Market evaluation of off-balance sheet financing: You can run but you can't hide*

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Abstract

A commonly cited motivation for off-balance sheet financing is a reduction in reported book (balance sheet) leverage. Operating leases, the most common form of off-balance sheet financing, are required to be disclosed in financial statement footnotes, but limited disclosure complicates external evaluation of the effective amount of off-balance sheet debt. In this paper we investigate the market evaluation of operating leases. We compare the impact of operating leases on debt ratings and the yield of new debt issues to that of balance sheet debt.

We document three central findings. First, operating leases are significantly less important than balance sheet debt for firm debt ratings. Second, operating leases have the same impact as balance sheet debt on the yields of new bond issues. Combined, these findings indicate that while moving debt off-balance sheet may be useful in maintaining higher debt ratings, it does not fool the market, because bond yields reflect off-balance sheet obligations, despite their limited disclosure, in the same manner as balance sheet debt. Finally, the simple perpetuity approach to estimating operating lease debt appears to be most consistent with the market evidence. Using the perpetuity method, we estimate operating lease debt to be of comparable magnitude to balance sheet debt.

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1. Introduction

There is increasing recognition that off-balance sheet financing vehicles, particularly operating leases, are a significant component of capital structure. For example, by including operating leases in firm debt, Graham, Lemmon and Schallheim (1998) find a positive relation between debt levels and taxes, which contrasts with findings in prior studies that used only balance sheet debt.[1] While Graham et al. find that operating leases help explain internal firm decisions, there is little available evidence on how operating leases are reflected in external evaluation of firms. Two exceptions are Imhoff et al. (1993), and Ely (1995), that find a relation between operating leases and equity volatility.

A significant roadblock to including operating leases in financial analysis is that operating leases have limited disclosure requirements, as emphasized in recent calls for increased disclosure.[2] Ratings agencies and finance textbooks agree that long-term lease obligations represent debt, regardless of the accounting treatment.[3] But there is no consensus as to how to estimate the amount of debt represented by operating leases.

In this paper we address the previously unstudied question of how off-balance sheet operating leases affect a firm's cost of debt. We examine the impact of operating lease debt on

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[1] Graham et al. (1998) take the present value – at ten percent – of minimum lease commitments for the next five years. We refer to this method as the "truncated S&P method" because unlike the normal S&P method it excludes the minimum commitments past year five. Thus, the truncated S&P method – by construction – excludes a component of reported lease commitments.

[2] Recently, the former SEC chairman Arthur Levitt Jr asked "Should companies still be allowed to leave billions of off-balance sheet debt, such as lease financing, out of a company's reported liabilities? Off-balance sheet debt persists, distorting the financial picture investors have been given in companies in many sectors. Markets will discipline themselves and their participants but only if they have accurate financial information." (*Wall Street Journal*, 2/10/2003). Shortly following the Enron bankruptcy filing, Business Week published a special issue entitled "Accounting in Crisis," in which a number of companies using extensively operating leases were cited as "hiding debt" by moving obligations off their balance sheets (*Business Week*, January 28, 2002).

[3] For example, see Brealey and Myers, 2002, p. 733.

firm debt ratings and the cost of new debt issues by comparing the impact of off-balance sheet to on-balance sheet debt. First, we find that operating leases are significantly less important than balance sheet debt for firm debt ratings. Second, operating leases have the same impact as balance sheet debt on the yields of new bond issues. Combined, these findings indicate that while moving debt off-balance sheet may be an effective way to maintain higher debt ratings, it does not fool the market, because bond yields reflect effective leverage, whether is represented by on- or off-balance sheet obligations.

Third, in order to examine the impact of off-balance sheet debt on the cost of debt, we estimate operating lease debt using several different approaches. By comparing the impact of operating lease debt (estimated using the various approaches) on cost of new debt to that of on-balance sheet debt, we are able to provide insight into not only the market's evaluation of off-balance sheet debt, but also the reasonableness of the different approaches to estimating the amount of debt represented by operating leases.

We estimate operating lease debt using variations on two conceptually different main approaches. The approach suggested by Standard and Poors (S&P) takes the present value of reported minimum contractual commitments – an approach ostensibly consistent with liquidation accounting. On the other hand, Moody's and McKinsey advise the use of multiples of operating lease expense, consistent with treating lease obligations as a permanent part of the capital structure in a going concern.[4] We refer to the minimum commitment approach as the S&P method, and the multiples approach as the perpetuity method. The difference in the methods is substantial, with the perpetuity method providing estimates 2 to 3 times larger than the S&P approach.

