marginal tax rates and lease intensity as well. Moreover, Graham *et al.* (1998) find that the response of capital lease intensity to taxation is one-eighth of the size of the response of operating lease intensity to taxation. Consistent with this finding, untabulated analyses show that the response of capital lease to taxation is one-fourth of that of operating leases obtained using ASC 842-implied lease data. We also find that higher tax-rate firms tend to enter longer-lived operating leases (perhaps to increase the life of lease-related tax shields).[26]

6 Conclusions and Directions for Future Research

The new information on operating leases disclosed under the recently implemented ASC 842 accounting rule provides us with an ideal setting to examine firm behavior in valuing these leases. The more granular disclosure on operating leases is important since the value of all types of balance sheet debt in a firm's capital structure is objectively determined except for the value of leases which is subjectively determined by the firm. It is also important since the prior literature has used either a survey approach or an approximation method to estimate this heretofore unobservable discount rate.

We construct a novel dataset from the ASC 842 disclosure information that includes the firm's self-reported discount rate for operating leases for the first time, the firm's own estimates of the value, average remaining life, and the presence of renewal or extension options on existing leases. This self-reported discount rate reflects each firm's own assessment on the average risk of the firm's lease commitments.

Although ASC 842 provides explicit guidelines on the discount rate choice, managers have discretion in choosing an operating lease discount rate. Specifically, when possible, firms should use the rate implicit in the lease terms, otherwise, the discount rate should reflect the firms' incremental borrowing rates. The implications of the choice of discount rate to use is clear. If a firm applies an unusually high discount rates to their lease-related commitments, then this understates their operating lease liabilities and therefore, lower leverage is reported on a firm's balance sheet. As such, we are particularly interested in (i) the extent to which

[26]Separately, we also find an economically large and statistically significant association between marginal tax rates and the firms' weighted-average discount rates. A 1% increase in the before (after) interest expense marginal tax rate is associated with 5.5% (4.4%) lower discount rates.

firms use unusually high discount rates in valuing their operating leases, and (ii) the salient drivers that act as an impetus that influences a firm's discount rate choice. We also study whether these same attributes also exert the same influence in other lease related choices.

Ex-ante, it is unclear which type of firm will choose to use a high discount rate since both low-Tobin's q firms and high-Tobin's q firms have high discount rates. However, the drivers of this high discount rate probably differ substantially with credit and default risk associated with the low-q firms while growth options provide the likely catalyst for high-q firms.

As our initial point of departure, we first examine the extent to which approximation methods used to estimate the lease values are similar to self-reported values. We find that for 80% of the firms in our sample, the approximated discount rate is similar to the self-reported values. However, we find that the borrowing rate option cannot explain the discount rate choices for 20% of the sample of firms. For this latter group of firms, we show that these firms may be taking advantage of the discretion in the new accounting standard to discount their operating lease commitments at a higher-than-expected discount rate. Accordingly, these firms report lower than expected lease liabilities on their balance sheets. These firms are characterized by high leverage, low profitability, a weaker governance structure which results in less internal monitoring, lower institutional ownership and less analysts following which leads to less external monitoring, inferior earnings forecasts, and a lower quality internal information environment. As such, the high discount rate is attributable to low-q firms. We also provide circumstantial evidence that investors tend to take notice of and react adversely to firms with abnormally high discount rates with equity values declining when this information is first reported in accounting statements prepared in accordance with ASC 842.

Although firm-level attributes influence the firm's choice of the discount rate for operating leases, we find that industry-level effects exert a greater influence on other lease related choices including lease intensity, average remaining life, and the presence of options to renew or extend existing leases.

Our findings also show the unintended consequences of increased transparency. Namely, the discretion provided by ASC 842 allows financially fragile firms to report significantly *lower* operating lease liabilities on their balance sheets than the values implied by the traditional methods for capitalizing leases and as a consequence to appear financially healthier.

Our findings pose a puzzle. Notably, we find that firms choose a discount rate for leases that likely reflects the unsecured (or subordinated) cost of debt, loading more heavily on credit default risk than it is the case for secured debt. This is puzzling since firms never acquire any ownership stake in the leased assets and repossession by the creditor is straightforward under existing law; it is not obvious why an economically-significant default risk premium should be embedded in the leasing contract terms.

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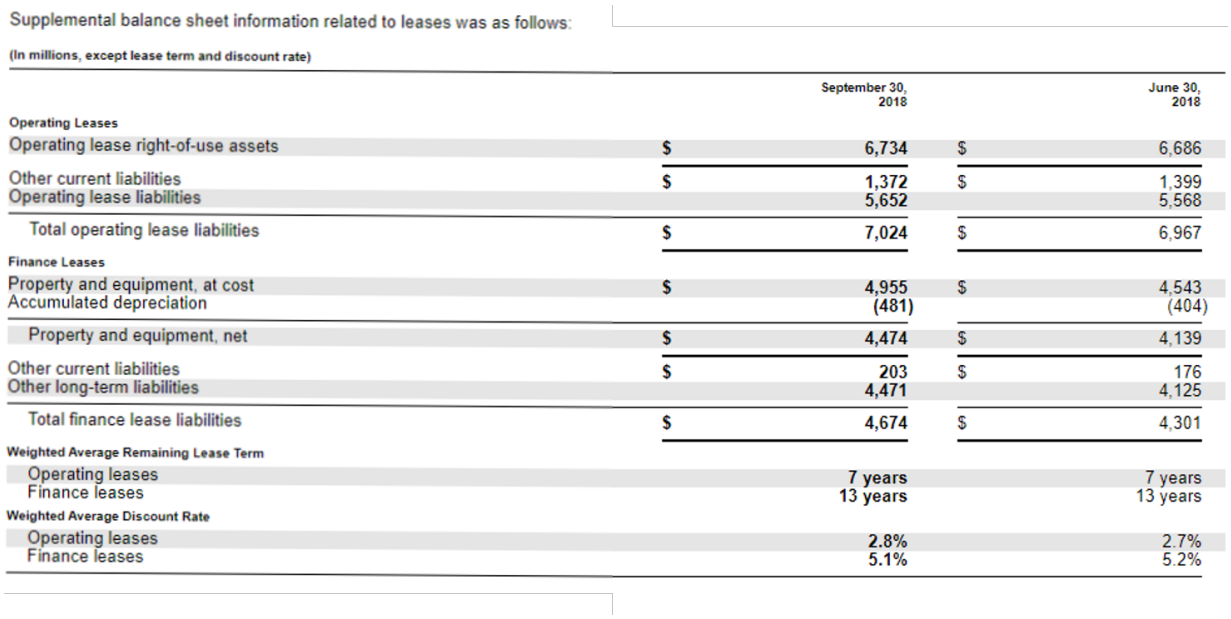
Figure 1: Supplemental Information on Leases for Microsoft Corporation

This figure shows supplemental balance sheet information related to leases for Microsoft Corporation. The figure represents part of the 10-Q filed by Microsoft Corporation for the quarter ended on September 30, 2018, and is drawn from the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system made available by the Security and Exchange Commission (SEC).



Supplemental balance sheet information related to leases was as follows:

(In millions, except lease term and discount rate)

	September 30, 2018	June 30, 2018
Operating Leases		
Operating lease right-of-use assets	$ 6,734	$ 6,686
Other current liabilities	$ 1,372	$ 1,399
Operating lease liabilities	5,652	5,568
Total operating lease liabilities	$ 7,024	$ 6,967
Finance Leases		
Property and equipment, at cost	$ 4,955	$ 4,543
Accumulated depreciation	(481)	(404)
Property and equipment, net	$ 4,474	$ 4,139
Other current liabilities	$ 203	$ 176
Other long-term liabilities	4,471	4,125
Total finance lease liabilities	$ 4,674	$ 4,301
Weighted Average Remaining Lease Term		
Operating leases	7 years	7 years
Finance leases	13 years	13 years
Weighted Average Discount Rate		
Operating leases	2.8%	2.7%
Finance leases	5.1%	5.2%

Figure 2: Distributions and Term Structure of Leasing Variables

The figure shows the histogram, kernel density (blue line), and median value (red dotted line) of the lease-to-assets ratio (top-left panel), the weighted-average discount rate (top-right panel), and the weighted-average remaining life of operating leases (bottom-left panel) for the first-time adopters of the new ASC 842 accounting standard. The bottom-right panel displays the mean weighted-average discount rate of operating leases across groups of firms whose operating leases have similar weighted-average remaining lives. The blue dashed line in this panel displays a firm's predicted discount rate as a function of the remaining life of the firm's leases. This predicted value is obtained by estimating a firm's discount rates as a function of the remaining life of a firm's leases using a fractional polynomial function. All continuous variables in each figure are winsorized at the 99 percent level.

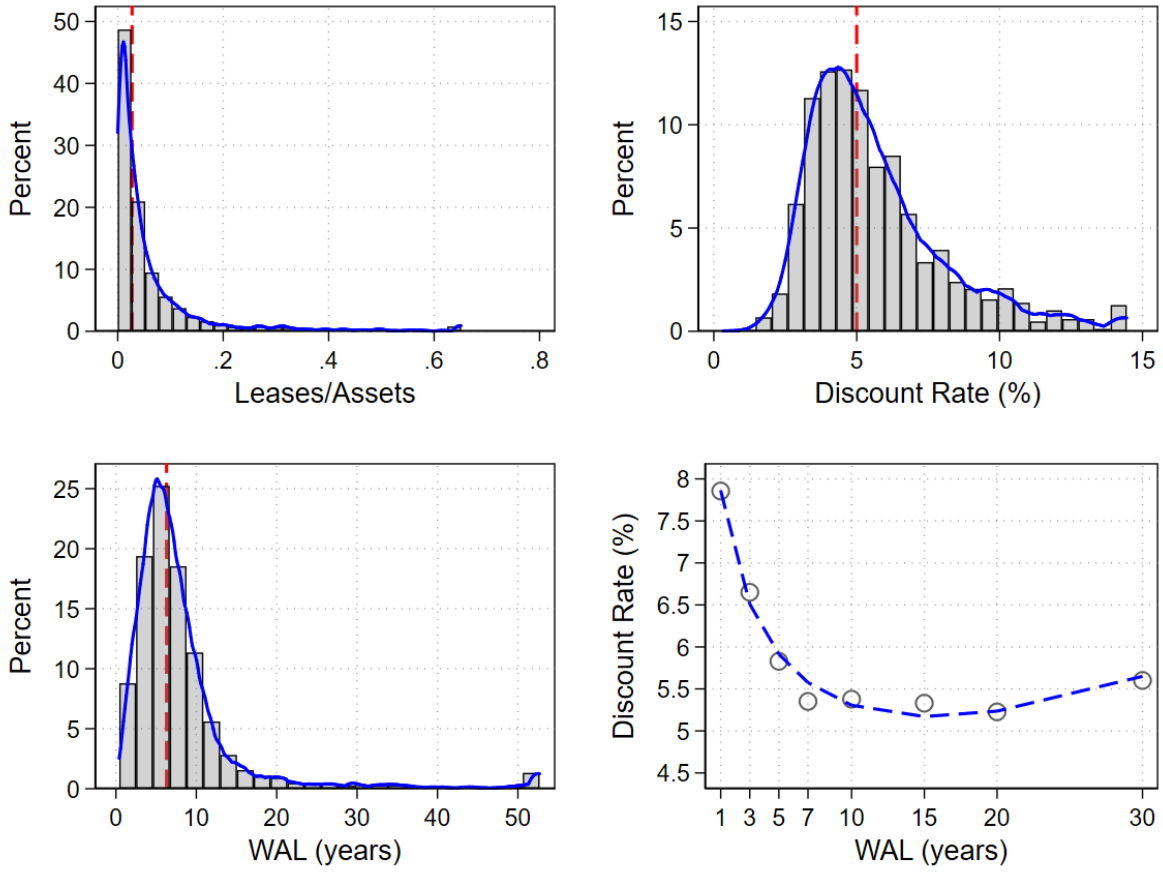


Figure 3: Deciles of Firm Characteristic and Discount Rates

The figures show the average weighted-average discount rates across deciles formed on various firm characteristics for the first-time adopters of the new ASC 842 accounting standard. Firm characteristics include total assets, book leverage, firm age, Tobin's q, idiosyncratic volatility, and S&P ratings. All continuous variables in each figure are winsorized at the 99 percent level.

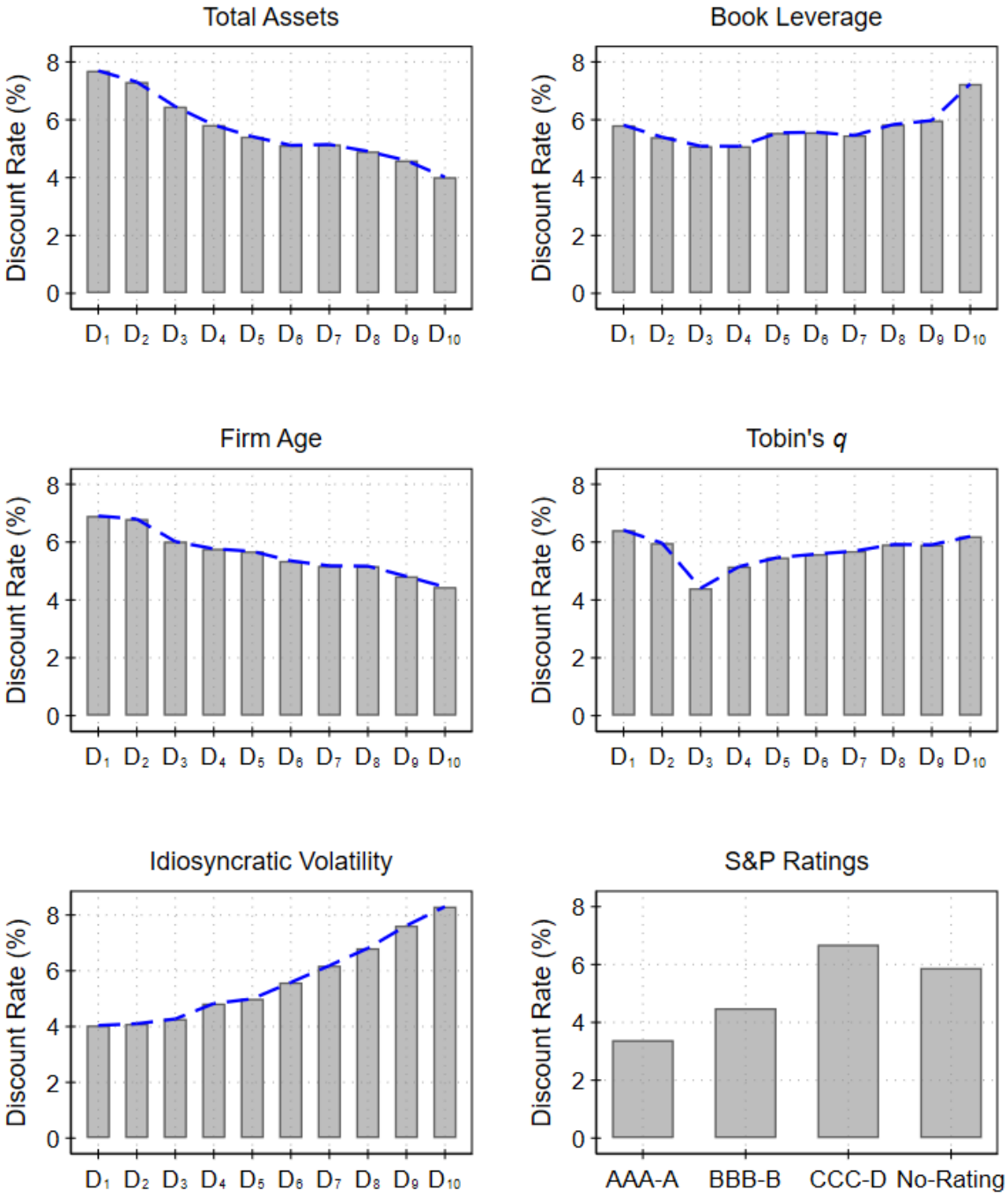


Figure 4: Heterogenous Effects of Leverage

This figure shows quantile regression coefficients and 90 percent confidence intervals for the effect of leverage on *abnormal* discount rates for the first-time adopters of the new ASC 842 accounting standard. The dependent variable is a measure of *abnormal* discount rate at the firm-level, computed as the residual from industry-level OLS regressions of weighted-average discount rates on a firm-level risk measure and various characteristics of operating leases (Equation 3). Each continuous variable is winsorized at the one percent level in both tails. All variables are described in detail in the Online Appendix. Standard errors are estimated using the bootstrap method with 1,000 resamples.

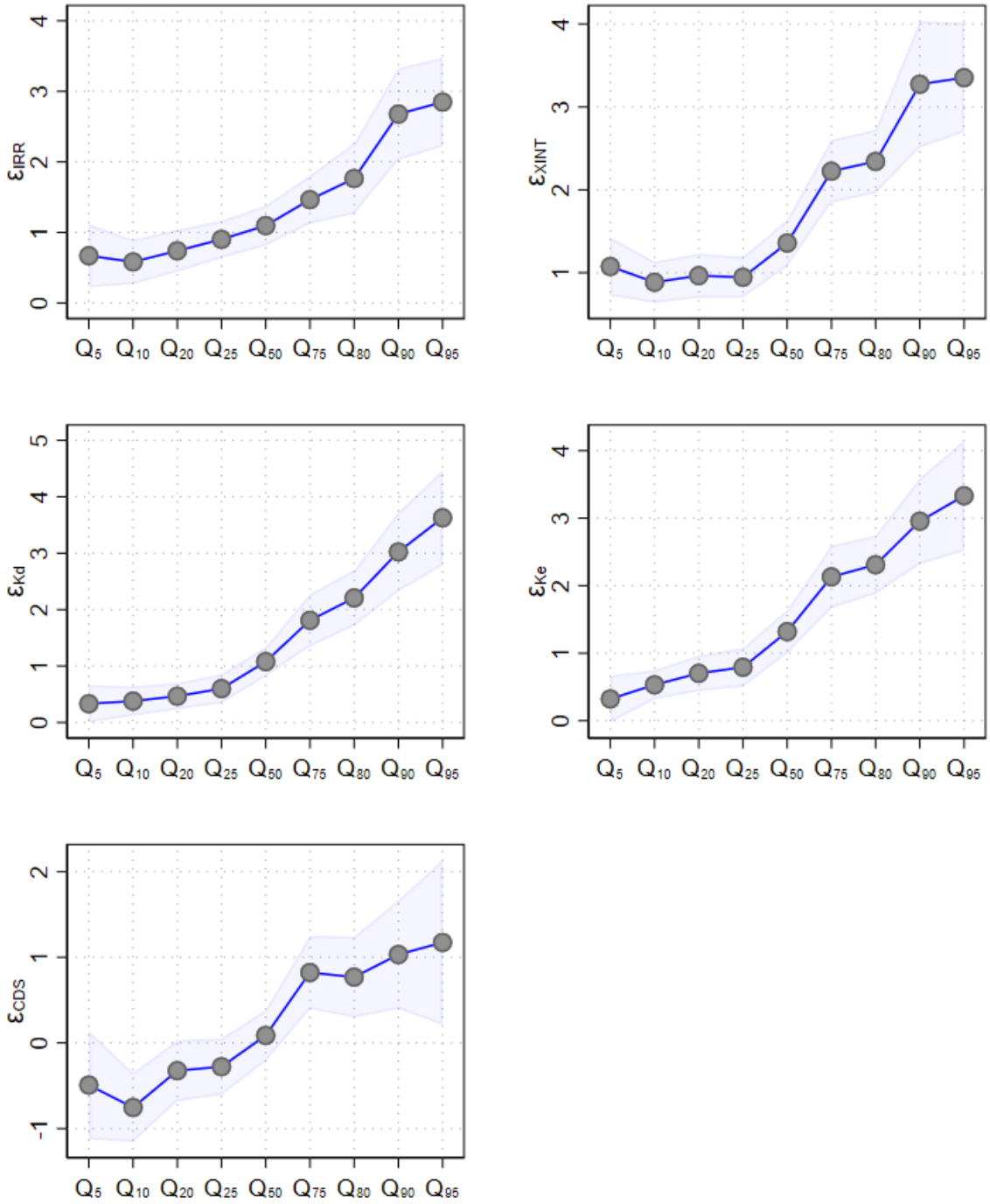


Figure 5: Heterogenous Effects of Distance-to-Default

This figure shows quantile regression coefficients and 90 percent confidence intervals for the effect of Distance-to-Default on *abnormal* discount rates for the first-time adopters of the new ASC 842 accounting standard. The dependent variable is a measure of *abnormal* discount rate at the firm-level, computed as the residual from industry-level OLS regressions of weighted-average discount rates on a firm-level risk measure and various characteristics of operating leases (Equation 3). Each continuous variable is winsorized at the one percent level in both tails. All variables are described in detail in the Online Appendix. Standard errors are estimated using the bootstrap method with 1,000 resamples.

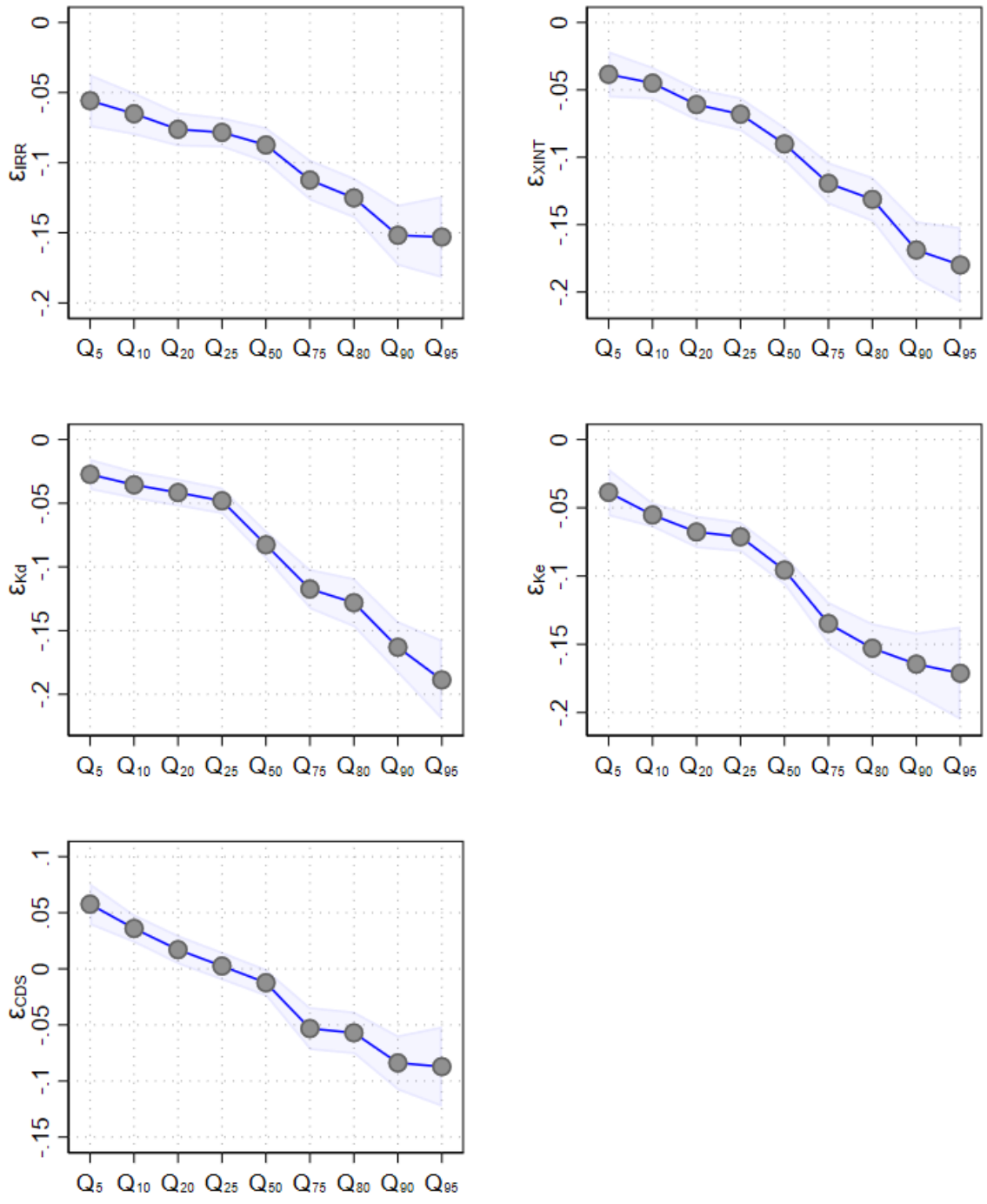


Table 1: Sample

This table reports details for the sample construction and timing of adoption of ASC 842. Panel A details the filtering procedure and reports the number of firm-year-quarter observations and the number of unique firms. Panel B describes the sample distribution of first time adopters over time.