[4] Some security analysts use a "rule of thumb" to estimate the debt-equivalent value of operating leases by multiplying the annual rent by a factor of 8 (see AAA Financial Accounting Standards Committee, 2001).

We investigate the market's evaluation of off-balance sheet debt by comparing the impact of estimated operating lease debt on firm cost of debt to the impact of on-balance sheet debt. If the market evaluates operating lease debt in the same manner as balance sheet debt, then debt should have the same effect whether it is on or off-balance sheet. Therefore our null hypothesis is that operating lease debt has the same impact as balance sheet debt. On the other hand, calls for increased disclosure suggest that firms are able to hide debt by using operating leases. If so, we would expect operating lease debt to be less important than balance sheet debt, which is our alternative hypothesis.

Our results indicate that operating lease debt is significantly less important than balance sheet debt for firm-wide debt ratings. Using variations of the two main approaches to estimating operating lease debt, we find balance sheet debt to be 25% to 200% more important than operating lease debt for debt ratings. The results suggest that firms may be able to manage credit ratings by using off-balance sheet debt. On the other hand, our evidence from the cost of new debt issues indicates that operating lease debt is at least as important as balance sheet debt in determining the yield of new bond issues. We conclude that while operating lease debt may allow firms to manage their credit rating, the market appears to assign at least as much importance to operating lease debt as balance sheet debt in its pricing of debt issues.

Our evidence on the relationships between estimated operating lease debt and credit ratings and the cost of debt also provides evidence on how the market evaluates the magnitude of operating lease debt. No matter which method we use to estimate operating leases, balance sheet debt is substantially more important for credit ratings, which is not particularly helpful in determining which method has more validity, as credit ratings are set by credit agencies, not the market. But the impact on the cost of debt is more illuminating. Using the S&P (minimum

commitment) approach, operating lease debt has twice the impact that balance sheet debt has on the cost of debt. However, using the perpetuity approach, we fail to reject the null hypothesis that bond yields reflect operating lease debt in the same manner as balance sheet debt. We interpret this evidence using the cost of debt as suggesting that the market evaluates operating leases as perpetuities in its pricing of new debt issues.

The market evidence suggests that the S&P approach substantially understates lease value. We consider the evidence reasonable, because the S&P approach implicitly makes three assumptions: i) leases are not renewed; ii) assets are not replaced; and iii) firms have no economic exposure to the leased assets. If any of these assumptions is untrue, the S&P method is akin to estimating the value of a bond by discounting only the coupon payments, but ignoring the principal. When balance sheet debt matures, either the principal is refinanced or an asset (cash) vanishes. Similarly, when lease contracts expire, firms intending to continue control over leased assets must either refinance or purchase the asset.[5] The S&P method assumes no economic exposure to the leased asset, and no economic consequence to lease expiration. Therefore, we label these S&P assumptions collectively as the "vanishing obligation" assumptions. Because both the truncated and the normal S&P methods embed the "vanishing obligation" assumptions, they are likely to underestimate lease values.

We provide additional evidence on which method provides the "best" estimate of the value of lease-related off-balance sheet debt. We find that the perpetuity method, based on

[5] Even when firms are willing to give up the asset, lease contract features often entail an economic equivalent to a purchase requirement, such as residual value guarantees, effectively obligating the firm to purchase the asset for a fixed price first. For example, Brinker International disclosed in its 2002 10-K that in February 2002 it terminated lease facilities with combined original value of $155 million prior to their maturity, and purchased the assets. The facilities had a residual value guarantee of 87% of the total amount funded under the leases.

capitalization of current lease expenses, is the best predictor of future leasing expenses.[6] In contrast, the S&P approach underestimates the future actual payments by 50% or more.

The remainder of the paper is structured as follows. Section 2 reviews accounting and empirical issues related to operating leases. Section 3 describes the data sources and the various methodologies we use to evaluate operating lease debt, and also provides results summarizing the differences in evaluation methodologies. Section 4 compares the impact of off-balance sheet debt to on-balance sheet debt for credit ratings and the cost of new debt issues. Section 5 provides additional evidence on the choice of evaluation method for operating leases, and section 6 concludes the paper.