Panel A: Sample Construction		
	Number of Observations	Number of Firms
10-K/Q from EDGAR with Op. Lease > 0	19,586	4,235
Not on CRSP-Compustat	(1,862)	(440)
Missing Discount Rate or WAL	(3,722)	(225)
Not First Time of Adoption	(10,452)	(20)
Total	**3,550**	**3,550**
Panel B: Sample Distribution by Adoption Date		
	Number of Observations	Percent
Q4-2017	4	0.11
Q1-2018	7	0.20
Q2-2018	7	0.20
Q3-2018	5	0.14
Q4-2018	23	0.65
Q1-2019	2,561	72.14
Q2-2019	314	8.84
Q3-2019	225	6.34
Q4-2019	298	8.39
Q1-2020	107	3.01
Total	**3,550**	100.00

Table 2: Summary Statistics of Lease and Firm Characteristics

This table reports summary statistics for the sample of first time adopters of the new ASC 842 accounting standard. Panel A summarizes the univariate distributions of six key leasing variables extracted from the first 10-K/Q filing reported by a firm that is in accordance with the ASC 842 accounting standard. These six key leasing variables are (1) the present value of operating lease liabilities reported on the balance sheet, expressed in units of millions of dollars, (2) the right-of-use assets of operating leases reported on the balance sheet, in millions of dollars, (3) the ratio of operating leases total assets, (4) the weighted-average discount rate used by the firm to compute the present value of operating leases, (5) the weighted-average remaining life of firms' operating leases, and (6) an indicator variable for the presence of options to extend or renew existing leases. Panel B reports the distribution of accounting and return-based firm characteristics, constructed using CRSP/Compustat data, for first-time adopters of the ASC 842 accounting standard. These firm-level characteristics are described in detail in the Online Appendix. For each variable contained in Panel A and Panel B we report the total number of observations (N), and the mean, standard deviation, minimum, 25^{th}, 50^{th}, and 75^{th} percentile (referred to as p25, median, and p75, respectively), and maximum value of each variable. Each continuous variable is winsorized at the one percent level in both tails.

	N	Mean	SD	Min	p25	Med.	p75	Max
				Panel A: Op. Lease Characteristics				
Lease Liabilities ($M)	3550	242.66	704.21	0.15	6.30	33.58	149.10	5,422.80
Lease Assets ($M)	3550	227.22	641.77	0.16	5.92	30.94	140.00	4,798.90
Lease/Adj. Assets (%)	3550	5.22	7.29	0.00	0.94	2.66	6.12	43.22
Discount Rate (%)	3550	5.66	2.44	0.33	3.99	5.00	6.71	14.45
WAL (years)	3550	8.24	7.92	0.42	4.30	6.30	9.08	52.70
Lease Option (0/1)	3550	0.36	0.48	0.00	0.00	0.00	1.00	1.00
				Panel B: Firm Characteristics				
Total Assets ($M)	3550	9,442.96	28,020.62	9.07	310.36	1,517.18	5,653.88	221,901.00
Age (years)	3550	23.39	17.50	1.00	9.00	20.00	31.00	70.00
Profitability	3549	-0.04	0.27	-1.52	-0.02	0.03	0.08	0.29
Leverage	3284	0.30	0.25	0.00	0.09	0.27	0.44	1.24
Tangibility	3438	0.22	0.23	0.00	0.05	0.13	0.31	0.91
Tobin's q	3548	2.07	1.79	0.52	1.02	1.39	2.33	10.17
Idiosyncratic Vol.	3436	0.38	0.26	0.11	0.19	0.30	0.49	1.63

Table 3: Summary Statistics of Leasing Variables by Industry

This table reports summary statistics for the sample of first time adopters of the new ASC 842 accounting standard within each Fama-French 12 industry group. The table reports the mean value of six key leasing variables within each industry, as well as the number of firms with valid leasing data that are assigned to each industry (denoted by N). The six key leasing variables are (1) the present value of operating lease liabilities reported on the balance sheet, expressed in units of millions of dollars, (2) the right-of-use assets of operating leases reported on the balance sheet, in millions of dollars, (3) the ratio of operating leases total assets (adjusted for leases), (4) the weighted-average discount rate used by the firm to compute the present value of operating leases, (5) the weighted-average remaining life of firms' operating leases, and (6) an indicator variable for the presence of options to extend or renew existing leases. Each continuous variable is winsorized at the 1 percent level in both tails.

Industry	N	Lease Liab.	Lease Assets	Lease/Adj. Assets	DR	WAL	Option
Consumer NonDurables	138	276.13	260.13	0.066	4.94	6.61	0.29
Consumer Durables	79	201.27	237.82	0.057	4.89	6.73	0.41
Manufacturing	289	128.90	125.33	0.036	5.13	6.80	0.33
Oil & Gas	162	236.05	231.89	0.025	6.31	5.59	0.24
Chemicals	85	278.55	273.44	0.033	5.22	7.82	0.24
Business Equipment	574	181.41	154.16	0.052	5.51	6.32	0.33
TMT	73	695.47	645.51	0.047	6.41	7.87	0.27
Utilities	89	363.53	361.26	0.018	4.78	13.03	0.38
Wholesale & Retail	301	741.62	662.26	0.163	5.69	8.67	0.42
Healthcare	652	62.24	60.07	0.053	7.64	5.43	0.48
Finance	715	186.21	177.57	0.018	4.40	13.00	0.33
Other	393	315.68	309.59	0.058	5.56	8.84	0.31

Table 4: Summary Statistics Across Different Methodologies

This table reports the mean and median values of the lease-to-asset ratio (Panel A), the lease-to-adjusted asset ratio (Panel B), and the adjusted book leverage (Panel C) for the sample of first time adopters of the new ASC 842 accounting standard. Each panel compares each ratio computed using the actual capitalized value of operating leases, denoted ASC 842, to four estimates of the balance sheet value of operating leases commonly employed in the literature. The methods for computing these estimates are drawn from Graham *et al.* (1998), Rauh & Sufi (2012), Cornaggia *et al.* (2013), and Graham & Lin (2018). Each panel computes the relevant statistics using quarterly leasing data extracted from the 10-Q filings of first time adopters, as well as annual leasing data obtained from the most recent 10-K filings of first time adopters and made available via Compustat. All continuous variables are winsorized at the 1 percent level in both tails, and the appendix provides detailed variable descriptions.

	EDGAR 10-Q			Compustat 10-K		
	N	Mean	Median	N	Mean	Median
	Panel A: Operating Leases to Assets					
ASC 842	3474	0.063	0.027	2909	0.068	0.032
Graham *et al.* (1998)	3474	0.045	0.021	2909	0.061	0.032
Rauh & Sufi (2012)	3474	0.069	0.029	2909	0.081	0.036
Cornaggia *et al.* (2013)	3474	0.058	0.025	2909	0.073	0.036
Graham & Lin (2018)	3474	0.067	0.027	2909	0.068	0.030
	Panel B: Operating Leases to Adj. Assets					
ASC 842	3474	0.053	0.027	2909	0.058	0.031
Graham *et al.* (1998)	3474	0.039	0.020	2909	0.053	0.031
Rauh & Sufi (2012)	3474	0.056	0.028	2909	0.066	0.035
Cornaggia *et al.* (2013)	3474	0.049	0.024	2909	0.061	0.035
Graham & Lin (2018)	3474	0.054	0.026	2909	0.056	0.029
	Panel C: Adjusted Book Leverage					
ASC 842	3284	0.339	0.309	2792	0.375	0.347
Graham *et al.* (1998)	3284	0.328	0.298	2792	0.369	0.344
Rauh & Sufi (2012)	3284	0.338	0.311	2792	0.376	0.351
Cornaggia *et al.* (2013)	3284	0.334	0.305	2792	0.374	0.349
Graham & Lin (2018)	3284	0.336	0.309	2792	0.371	0.346

Table 5: Determinants of Weighted-Average Discount Rate

This table reports OLS regression coefficients and standard errors for the effect of lease and firm characteristics on the weighted-average discount rate of operating leases of first time adopters of the new ASC 842 accounting standard. The dependent variable is the weighted-average discount rate reported in the Notes to Consolidated Financial Statements at the end of the fiscal quarter. Independent variables include the weighted-average life of the lease, lease option dummy, lease-to-asset ratio, the natural logarithm of total assets, leverage, profitability, tangibility, Tobin's q, idiosyncratic volatility, the natural logarithm of firm age, S&P ratings, and a dummy variable that equals one if the firm is not rated, zero otherwise. All continuous variables are winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. All specifications include year-quarter and Fama-French 30 industry fixed effects. Standard errors are robust to heteroskedasticity. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
WAL	0.02***	0.03***	0.03***	0.03***	0.03***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Lease Option (Dummy)	0.17**	0.11	0.16**	0.17**	0.17**
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
Leases/Assets	3.12***	2.02***	0.71*	0.30	0.13
	(0.50)	(0.45)	(0.43)	(0.41)	(0.41)
Assets		-0.37***	-0.31***	-0.22***	-0.15***
		(0.02)	(0.02)	(0.02)	(0.02)
Age		-0.40***	-0.32***	-0.24***	-0.18***
		(0.05)	(0.04)	(0.05)	(0.05)
Leverage			2.39***	2.19***	2.08***
			(0.19)	(0.18)	(0.19)
Profitability			-2.29***	-1.85***	-2.02***
			(0.24)	(0.24)	(0.24)
Tangibility			-0.29	-0.30	-0.31
			(0.23)	(0.23)	(0.23)
Tobin's q				-0.12***	-0.10***
				(0.02)	(0.02)
Idiosyncratic Vol.				2.13***	2.01***
				(0.25)	(0.24)
S&P Ratings					-0.15***
					(0.02)
No Rating					-1.27***
					(0.26)
Year–Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
FF30 Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj.–R^2	0.23	0.35	0.44	0.48	0.49
Observations	3550	3550	3268	3157	3157

Table 6: Discount Rate and Firm-Level Risk Measures

This table reports summary statistics and correlation coefficients between firm-level risk measures of first time adopters of the new ASC 842 accounting standard. Panel A summarizes the univariate distributions of firm-level risk measures. These variables are (1) the internal rate of return of operating leases, (2) the ratio of total interest expenses total debt (K_d^{XINT}), (3) the spread over LIBOR for bank loans (K_d^{Loans}), (4) the cost of equity (K_e), and (5) the Bloomberg-Implied CDS spread in basis points (BB-CDS). Panel B shows pairwise correlation coefficients between these variables. These firm-level risk measures are described in detail in the Online Appendix. For each variable contained in Panel A we report the total number of observations (N), and the mean, standard deviation, minimum, 25^{th}, 50^{th}, and 75^{th} percentile (referred to as p25, median, and p75, respectively), and maximum value of each variable. Each continuous variable is winsorized at the 1 percent level in both tails.

Panel A: Summary Statistics

	N	Mean	SD	Min	p25	Median	p75	Max
IRR	3083	5.70	4.07	0.01	3.47	4.89	6.72	30.06
K_d^{XINT}	3550	5.65	7.10	0.12	3.09	4.15	5.56	58.60
K_d^{Loans}	3548	2.08	0.88	0.30	1.64	2.04	2.75	12.00
K_e	3436	9.87	4.92	0.08	6.69	9.15	12.05	25.92
BB-CDS	2518	1.48	1.14	0.14	0.67	1.16	1.87	6.01

Panel B: Pairwise Correlations

	DR	IRR	K_d^{XINT}	K_d^{Loans}	K_e	CDS
DR	1					
IRR	0.48	1				
K_d^{XINT}	0.27	0.11	1			
K_d^{Loans}	0.37	0.16	0.14	1		
K_e	0.25	0.10	0.13	0.15	1	
BB-CDS	0.44	0.22	0.20	0.27	0.30	1

Table 7: Relationship Between Discount Rates and Firm-Level Risk Measures
This table reports OLS regression coefficients and standard errors for the relationship between weighted-average discount rates on firm-level risk measures of first time adopters of the new ASC 842 accounting standard. The dependent variable is the weighted-average discount rate of operating leases. Panel A only includes the various firm-level risk measures as independent variables, while Panel B also includes the weighted-average life of the lease, lease option dummy, lease-to-asset ratio, the natural logarithm of total assets, leverage, profitability, tangibility, Tobin's q, idiosyncratic volatility, the natural logarithm of firm age, S&P ratings, and a dummy variable that equals one if the firm is not rated, zero otherwise. Each continuous variable is winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. Standard errors are robust to heteroskedasticity. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	Panel A: Without Controls				
IRR	0.29***				
	(0.01)				
K_d^{XINT}		0.09***			
		(0.01)			
K_d^{Loans}			1.03***		
			(0.04)		
K_e				0.11***	
				(0.01)	
BB-CDS					0.96***
					(0.04)
Controls	No	No	No	No	No
Year Fixed Effects	No	No	No	No	No
FF30 Fixed Effects	No	No	No	No	No
Adj.-R^2	0.23	0.07	0.14	0.06	0.19
Observations	3083	3550	3548	3436	2518
	Panel B: With Controls				
IRR	0.18***				
	(0.01)				
K_d^{XINT}		0.03***			
		(0.00)			
K_d^{Loans}			0.23***		
			(0.05)		
K_e				0.02**	
				(0.01)	
BB-CDS					0.33***
					(0.05)
Controls	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	No	No	No	No	No
FF30 Fixed Effects	No	No	No	No	No
Adj.-R^2	0.54	0.46	0.45	0.45	0.44
Observations	2752	3157	3155	3157	2247