2. The accounting treatment and disclosure of off-balance sheet leases

2.1. Overview

The importance of including operating leases in studying capital structure decisions is emphasized by evidence reported in Graham, Lemmon and Schallheim (1998). They estimate the value of the off-balance sheet debt represented by operating leases using the truncated S&P method, which discounts the future minimum lease commitments (only for the first five years, as the amount "thereafter" was not reported by COMPUSTAT) at 10% (as proxy for the cost of debt).[7] By including operating leases in firm debt, the authors find a positive relation between debt levels and taxes, which contrasts with findings in prior studies that used only balance sheet debt. The importance of leasing is underscored by the fact that Graham, Lemmon and Schallheim (GLS) used a method likely to substantially underestimate operating lease debt. By omitting commitments beyond five years, the truncated S&P method used by GLS certainly

[6] The perpetuity approach estimates operating lease debt assuming perpetual payments discounted at a chosen rate.
[7] Graham et al. also use the firm short-term borrowing rate as the discount rate.

underestimates future obligations. However, even the normal S&P method is likely to underestimate the value of operating leases in several ways.

First, and most importantly, the approach embeds what we call the "vanishing obligation" assumption, which generates estimates of operating lease debt akin to estimating the value of a bond by discounting only the coupon payments – but ignoring the principal. From a liquidation accounting perspective, the S&P treatment may make sense, because the firm does not own the leased assets and may be obligated only to the extent shown in the minimum commitments.[8] However, when the lease contract reaches maturity, the "going concern" firm either has to renew the lease, purchase the asset, or else give up the asset. In reality, when lease contracts expire, firms intending to continue control over leased assets must either refinance or purchase the asset. Even when firms are willing to give up the asset, lease contract features such as residual value guarantees effectively obligate the firm to purchase the asset for a fixed price first.

When balance sheet loans or bonds mature, either the principal is refinanced or an asset (cash) vanishes. Similarly, when leases mature, either new financing is obtained, or an asset vanishes. Many leases embed what is the economic equivalent to a purchase requirement (such as residual value guarantees). The S&P method assumes no economic exposure to the leased asset. Moreover, the S&P approach also assumes no economic consequence to lease expiration. When off-balance sheet debt matures, various purchase options will generally result in either: i) lease renewal; ii) purchase of the asset by the lessee; or iii) sale of the leased asset by the special purpose entity ("SPE"), where sale proceeds in excess of principal owed to entity lenders are allocated to the equity holders of the SPE (typically 97% lessee and 3% lending institution). In each case, lease maturity has essentially the same economic consequences as debt maturity. The

[8] However, reported minimum commitments typically exclude residual value guarantees, leading reported minimum commitments to understate firm obligations.

S&P method, which fails to consider the economic effect of lease maturity, would substantially underestimate off-balance sheet debt. Because both the truncated S&P method and the normal S&P method rely on reported minimum commitments, both approaches embed the "vanishing obligation" assumptions, and therefore underestimate lease values.

With the S&P approach, if leases had very long maturities, the error would be small. But one of the conditions for leases to qualify as operating leases requires that the present value of payments be less than 90% of the asset value at lease origination, or that the lease term is less than 75% of the economic life of the leased asset. Therefore, even at lease origination, the present value of the payments does not fully capture the obligation, and as lease maturities approach, the error is exacerbated.

The S&P method also underestimates operating lease debt for a second reason: future minimum commitments underestimate expected future lease expense, because lease maturities are typically much shorter than bond maturities. For example, Phillips Petroleum recently disclosed the maturity structure of their off-balance sheet debt, which we reproduce as Figure 1. Note that 67% of their off-balance sheet debt matures within about four years. Many operating leases have short maturities at lease origination (between three to seven years for most synthetic leases), and/or are near maturity at any given point in time.[9] Therefore, reported minimum commitments usually decline substantially from year one (the year following the date of the 10-K) through year five, as short-term operating leases expire.

[9] For example, Stohs and Mauer (1996) report an average remaining maturity for equipment leases lower than seven years.

2.2. Accounting Treatment of operating leases

Firms use operating leases for a number of reasons. Value-maximizing motives include low-cost financing, tax-related incentives (such as alternative minimum tax), limited access to other external funds, as well as the use of assets with shorter lives that are more prone to the effects of innovation or high maintenance. However, managers have a variety of other incentives to keep debt off of the books. Compensation incentives are often calculated on the basis of such financial ratios as return on assets, return on equity, and debt-to-equity. Earnings management incentives exist as well, because transactions such as "Sale and Leasebacks" can be used to record gains or losses. Gramlich et al. (2001) document manager's non-random behavior in reclassifying debts (from short-term debt to long-term debt and vice versa) for smoothing measures of liquidity and leverage reported on the balance sheet. Lipe (2001) provides a nice review about empirical research on lessee accounting focusing on the implications of unrecorded debt-equivalent values of operating leases.