Table 8: Differences in Methodologies Across Abnormal Discount Rates

This table reports mean values and t-statistics for the lease-to-asset and lease-to-adjusted asset ratios for the sample of first time adopters of the new ASC 842 accounting standard across quantiles of *abnormal* discount rates. *Abnormal* discount rates are denoted $\varepsilon^{q}_{i,t}$, and are computed as the residuals from industry-level OLS regressions of weighted-average discount rates on a firm-level risk measure and various characteristics of operating leases (see Equation 3). To reduce estimation errors, we average residuals estimated using three different risk measures (cost of bank loans, cost of equity, and interest expenses), and refer to these residuals as $\overline{\varepsilon^{q}_{i,t}}$. We then compare the lease ratios computed using the actual capitalized value of operating leases, denoted as ASC 842, to the Rauh & Sufi (2012) and Graham & Lin (2018) estimates of balance sheet lease liabilities. The relevant statistics are computed using quarterly leasing data extracted from the 10-Q filings of first time adopters. In the bottom portion of the table we report the characteristics of the firms assigned to each abnormal discount rate quintile. Specifically, we report the average entrenchment index (e-index) computed following Bebchuk *et al.* (2009), discretionary accruals (Disc. Accruals), institutional ownership (InstOwn), analyst following (# Analysts), the speed, measured in days, with which firms report their financial statements following the end of a fiscal quarter (Speed), and standardized unexpected earnings (SUE). t-statistics (in square brackets) are calculated to test the difference between values based on ASC 842 and values based on the relevant methodology, controlling for industry effects. All continuous variables are winsorized at the 1 percent level in both tails, and the appendix provides detailed variable descriptions.

Panel A: Lease Intensity and Adjusted Leverage

$\overline{\varepsilon^{q}_{i,t}}$	Lease-to-Assets			Lease-to-Adj. Assets		
	ASC 842	RS 2012	GL 2018	ASC 842	RS 2012	GL 2018
1	0.075	0.075	0.074	0.062	0.061	0.059
	-	[0.50]	[1.32]	-	[0.65]	[1.53]
2	0.050	0.054	0.053	0.043	0.045	0.043
	-	[0.01]	[1.71]*	-	[0.10]	[1.75]*
3	0.056	0.059	0.059	0.046	0.048	0.047
	-	[-0.04]	[1.57]	-	[-0.17]	[1.54]
4	0.060	0.065	0.065	0.052	0.055	0.054
	-	[-1.20]	[-1.04]	-	[-1.20]	[-1.02]
5	0.065	0.081	0.075	0.056	0.066	0.061
	-	[-2.71]***	[-2.21]**	-	[-2.73]***	[-2.18]**

Panel B: Characteristics Across Abnormal Discount Rates

	E-Index	Disc. Accruals	InstOwn	# Analysts	Speed	SUE
1	4.14	0.12	0.67	8.09	43.69	0.000
2	4.13	0.11	0.69	7.41	41.94	-0.001
3	4.09	0.12	0.68	6.64	43.67	0.000
4	4.14	0.12	0.67	5.84	48.79	-0.007
5	4.28	0.19	0.54	4.23	56.27	0.017
5-1	[3.44]***	[5.05]***	[-7.71]***	[-10.38]***	[13.73]***	[2.67]***

Table 9: Short-Term Valuation Effects of Operating Lease Disclosure

This table reports OLS regression coefficients and standard errors for the effect of lease and firm characteristics on the cumulative abnormal return (CAR) of first time adopters of the new ASC 842 accounting standard around each filing date. The dependent variable is the CAR over the 11-day period surrounding the first accountin disclosure prepared in accordance with ASC 842, and computed using the market model (CAPM). Independent variables include the weighted-average discount rate (in decimal form), the abnormal discount rate from Equation 3 (in decimal form), the weighted-average life of the lease, lease option dummy, lease-to-asset ratio, the natural logarithm of total assets, leverage, profitability, tangibility, Tobin's q, the standardized unexpected earnings (SUE), and the natural logarithm of firm age. All continuous variables are winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. All specifications include event date and Fama-French 30 industry fixed effects. Standard errors are clustered at the industry level. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Discount Rate	-0.29***	-0.27**	-0.38**			
	(0.09)	(0.10)	(0.14)			
Abnormal Discount Rate				-0.22*	-0.25*	-0.33*
				(0.11)	(0.13)	(0.17)
Leases/Assets		-0.06*	-0.05*		-0.08*	-0.07**
		(0.04)	(0.03)		(0.04)	(0.03)
WAL		-0.00***	-0.00		-0.00***	-0.00
		(0.00)	(0.00)		(0.00)	(0.00)
Lease Option (Dummy)		0.00	0.00		0.00	0.00
		(0.00)	(0.00)		(0.00)	(0.00)
SUE		-0.03	-0.03		-0.03	-0.03
		(0.02)	(0.02)		(0.02)	(0.02)
Assets			0.00			0.00
			(0.00)			(0.00)
Age			-0.00**			-0.00*
			(0.00)			(0.00)
Leverage			-0.02			-0.02
			(0.02)			(0.02)
Profitability			-0.01			-0.01
			(0.01)			(0.01)
Tobin's q			-0.00***			-0.00***
			(0.00)			(0.00)
Tangibility			-0.02			-0.01
			(0.02)			(0.02)
Event Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
FF30 Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.05	0.05	0.06	0.05	0.05	0.06
Observations	3128	3060	2795	3048	2982	2721

Table 10: Determinants of Lease-to-Asset Ratios

This table reports OLS regression coefficients and standard errors for the effect of lease and firm characteristics on the lease-to-asset ratios of first time adopters of the new ASC 842 accounting standard. The dependent variable is the lease-to-asset ratio at the end of the fiscal quarter. Independent variables include the weighted-average discount rate, weighted-average life of the lease, lease option dummy, the natural logarithm of total assets, leverage, profitability, tangibility, Tobin's q, idiosyncratic volatility, the natural logarithm of firm age, S&P ratings, and a dummy variable that equals one if the firm is not rated, zero otherwise. Each continuous variable is winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. All specifications include year-quarter and Fama-French 30 industry fixed effects. Standard errors are robust to heteroskedasticity. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Discount Rate	0.00***	0.00***	0.00*	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
WAL	-0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Lease Option (Dummy)	0.01***	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Assets		-0.00***	-0.01***	-0.01***	-0.00***
		(0.00)	(0.00)	(0.00)	(0.00)
Age		0.00**	0.00*	0.00	0.00*
		(0.00)	(0.00)	(0.00)	(0.00)
Leverage			0.05***	0.05***	0.05***
			(0.01)	(0.01)	(0.01)
Profitability			-0.02**	-0.01*	-0.02**
			(0.01)	(0.01)	(0.01)
Tangibility			0.07***	0.07***	0.07***
			(0.01)	(0.01)	(0.01)
Tobin's q				-0.00**	-0.00**
				(0.00)	(0.00)
Idiosyncratic Vol.				0.01	0.01
				(0.01)	(0.01)
S&P Ratings					-0.00
					(0.00)
No Rating					0.01
					(0.01)
Year–Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
FF30 Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj.–R^2	0.37	0.38	0.41	0.42	0.42
Observations	3550	3550	3268	3157	3157

Internet Appendix

IA.1 Variable Definitions

Age. Age is computed as the difference between the filing year and the first year the firm appears in Compustat. We use the natural logarithm of Age in regressions.

Analyst following (# Analysts). The number of analysts following a firm in year t is defined as the number of analysts that issue a forecast for firm-level EPS in the same year (I/B/E/S item NUMEST from the Historical Summary Statistics dataset).

Assets. Assets is the book value of assets (Compustat Item *atq*). We use the natural logarithm of Compustat Item *atq* in regressions.

Bloomberg-Implied Credit Default Swap. 5 Year CDS (credit default swap) spread for the company implied by the Bloomberg Issuer Default Risk model Likelihood of Default.

Cost of Debt (K_d^{XINT}). Cost of debt is calculated as the ratio of interest expenses (Compustat item *xint*) divided by total debt (short-term debt and long-term debt). Whenever missing or zero, we replace it with its median value by 2-digits SIC.

Cost of Debt (K_d^{Loans}). Cost of debt is calculated as the weighted-average spread over LIBOR for the ten most recent bank loans issued by the firm. We use the largest facility in each loan package to compute the weighted-average cost of debt at each fiscal-year quarter. Whenever missing or zero, we replace it with its median value by 2-digits SIC.

Cost of Equity (K_e). Derived from the Capital Asset Pricing Model (CAPM). Betas are estimated from a regression of stock returns adjusted for delisting on market returns. Data on the risk-free rate and equity risk premium for each month are from Damodaran.

Discretionary Accruals (Disc. Accruals). Discretionary accruals are obtained by implementing the procedures outlined by Kothari *et al.* (2005).

Distance-to-default (DtD). The distance-to-default of each firm is computed in accordance with the structural model of Merton (1974).

Earnings Announcement Speed (Speed). To proxy for the quality of a firm's internal information environment follow Gallemore & Labro (2015) and compute the number of days between the end of a firm's fiscal quarter and the announcement of its earnings (as determined by Compustat Quarterly item RDQ).

Idiosyncratic Volatility. Idiosyncratic volatility is computed as the annualized standard deviation of residuals from a regression of stock return adjusted for delisting on market returns. We use two years of monthly stock data to estimate market model regressions, and a minimum of six months of valid returns.

Institutional Ownership (InstOwn). At time t, the proportion of shares outstanding owned by institutional investors is computed by scaling the shares owned by institutional investors (identified using data from SEC Form 13(f)) by the total split-adjusted shares outstanding for each security in CRSP.

Leverage. Leverage is computed as the firm's short- and long-term debt (Compustat Items *dlttq* + *dlcq*) divided by the book value of assets (Compustat Item *atq*).

Profitability (ROA). ROA is computed as the firm's net income (Compustat Item *niq*) divided by the book value of assets (Compustat Item *atq*).

Standardized Unexpected Earnings (SUE). Consistent with the measures of standardized unexpected earnings (SUE) based on the seasonal random walk models in Livnat & Mendenhall (2006), SUE1 in quarter t is computed by taking the difference between split-adjusted earnings per share excluding extraordinary items (Compustat Quarterly item EPSPXQ divided by item AJEXQ) in quarters t and $t-4$, and scaling this difference by the split-adjusted price at the end of quarter t (Compustat Quarterly item PRCCQ divided by item AJEXQ).

Tangibility. Tangibility is defined as a firm's property, plant, and equipment (Compustat Item *ppentq*) divided by the book value of assets (Compustat Item *atq*).

Tobin's *q*. Tobin's q is defined as a firm's book value of assets minus the book value of common equity plus the market value of common equity (Compustat Items *atq* - *ceqq* + *cshoq* × *prccq*) divided by the book value of assets (Compustat Item *atq*).

IA.2 Additional Details Regarding ASC 842

In this section we provide additional details on (1) the history of ASC 842, (2) the timeline for implementing ASC 842, and (3) the tests that determine whether a lease is classified as a finance (capital) lease or an operating lease on the balance sheet.

A brief history of ASC 842. A tentative version of the new rule first appeared in a preliminary document circulated by FASB and the IASB in 2009. This was followed by an exposure document in 2010, a revised version in 2013, and a further revised final document in 2016 (ASC 842). As of early 2020, the date when private firms and certain other entities must adhere to the new rules has been slipped further into the future, largely over concerns about the cost of implementation. As Khan *et al.* (2018, p. 212) note, lease accounting changes have a history of being controversial: "the FASB's precursor, the Accounting Principles Board (APB), was eventually undone by at least three visible instances in which industry lobbyists prevented it from issuing accounting standards related to (1) the accounting for marketable securities, (2) long-term leases, and (3) exploration and drilling costs for oil and gas that were opposed, respectively, by the insurance, leasing, and petroleum industries."