Much off-balance sheet financing is via operating leases. The current accounting rule (Statement of Financial Accounting Standards, SFAS, No. 13) mandates capitalizing leases on the books of the lessee if a lease satisfies any one of the following criteria:

1. The lease transfers ownership of the asset to the lessee by the end of the lease term.
2. The lease contains a bargain purchase option.
3. The non-cancelable lease term is 75% or more of the estimated economic life of the leased asset.
4. The present value of the minimum lease payments equals or exceeds 90% of the fair value of the leased assets.

SFAS No. 13 requires that the capitalized dollar amount be equal to the discounted present value of the minimum lease payments specified in the lease. The discount rate that is used to determine the present value is the lower of the lessee's incremental borrowing rate or the lessor's rate of return that is implicit to the lease. SFAS No. 13 defines the lessee's incremental

borrowing rate as the rate that the lessee "would have incurred to borrow the funds necessary to buy the leased asset on a second loan with repayment terms similar to the payment schedule call for in the lease". If the lessee cannot determine the lessor's rate of return, the lessee uses the incremental borrowing rate.

Note that the first three criteria for capitalizing lease commitments can be readily circumvented, and managers have incentives not to capitalize their lease contracts. However, criterion 4 is the most difficult to circumvent and undoubtedly accounts for many of the capital leases that ultimately appear on financial statements. U.K. accounting standards for leases use only the fourth criterion for differentiating between operating and capital leases. Reither (1998) reports that SFAS No. 13 was voted as one of the least favorite Financial Accounting Standard Board (FASB) standards in a survey of accounting academics, regulators, and practitioners. Lipe (2001) speculates that accountants may soon reconsider accounting rules for lease transactions: FASB has issued two special reports on lease accounting (*Accounting for Leases: A New Approach-Recognition by Lessees of Assets and liabilities Arising under Lease Contracts* 1996, *Leases: Implementation of New Approach* 2000). The special reports represent a movement to capitalize all leases that convey significant property rights. In addition, FASB is actively investigating methods of capitalization -- for example, they have invited public comments on whether the capitalization should be limited to the present value of minimum payments required by the lease or extended to the value of property rights conveyed by the lease when the present value of the minimum payments is significantly below the value of the property rights.

2.3. Synthetic leases

Some off-balance sheet financing takes the form of leveraged and synthetic leases.[10] Synthetic leases are particularly interesting arrangements which, in essence, provide a lessee firm with 100% financing for an asset, allows the lessee firm to retain up to 97% economic and tax ownership of the asset (allowing the firm to depreciate the asset for tax purposes), while keeping the financing off the books by meeting the FASB standards for qualification as operating leases. As described by G.E. Capital (www.gecfo.com/equipment/tax.html):

> *Off-Balance Sheet Financing - Synthetic Leasing*
> This form of off-balance sheet financing is a loan for federal tax purposes that uses lease documentation and is subject to lease accounting for financial reporting. This product suits clients that wish to retain the tax benefits of equipment ownership, control of the asset and any residual upside. Through this structure, a business can receive ownership tax benefits without incurring debt on its balance sheet for accounting purposes.

While the structure of a synthetic lease can be quite complex, synthetic leases are debt structured to meet operating lease criteria. Recently, First Union / Wachovia Securities has disclosed financing arrangements that include examples of off-balance sheet financing structures (some with interesting nomenclature) qualifying as operating leases, some of which exceed one billion dollars in value.[11]

The arrangement in synthetic leases in which the lessee (the borrower) largely retains the ownership of the leased asset has important implications for the valuation of leases, because the lease payment to the lessor in that case would tend to represent exclusively a finance charge as the lessee de facto owns the asset. This is substantially different from the case of a regular

[10] According to Rob Urban of Bloomberg News, the Financial Accounting Standards Board estimated that $100 billion of property was financed with synthetic leases, which allowed companies to keep real estate loans off the books while enjoying the tax benefits of ownership. The leases are used by more than 2,000 companies in the United States, including AOL Time Warner, Microsoft Corp., Cisco Systems, 3Com Corp. and Symantec Corp. to finance items from headquarters buildings to retail stores. (*Bloomberg News*, February 28, 2002)

[11] See http://business.firstunion.com/tombstones/0,3683,31,00.html

operating lease, where the lease payments would consist of both a finance charge and a depreciation charge (since the lessor owns the asset).[12]