Timeline for implementing ASC 842. Publicly-traded firms must conform with the new rules for annual reporting periods (including quarterly periods therein) starting after December 15, 2018. Firms must choose whether to apply the new accounting standard to prior periods, thereby restating values for earlier periods. If the firm chooses to do so,

it applies the new leasing rules to each lease that existed at the beginning of the earliest comparative period presented in the financial statements (e.g., January 1, 2017 for a calendar year-end publicly-traded company) and leases that commenced after that date. For leases that began before the earliest comparative period presented, a cumulative effect adjustment is recognized as of that date (e.g., January 1, 2017 for a calendar year-end publicly-traded company). The "look-back period" covers the time from the start of the earliest comparative period until immediately before the effective date. For a calendar year-end publicly-traded company adopting the standard on January 1, 2019, the look-back period is January 1, 2017 through December 31, 2018.

Firms could alternatively choose to apply the new rules to each lease in effect as of the beginning of the reporting period in which the entity first applies the lease standard with a cumulative effect adjustment as of that date. Prior comparative periods would be not be adjusted under this method. The application date is January 1, 2019 for a calendar year-end publicly-traded company choosing this approach. Regardless of the transition choice that a firm makes, the firm's classification of existing leases and its identification of leases in contracts does not need to be reassessed. Consequently, lessees are generally carrying forward the existing lease accounting balances when applying the new rules.

Lease classification tests. Under the previous accounting standard (ASC 840), a set of tests determined whether a lease was regarded as an operating lease or a financial lease. The specific tests are as follows: (i) Leased asset ownership transfers to the lessee at lease termination, (ii) Lessee has a purchase option for the leased asset at a bargain price at lease termination, (iii) Lease term equals or exceeds 75% of leased asset's economic life, or (iv) Present value of minimum lease payments was greater than or equal to 90% of leased asset fair value lease inception where these payments include any required lessee guarantee of leased asset residual value to the lessor at lease termination. If any of these four requirements were satisfied then the lease was classified as a capital lease, and would therefore be reported on financial statements. If none of these requirements were satisfied, then ASC 840 would allow the firm to classify the lease as an operating lease. The cash flows associated with these operating leases were then only reported in the footnotes of financial statements.

Under ASC 842, the firm is required to capitalize the values of operating leases, and report the right-of-use asset and liability associated with these leases on their balance sheets. ASC 842 defines an operating lease as a contractual arrangement that conveys to the lessee the right to "control" the use of an "identified asset." The new rule does, however, exempt firms from reporting all leases with a term of 12 months or less. In addition, the following contracts are outside the scope of the leasing new rules: leases of inventory or of construction in progress, leases of intangible assets, including licenses of internal-use software, leases to explore for or use natural resources, leases of biological assets, and service concession arrangements within the scope of ASC 853.

IA.3 Approximation Methods for Capitalizing Operating Leases

This section provides details on four of the most common empirical proxies for the capitalized value of operating leases. The methods we consider are those outlined by Graham *et al.* (1998), Rauh & Sufi (2012), Cornaggia *et al.* (2013), Graham & Lin (2018). Each of these methods arose as a result of the older ASC 840 accounting standard that only required

firms to report the minimal rental commitments due in (i) the current fiscal year, (ii) each of the next five fiscal years, and (iii) all fiscal years thereafter reported as a single, lump sum, figure in the footnotes of their accounting statement. Consequently, each of these four methods makes different assumption regarding the distribution of lease-related cash flows and the discount rate required to find the present value of operating lease commitments. We discuss the assumptions employed by each method below.

For this discussion, we denote the minimum rental commitment owed by firm i in the current fiscal year t as $XRENT_{i,t}$, the rental commitment owed in fiscal year $t+\tau$ as $MRC_{i,t+\tau}$, and the sum of rental commitments due after fiscal year $t+5$ as $MRCA_{i,t+5}$. $r_{i,t}$ refers to the discount rate applicable to the lease commitments in fiscal year t, while N_i denotes the estimate of the remaining life of firm i's operating leases after year $t+5$. Finally, $OpLeases_{i,t}^{M}$ represents the estimated value of firm i's operating leases as of fiscal year t according to method M.

IA.3.1 Method 1: Graham *et al.* (1998)

Graham *et al.* (1998) measure the value of operating leases as the current-year rental expense plus the present value of rental commitments over the next five fiscal years, discounted at a constant rate of $r_{i,t} = r = 10\%$ for all firms and time periods (as this constant discount rate of 10% was consistent with the average short-term borrowing rate of 9.6% over the sample period underlying Graham *et al.* (1998)), or

$$OpLeases_{i,t}^{GMS} = XRENT_{i,t} + \sum_{\tau=1}^{5} \frac{MRC_{i,t+\tau}}{(1+r)^{\tau}}. \tag{5}$$

In contrast to the other methodologies, described below, the Graham *et al.* (1998) measure does not incorporate the value of operating leases remaining after fiscal year $t+5$, due to data limitations at the time of the study.

IA.3.2 Method 2: Rauh & Sufi (2012)

Rauh & Sufi (2012) measure the value of operating leases as the sum of the present values of both the rental commitments over the next five years and the estimated value of the rental commitments due thereafter. The magnitude of the rental commitment due in each year between fiscal year $t+6$ to fiscal year $t+6+N_i$ is denoted as $\overline{MRC}_i$, which is defined as $MRCA_{i,t}$ divided by N_i. Here, N_i is equal to $MRCA_{i,t}$ divided by $\frac{1}{5}\sum_{\tau=1}^{5} MRC_{i,t+\tau}$, rounded to the nearest year. The assumption behind this definition of N_i is that rental commitment due in each period beyond year $t+5$ is equal to the average rental commitment between year $t+1$ and year $t+5$. Additionally, $r_{i,t} = r_t$ is set to the time t zero-coupon yield associated with A rated corporate debt, drawn from Bloomberg, for all firms. Thus, the Rauh & Sufi (2012) measure of operating lease liabilities is

$$OpLeases_{i,t}^{RS} = \sum_{\tau=1}^{5} \frac{MRC_{i,t+\tau}}{(1+r_{t+\tau})^{\tau}} + \sum_{\tau=6}^{6+N_i} \frac{\overline{MRC}_i}{(1+r_{t+\tau})^{\tau}}. \tag{6}$$

IA.3.3 Method 3: Cornaggia *et al.* (2013)

Cornaggia *et al.* (2013) measure the value of a firm's operating leases as the sum of the current-year rental expenses plus the present value of future minimum rental commitments over the remaining life of the firm's operating leases. Similar to the Rauh & Sufi (2012) measure, the estimated lease commitments beyond year $t+5$ are denoted $\overline{MRC}_i = MRCA_{i,t}/N_i$, where N_i is $MRCA_{i,t}/MRC_{i,t+5}$ rounded to the nearest year. This suggests that a firm pays a lease expense equal to $MRC_{i,t+5}$ for the N_i years beyond fiscal year $t+5$. Unlike Rauh & Sufi (2012), but in line with Graham *et al.* (1998), the discount rate used to determine the present values is set equal to a constant value of $r_{i,t} = r = 10\%$ for all firms. Consequently, Cornaggia *et al.* (2013) measure operating leases as

$$OpLeases_{i,t}^{CFS} = XRENT_{i,t} + \sum_{\tau=1}^{5} \frac{MRC_{i,t+\tau}}{(1+r)^{\tau}} + \frac{MRC_{i,t+5}}{(1+r)^{5}} \times \frac{1}{r}\left[1 - \frac{1}{(1+r)^{N_i}}\right]. \quad (7)$$

IA.3.4 Method 4: Graham & Lin (2018)

Graham & Lin (2018) also measure the capitalized value of operating leases as the sum of the present value of both the rental commitments over the next five years and the estimated value of the rental commitments due thereafter. Graham & Lin (2018) measure operating leases similar to the Cornaggia *et al.* (2013) method. However, instead of using a constant discount rate across all firms and years, Graham & Lin (2018) employ a firm-specific discount rate. Here, $r_{i,t} = r_i$ is set equal to a firm's interest expense (Compustat annual item XINT) divided by the sum of short-term and long-term debt (Compustat annual items DLC and DLTT, respectively) if possible, and the median value of r_i within the same two-digit SIC code industry if the firm's interest expense is zero or missing. Thus, according to this measure,

$$OpLeases_{i,t}^{GL} = \sum_{\tau=1}^{5} \frac{MRC_{i,t+\tau}}{(1+r_i)^{\tau}} + \frac{MRC_{t+5}}{(1+r_i)^{5}} \times \frac{1}{r_i}\left[1 - \frac{1}{(1+r_i)^{N_i}}\right]. \quad (8)$$

Figure IA.3.1: Discount Rates and Ratings

The figures display mean weighted-average discount rate of operating leases across group of firms of similar credit rating and whose operating leases have similar weighted-average remaining lives. The blue dashed line in each panel displays a firm's predicted discount rate as a function of the remaining life of the firm's leases. This predicted value is obtained by estimating a firm's discount rates as a function of the remaining life of a firm's leases using a fractional polynomial function. All continuous variables in each figure are winsorized at the 99 percent level.

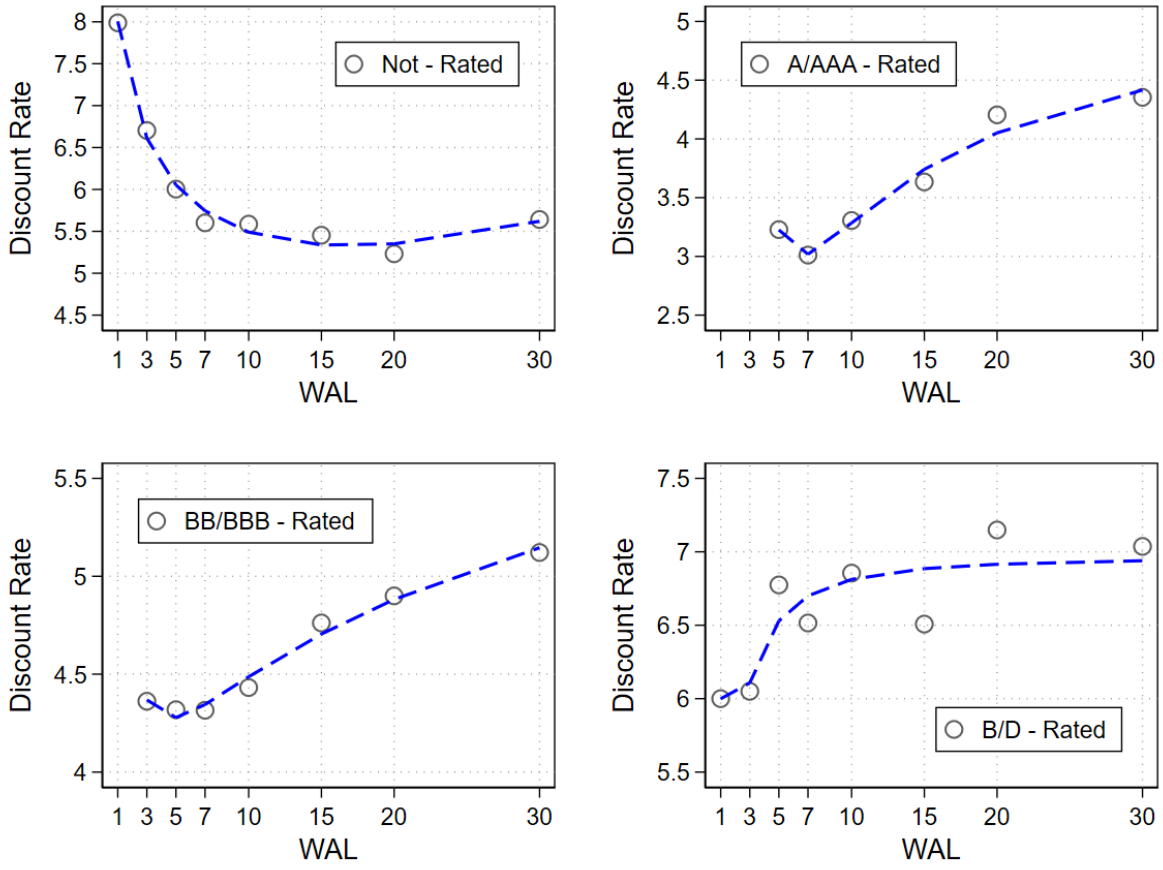


Figure IA.3.2: Discount Rates and Industry

The figures display mean weighted-average discount rate of operating leases across Fama-French 12 industry groups and whose operating leases have similar weighted-average remaining lives. The blue dashed line in each panel displays a firm's predicted discount rate as a function of the remaining life of the firm's leases. This predicted value is obtained by estimating a firm's discount rates as a function of the remaining life of a firm's leases using a fractional polynomial function. All continuous variables in each figure are winsorized at the 99 percent level.

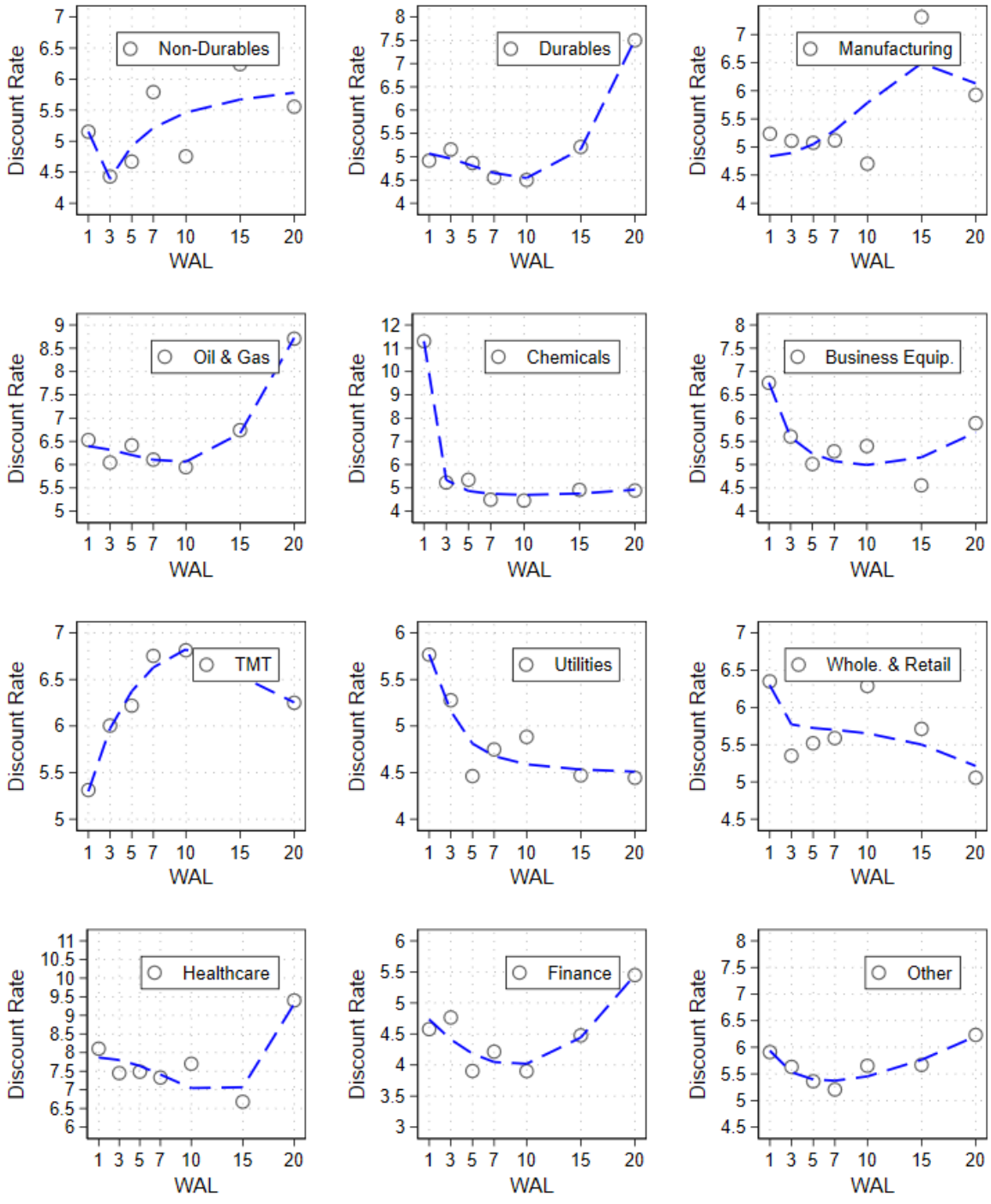


Figure IA.3.3: Lease Ratios by Industry

This figure shows the histogram, kernel density (blue line), and median value (red dotted line) of the lease-to-assets ratio, referred to as the lease ratio, for the first time adopters of the new ASC 842 accounting standard within each Fama-French 12 industry group. Here, the lease ratio is winsorized at the first and 95^{th} percentile.

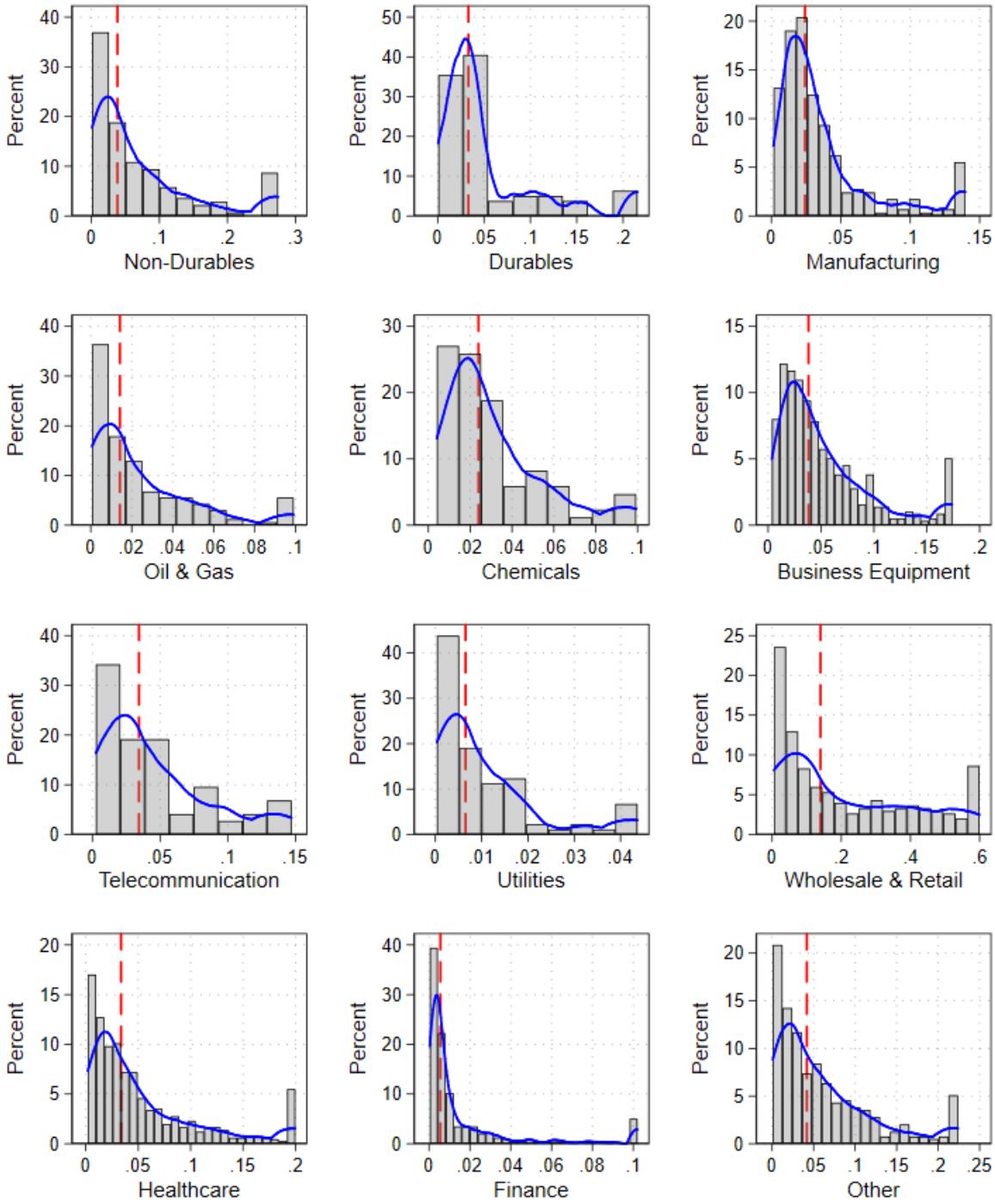


Figure IA.3.4: Weighted Average Discount Rate by Industry

This figure shows the histogram, kernel density (blue line), and median value (red dotted line) of the weighted-average discount for the first time adopters of the new ASC 842 accounting standard within each Fama-French 12 industry group. Here, the weighted-average discount rate is winsorized at the 99 percent level.

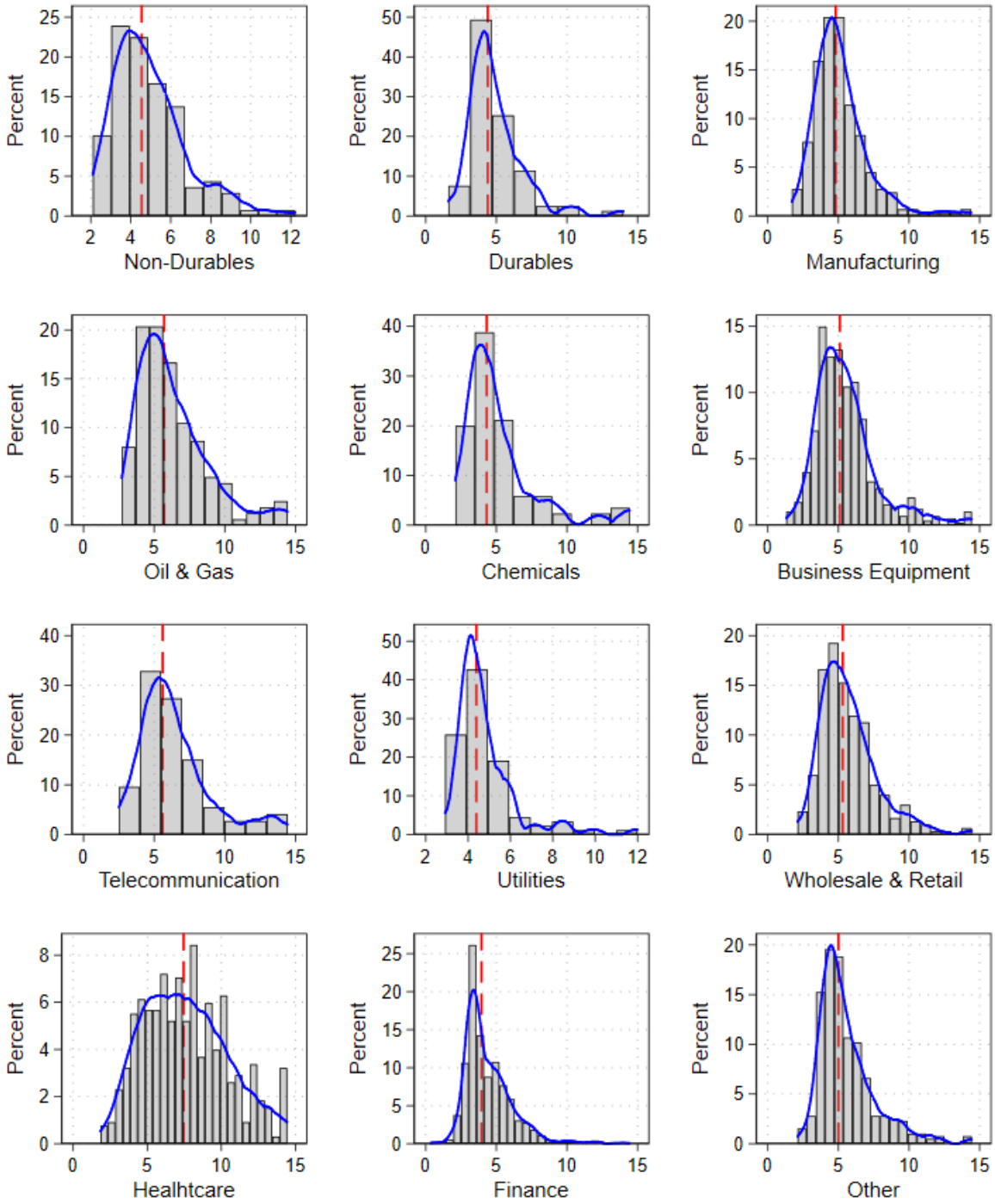


Figure IA.3.5: Weighted Average Life by Industry

This figure shows the histogram, kernel density (blue line), and median value (red dotted line) of the weighted-average life of operating leases for the first time adopters of the new ASC 842 accounting standard within each Fama-French 12 industry group. Here, the weighted-average life of operating leases is winsorized at the 99 percent level.

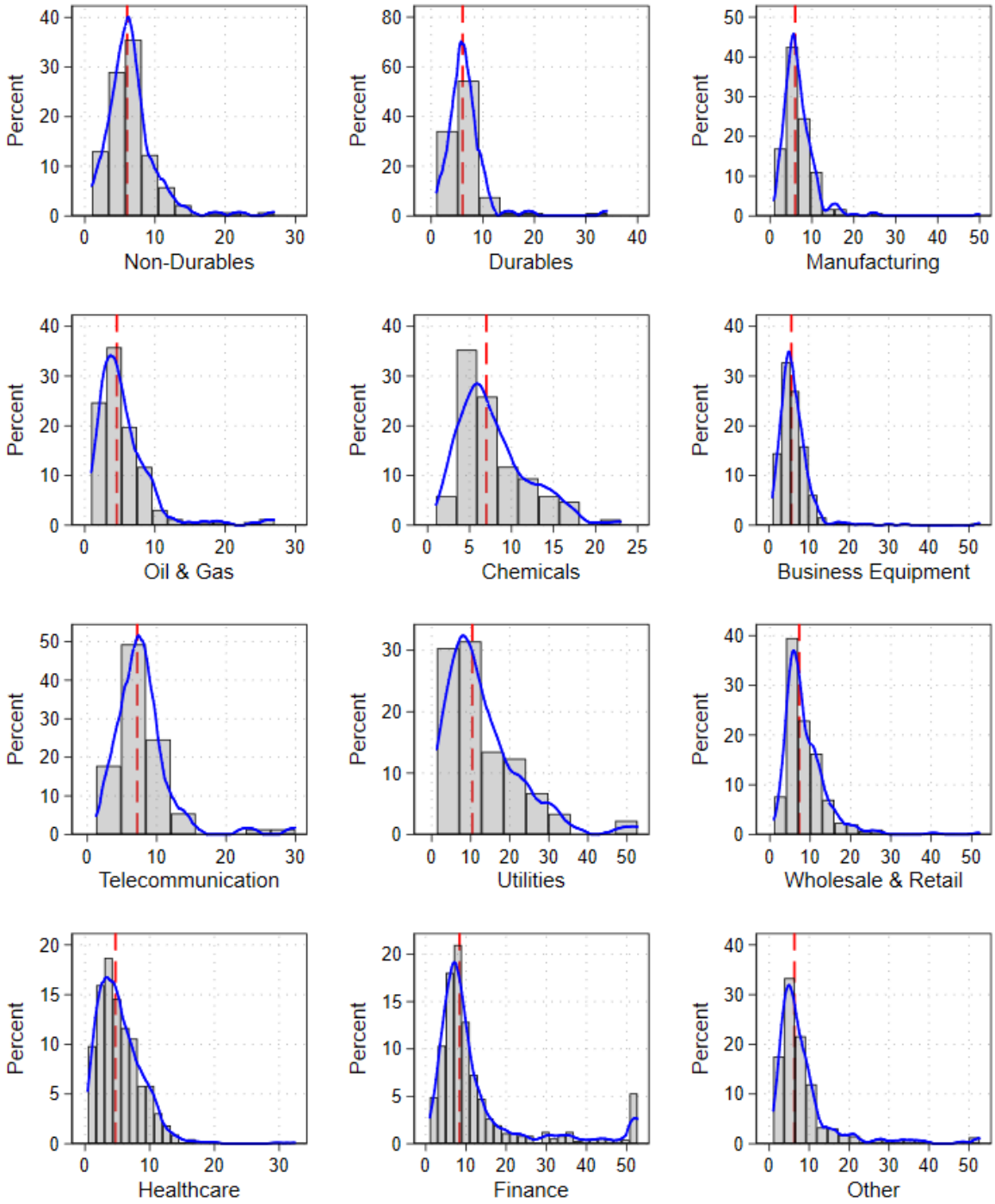


Table IA.3.1: Summary Statistics Across Different Methodologies by Industry

This table reports summary statistics for the sample of first time adopters of the new ASC 842 rule by industry using the Fama-French 12 industry classification. Panel A summarizes various measures of operating leases as a percentage of total assets across various methodologies commonly employed in the literature. Panel B summarizes various measures of leverage after adjusting for operating lease liabilities. We compute each ratio using the actual balance sheet value of operating leases, obtained via the ASC 842 accounting standard and denoted by "10-Q," as well as four estimates of the balance sheet values of leases proposed by the prior literature. These four estimates of the value of operating leases are drawn from Graham *et al.* (1998) (denoted "GLS 1998"), Rauh & Sufi (2012) (denoted "RS 20212"), Cornaggia *et al.* (2013) (denoted "CFS 2013"), and Graham & Lin (2018) (denoted "GK 2018"). All continuous variables are winsorized at the 1 percent level in both tails, and the appendix provides detailed variable descriptions.

Industry	10-Q	GLS 1998	RS 2012	CFS 2013	GK 2018
	Panel A: Lease-to-Assets				
Consumer NonDurables	0.080	0.058	0.085	0.072	0.086
Consumer Durables	0.073	0.044	0.066	0.056	0.066
Manufacturing	0.042	0.032	0.047	0.040	0.045
Oil & Gas	0.029	0.023	0.031	0.027	0.029
Chemicals	0.034	0.027	0.037	0.032	0.034
Business Equipment	0.063	0.049	0.068	0.059	0.066
TMT	0.057	0.040	0.072	0.057	0.057
Utilities	0.027	0.018	0.031	0.025	0.032
Wholesale & Retail	0.239	0.159	0.269	0.219	0.279
Healthcare	0.062	0.050	0.073	0.063	0.067
Finance	0.022	0.015	0.024	0.020	0.024
Other	0.070	0.054	0.076	0.067	0.074
	Panel B: Lease-to-Adj. Assets				
Consumer NonDurables	0.069	0.051	0.072	0.062	0.072
Consumer Durables	0.059	0.039	0.054	0.047	0.053
Manufacturing	0.039	0.030	0.042	0.036	0.040
Oil & Gas	0.027	0.022	0.028	0.025	0.026
Chemicals	0.031	0.025	0.034	0.029	0.032
Business Equipment	0.056	0.044	0.059	0.052	0.057
TMT	0.050	0.036	0.060	0.049	0.050
Utilities	0.021	0.014	0.023	0.019	0.023
Wholesale & Retail	0.176	0.126	0.187	0.161	0.189
Healthcare	0.055	0.045	0.061	0.054	0.056
Finance	0.019	0.013	0.021	0.018	0.021
Other	0.060	0.048	0.065	0.058	0.062
	Panel C: Adj. Leverage				
Consumer NonDurables	0.380	0.367	0.380	0.374	0.381
Consumer Durables	0.352	0.333	0.344	0.339	0.344
Manufacturing	0.330	0.324	0.332	0.328	0.331
Oil & Gas	0.383	0.379	0.383	0.382	0.383
Chemicals	0.423	0.416	0.421	0.419	0.421
Business Equipment	0.286	0.277	0.287	0.282	0.286
TMT	0.514	0.506	0.516	0.512	0.512
Utilities	0.452	0.429	0.434	0.432	0.434
Wholesale & Retail	0.561	0.522	0.552	0.539	0.552
Healthcare	0.296	0.287	0.297	0.293	0.294
Finance	0.188	0.184	0.187	0.186	0.187
Other	0.423	0.415	0.424	0.421	0.423

Table IA.3.2: Discount Rates and the Graham *et al.* (1998) Definition of Lease Ratios
This table reports OLS regression coefficients and standard errors for the effect of lease and firm characteristics on the weighted-average discount rate of operating leases of first time adopters of the new ASC 842 accounting standard. The dependent variable is the weighted-average discount rate reported in the Notes to Consolidated Financial Statements at the end of the fiscal quarter. Independent variables include the weighted-average life of the lease, lease option dummy, lease-to-asset ratio, defined by following Graham *et al.* (1998), the natural logarithm of total assets, leverage, profitability, tangibility, Tobin's q, idiosyncratic volatility, the natural logarithm of firm age, S&P ratings, and a dummy variable that equals one if the firm is not rated, zero otherwise. All continuous variables are winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. All specifications include year-quarter and Fama-French 30 industry fixed effects. Standard errors are robust to heteroskedasticity. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
WAL	0.02***	0.03***	0.03***	0.03***	0.03***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Lease Option (Dummy)	0.16**	0.10	0.14*	0.16**	0.16**
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
Leases/Value	7.63***	5.68***	4.09***	2.05**	1.52*
	(0.91)	(0.86)	(0.84)	(0.82)	(0.82)
Assets		-0.36***	-0.29***	-0.21***	-0.15***
		(0.02)	(0.02)	(0.02)	(0.02)
Age		-0.41***	-0.33***	-0.25***	-0.19***
		(0.05)	(0.04)	(0.05)	(0.05)
Leverage			2.34***	2.16***	2.06***
			(0.19)	(0.18)	(0.19)
Profitability			-2.29***	-1.86***	-2.02***
			(0.24)	(0.24)	(0.24)
Tangibility			-0.40*	-0.34	-0.35
			(0.23)	(0.23)	(0.23)
Tobin's q				-0.10***	-0.09***
				(0.02)	(0.02)
Idiosyncratic Vol.				2.10***	1.99***
				(0.24)	(0.24)
S&P Ratings					-0.15***
					(0.02)
No Rating					-1.26***
					(0.26)
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
FF30 Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.24	0.35	0.45	0.48	0.49
Observations	3548	3548	3266	3157	3157

Table IA.3.3: WAL and Graham *et al.* (1998) Definition of Lease Ratios

This table reports OLS regression coefficients and standard errors for the effect of lease and firm characteristics on the weighted-average life of operating leases of first time adopters of the new ASC 842 accounting standard. The dependent variable is the weighted-average life reported in the Notes to Consolidated Financial Statements at the end of the fiscal quarter. Independent variables include the weighted-average discount rate, lease option dummy, lease-to-asset ratio, defined by following Graham *et al.* (1998), the natural logarithm of total assets, leverage, profitability, tangibility, Tobin's q, idiosyncratic volatility, age, S&P ratings, and a dummy variable that equals one if the firm is not rated, zero otherwise. Each continuous variable is winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. All specifications include year-quarter and Fama-French 30 industry fixed effects. Standard errors are robust to heteroskedasticity. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Discount Rate	0.18***	0.45***	0.19***	0.23***	0.23***
	(0.05)	(0.06)	(0.04)	(0.05)	(0.05)
Lease Option (Dummy)	0.77***	0.77***	0.82***	0.83***	0.84***
	(0.27)	(0.27)	(0.20)	(0.21)	(0.21)
Leases/Value	-0.32	1.68	1.05	0.91	1.13
	(2.33)	(2.29)	(1.89)	(2.05)	(2.07)
Assets		0.74***	0.59***	0.51***	0.47***
		(0.07)	(0.06)	(0.07)	(0.07)
Age		0.47***	0.19	0.13	0.12
		(0.15)	(0.12)	(0.13)	(0.13)
Leverage			0.05	0.15	-0.08
			(0.41)	(0.42)	(0.44)
Profitability			0.79**	0.53	0.54
			(0.35)	(0.35)	(0.36)
Tangibility			5.95***	5.95***	5.95***
			(0.85)	(0.86)	(0.86)
Tobin's q				-0.03	-0.02
				(0.04)	(0.04)
Idiosyncratic Vol.				-1.88***	-1.90***
				(0.41)	(0.41)
S&P Ratings					-0.06
					(0.06)
No Rating					-1.14*
					(0.61)
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
FF30 Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.14	0.17	0.20	0.20	0.20
Observations	3548	3548	3266	3157	3157

Table IA.3.4: Option to Extend and Graham *et al.* (1998) Definition of Lease Ratios
This table reports OLS regression coefficients and standard errors for the effect of lease and firm characteristics on the presence of option to extend or renew existing leases of first time adopters of the new ASC 842 accounting standard. The dependent variable is an indicator that takes a value of one if a firm uses leases that contain renewal or extension options at the end of the fiscal quarter. Independent variables include the weighted-average discount rate, weighted-average life of the lease, lease-to-asset ratio, defined by following Graham *et al.* (1998), the natural logarithm of total assets, leverage, profitability, tangibility, Tobin's q, idiosyncratic volatility, the natural logarithm of firm age, S&P ratings, and a dummy variable that equals one if the firm is not rated, zero otherwise. Each continuous variable is winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. All specifications include year-quarter and Fama-French 30 industry fixed effects. Standard errors are robust to heteroskedasticity. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
WAL	0.00***	0.00***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Discount Rate	0.01**	0.01	0.01**	0.01**	0.01**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Leases/Value	0.55***	0.63***	0.70***	0.94***	0.93***
	(0.18)	(0.19)	(0.19)	(0.20)	(0.21)
Assets		0.01*	0.01	0.01	0.01
		(0.00)	(0.01)	(0.01)	(0.01)
Age		-0.05***	-0.06***	-0.05***	-0.05***
		(0.01)	(0.01)	(0.01)	(0.01)
Leverage			-0.09**	-0.10**	-0.09**
			(0.04)	(0.04)	(0.04)
Profitability			0.07*	0.07*	0.07
			(0.04)	(0.04)	(0.04)
Tangibility			-0.05	-0.03	-0.03
			(0.06)	(0.06)	(0.06)
Tobin's q				0.02***	0.02***
				(0.01)	(0.01)
Idiosyncratic Vol.				-0.02	-0.02
				(0.04)	(0.04)
S&P Ratings					0.00
					(0.01)
No Rating					0.04
					(0.06)
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
FF30 Fixed Effects	Yes	Yes	Yes	Yes	Yes
Pseudo.-R^2	0.04	0.05	0.05	0.06	0.06
Observations	3548	3548	3266	3157	3157

Table IA.3.5: Graham *et al.* (1998) Definition of Lease Ratios and Controls

This table reports OLS regression coefficients and standard errors for the effect of lease and firm characteristics on the lease-to-asset ratios of first time adopters of the new ASC 842 accounting standard. The dependent variable is the lease-to-asset ratio, defined by following Graham *et al.* (1998), at the end of the fiscal quarter. Independent variables include the weighted-average discount rate, weighted-average life of the lease, lease option dummy, the natural logarithm of total assets, leverage, profitability, tangibility, Tobin's q, idiosyncratic volatility, the natural logarithm of firm age, S&P ratings, and a dummy variable that equals one if the firm is not rated, zero otherwise. Each continuous variable is winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. All specifications include year-quarter and Fama-French 30 industry fixed effects. Standard errors are robust to heteroskedasticity. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Discount Rate	0.00***	0.00***	0.00***	0.00**	0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
WAL	-0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Lease Option (Dummy)	0.00***	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Assets		-0.00***	-0.00***	-0.00***	-0.00***
		(0.00)	(0.00)	(0.00)	(0.00)
Age		0.00***	0.00***	0.00**	0.00***
		(0.00)	(0.00)	(0.00)	(0.00)
Leverage			0.02***	0.02***	0.02***
			(0.00)	(0.00)	(0.00)
Profitability			0.00	0.00	-0.00
			(0.00)	(0.00)	(0.00)
Tangibility			0.04***	0.03***	0.03***
			(0.01)	(0.01)	(0.01)
Tobin's q				-0.01***	-0.01***
				(0.00)	(0.00)
Idiosyncratic Vol.				0.01***	0.01***
				(0.00)	(0.00)
S&P Ratings					-0.00***
					(0.00)
No Rating					-0.01
					(0.01)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
FF30 Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.35	0.35	0.38	0.44	0.45
Observations	3548	3548	3266	3157	3157

Table IA.3.6: Variance Decomposition

This table reports a variance decomposition for the effect of some variables lease characteristics of first-time adopters of the new ASC 842 accounting standard. The dependent variable is either the weighted-average discount rate or the weighted-average remaining life of operating lease at the end of the fiscal quarter. Independent variables include the same controls of Table 5. We compute the partial sum of squares for each variable and fixed effects and normalize to sum to one across specifications. Each continuous variable is winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix.

	Weighted-Average Discount Rates						Weighted-Average Remaining Lives					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Industry FE	0.92	-	0.85	-	0.19	0.19	0.98	-	0.96	-	0.63	0.56
Time FE	0.08	-	0.08	-	0.11	0.10	0.02	-	0.01	-	0.02	0.02
Discount Rate	-	-	-	-	-	-	-	0.66	0.02	-	-	0.04
WAL	-	0.14	0.01	-	-	0.02	-	-	-	-	-	–
Lease Option (Dummy)	-	0.29	0.00	-	-	0.01	-	0.34	0.01	-	-	0.04
Lease-to-Asset	-	0.57	0.05	-	-	0.00	-	0.00	0.00	-	-	0.00
Assets	-	-	-	0.07	0.04	0.04	-	-	-	0.41	0.10	0.10
Age	-	-	-	0.03	0.02	0.02	-	-	-	0.00	0.00	0.00
Leverage	-	-	-	0.26	0.21	0.19	-	-	-	0.02	0.00	0.00
Profitability	-	-	-	0.28	0.17	0.16	-	-	-	0.01	0.00	0.00
Tangibility	-	-	-	0.01	0.00	0.00	-	-	-	0.30	0.22	0.19
Tobin's q	-	-	-	0.01	0.03	0.03	-	-	-	0.02	0.00	0.00
Idiosyncratic Vol.	-	-	-	0.25	0.15	0.15	-	-	-	0.19	0.02	0.03
SP Ratings	-	-	-	0.05	0.06	0.05	-	-	-	0.03	0.01	0.00
No Rating	-	-	-	0.04	0.03	0.03	-	-	-	0.03	0.01	0.01
Adj-R^2	0.22	0.03	0.24	0.44	0.48	0.49	0.13	0.01	0.14	0.12	0.19	0.20

Table IA.3.7: Variance Decomposition

This table reports a variance decomposition for the effect of some variables lease characteristics of first time adopters of the new ASC 842 accounting standard. The dependent variable is either the lease-to-asset ratio or the option to extend/renew existing operating leases at the end of the fiscal quarter. Independent variables include the same controls of Table IA.3.4. We compute the partial sum of squares for each variable and fixed effects and normalize to sum to one across specifications. Each continuous variable is winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix.

	Lease-to-Asset						Option to Renew/Extend					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Industry FE	0.97	-	0.93	-	0.88	0.87	0.69	-	0.53	-	0.53	0.31
Time FE	0.03	-	0.03	-	0.03	0.04	0.31	-	0.32	-	0.29	0.26
Discount Rate	-	0.77	0.03	-	-	0.00	-	0.55	0.03	-	-	0.03
WAL	-	0.00	0.00	-	-	0.00	-	0.14	0.06	-	-	0.11
Lease Option (Dummy)	-	0.23	0.01	-	-	0.01	-	-	-	-	-	–
Lease-to-Asset	-	-	-	-	-	-	-	0.32	0.06	-	-	0.08
Assets	-	-	-	0.12	0.00	0.01	-	-	-	0.07	0.01	0.01
Age	-	-	-	0.00	0.00	0.00	-	-	-	0.65	0.12	0.11
Leverage	-	-	-	0.75	0.04	0.04	-	-	-	0.00	0.01	0.03
Profitability	-	-	-	0.00	0.00	0.00	-	-	-	0.01	0.01	0.02
Tangibility	-	-	-	0.09	0.03	0.03	-	-	-	0.00	0.00	0.00
Tobin's q	-	-	-	0.01	0.00	0.00	-	-	-	0.24	0.03	0.04
Idiosyncratic Vol.	-	-	-	0.02	0.00	0.00	-	-	-	0.02	0.00	0.00
SP Ratings	-	-	-	0.00	0.00	0.00	-	-	-	0.00	0.00	0.00
No Rating	-	-	-	0.00	0.00	0.00	-	-	-	0.00	0.00	0.00
Adj-R^2	0.36	0.02	0.37	0.09	0.42	0.42	0.03	0.02	0.04	0.01	0.04	0.05

Table IA.3.8: The Role of Financial Distress

This table reports OLS regression coefficients and standard errors for the effect of distress on the weighted-average discount rate, weighted-average remaining life, option to extend/renew, and lease-to-asset ratios of first time adopters of the new ASC 842 accounting standard. The dependent variable is the weighted-average discount rate (Panel A), the weighted-average remaining life of operating lease (Panel B), an indicator that takes a value of one if a firm uses leases that contain renewal or extension options (Panel C), and the lease-to-asset ratio (Panel D). Independent variables include the probability of default estimated using Merton (1974)'s structural model, and controls as in Table 5. Each continuous variable is winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. All specifications include year-quarter and Fama-French 30 industry fixed effects. Standard errors are robust to heteroskedasticity. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
			Panel A: Discount Rate		
Probability of Default	2.76***	2.26***	1.50***	0.74***	0.70***
	(0.23)	(0.23)	(0.22)	(0.22)	(0.22)
Adj.-R^2	0.27	0.37	0.47	0.50	0.51
			Panel B: WAL		
Probability of Default	-2.13***	-1.88***	-1.05**	-0.46	-0.46
	(0.62)	(0.60)	(0.49)	(0.54)	(0.55)
Adj.-R^2	0.13	0.16	0.18	0.18	0.18
			Panel C: Option to Extend		
Probability of Default	-0.12***	-0.12***	-0.11***	-0.10**	-0.10**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)
Pseudo.-R^2	0.03	0.04	0.04	0.04	0.04
			Panel D: Lease-to-Asset		
Probability of Default	-0.00	-0.00	-0.02**	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Adj.-R^2	0.38	0.39	0.42	0.42	0.43

Table IA.3.9: The Role of Financial Constraints

This table reports OLS regression coefficients and standard errors for the effect of financial constraints on the weighted-average discount rate, weighted-average remaining life, option to extend/renew, and lease-to-asset ratios of first time adopters of the new ASC 842 accounting standard. The dependent variable is the weighted-average discount rate (Panel A), the weighted-average remaining life of operating lease (Panel B), an indicator that takes a value of one if a firm uses leases that contain renewal or extension options (Panel C), and the lease-to-asset ratio (Panel D). Independent variables include the SA index as measure of financial constraints (as in Hadlock & Pierce (2010)), and controls as in Table 5 except for firm size and age. We remove firm size and age as controls due to their mechanically high correlations with the SA (size-age) index. Each continuous variable is winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. All specifications include year-quarter and Fama-French 30 industry fixed effects. Standard errors are robust to heteroskedasticity. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
			Panel A: Discount Rate		
Financial Constraints	1.99***	2.07***	1.29***	0.69***	0.51***
	(0.12)	(0.12)	(0.14)	(0.15)	(0.15)
Adj.-R^2	0.30	0.32	0.40	0.46	0.48
			Panel B: WAL		
Financial Constraints	-3.36***	-4.16***	-3.08***	-2.60***	-2.30***
	(0.22)	(0.27)	(0.30)	(0.34)	(0.34)
Adj.-R^2	0.16	0.17	0.19	0.19	0.20
			Panel C: Option to Extend		
Financial Constraints	-0.08***	-0.10***	-0.13***	-0.15***	-0.17***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
Pseudo.-R^2	0.04	0.05	0.05	0.06	0.06
			Panel D: Lease-to-Asset		
Financial Constraints	0.02***	0.02***	0.02***	0.02***	0.01*
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Adj.-R^2	0.37	0.37	0.41	0.41	0.42

Table IA.3.10: Marginal Tax Rates

This table reports OLS regression coefficients and standard errors for the effect of marginal tax rates on the weighted-average discount rate, weighted-average remaining life, option to extend/renew, and lease-to-asset ratios of first time adopters of the new ASC 842 accounting standard. The dependent variable is the weighted-average discount rate (Panel A), the weighted-average remaining life of operating lease (Panel B), an indicator that takes a value of one if a firm uses leases that contain renewal or extension options (Panel C), and the lease-to-asset ratio (Panel D). Independent variables include the before and after financing costs marginal tax rates from Graham *et al.* (1998), and controls as in Table 5. Each continuous variable is winsorized at the 1 percent level in both tails. All variables are described in detail in the Online Appendix. All specifications include year-quarter and Fama-French 30 industry fixed effects. Standard errors are robust to heteroskedasticity. ***, **, * correspond to statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
			Panel A: Discount Rate		
MTR (Before)	-11.17***	-7.62***	-6.15***	-5.32***	-5.50***
	(0.57)	(0.60)	(0.66)	(0.65)	(0.65)
MTR (After)	-10.44***	-7.27***	-5.62***	-4.81***	-4.84***
	(0.52)	(0.54)	(0.57)	(0.57)	(0.56)
			Panel B: WAL		
MTR (Before)	14.64***	8.17***	3.02**	2.26*	2.03
	(1.57)	(1.68)	(1.31)	(1.33)	(1.35)
MTR (After)	12.48***	6.86***	2.46*	1.95	1.73
	(1.59)	(1.66)	(1.32)	(1.34)	(1.36)
			Panel C: Option to Extend		
MTR (Before)	-0.06	-0.04	-0.19	-0.16	-0.15
	(0.13)	(0.14)	(0.15)	(0.15)	(0.15)
MTR (After)	-0.06	-0.06	-0.20	-0.18	-0.17
	(0.12)	(0.13)	(0.13)	(0.14)	(0.14)
			Panel D: Lease-to-Asset		
MTR (Before)	-0.03	0.00	-0.00	0.00	0.00
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
MTR (After)	-0.09***	-0.07***	-0.07***	-0.06**	-0.06**
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)