2.4. Accounting disclosure and off-balance sheet financing

Operating leases are often cited as an example of financing with limited disclosure requirements. Operating leases are usually disclosed in the footnotes to financial statements, but typically the only quantitative information reported has been minimum contractual commitments. Recently at least one firm has provided additional disclosure that allows us to illustrate the issues by means of an example. A recent presentation by Phillips Petroleum indicated that as of 10/31/01, Phillips had $4.7 billion in off-balance sheet debt maturing after 2001. Phillips also reported $8.6 billion of balance sheet debt, thus off-balance sheet was about 37% of the $13.3 billion total debt.[13] The existing S&P approaches using information reported in the footnotes to Phillips 10-K for its fiscal year ended December 31, 2001 generate the following lease value estimates:

Approach	Estimated Value	Percentage of Reported Value
Truncated S&P (GLS 1998)	$1.6 billion	34%
Normal S&P	2.2 billion	47%
Reported 10/31/01	4.7 billion	100%

In this example, the truncated S&P approach (Graham, Lemmon and Schallheim, 1998) captures 34% of the reported value, while the normal S&P approach, which includes the minimum obligations beyond five years captures 47% of the reported amount. Thus, the

[12] For detailed treatment on the valuation of the regular operating lease, see McConnell and Schallheim (1983).
[13] See http://www.phillips66.com/anmtg01/financial_files/frame.htm. This example assumes that Phillips' off-balance sheet debt is comprised exclusively of leases. This assumption, however, is consistent with Phillips' stated commitment to "financial accounting integrity," including "no self-dealing or exotic financing." The details of the calculations appear in the Appendix.

truncation bias is significant in this example, but is dwarfed by the "vanishing obligation" bias, which misses about more than half of the lease value.

Further, their interest expense for 2001 was $338 million compared to rental expense of $249 million (a ratio of 1.4:1). At the same time, Phillips had $8,645 million in on-balance sheet long-term debt, which was 5.4 times the amount of leases generated by the truncated S&P method, and 3.9 times the amount generated by the normal S&P method. In other words, Phillips has a total annual debt expense 1.4 times greater than their operating lease expense, yet the on-balance sheet long-term debt is approximately four times higher than the normal S&P estimate of lease value (and more than five times higher than the truncated S&P estimate of lease value). The imputed amount of leases relative to debt appears minuscule, and in sharp contrast to the amount of the lease charge relative to the interest charge. The lease values from either S&P approach relative to the known on-balance sheet debt are hard to reconcile with the actual reported debt and lease expenses. The large discrepancy between the S&P approach estimates and the reported value illustrates the importance of the error due to the "vanishing obligation" assumptions.

In its 2001 10-K, Phillips dramatically expanded its discussion of operating lease obligations, from two sentences in 2000 to twenty-four sentences in 2001, describing the role of special purpose entities in the leasing structures. In addition, the 2001 discussion states that the future minimum commitments *exclude* $1.8 billion in "guaranteed residual value payments" due at the end of lease terms, noting that those amounts "would be reduced by the fair market value of the leased assets returned." In other words, Phillips guarantees payment of a fixed amount to a financial institution (a special purpose entity) while retaining all economic exposure to the asset. Increased disclosure, such as the Phillips 2001 10-K, will facilitate diligent analysts to

estimate lease values more accurately. But detailed footnote analysis is impractical for large-sample research, even if such disclosure were generally available (which is not the case, historically.)

3. Data and methodology

3.1. Sample Selection

Our sample consists of annual industrial PST, Full-Coverage, and Research COMPUSTAT firms with SIC codes between 2000 and 5999, similar to Graham, Lemmon, and Schallheim (1998), during the period 1980 to 1999 (20 years). The final sample has 39,418 firm/year observations on 6,800 firms.

We estimate the debt-equivalent value of operating leases using three different methods. For all three methods, we also use three different discount rates as proxies for the cost of debt: 1) 10% discount rate employed by Ely (1995) and Graham, et al. (1998); 2) Moody's seasoned AAA corporate bonds yield; and 3) Moody's seasoned BAA corporate bonds yield.

We also collect data on the historical S&P long-term issuer credit ratings for our sample firms from Compustat. Further, for the sample firms we obtain data on their new issues of straight public debt from Thompson Financial's New Issues database (SDC). We obtain data on the issue date, the identity and characteristics of the borrower (such as industry and nationality), and various characteristics of the bond issue, such as proceeds in nominal dollars, maturity, yield to maturity (YTM) at issuance, credit rating of the new issue. From the Federal Reserve Bank of Saint Louis' FRED database we obtain time series of the monthly yields on the 10-year constant maturity Treasury rate (denoted thereafter as G10). In our analysis of the impact of leases on

cost of debt, we measure the yield spread as the difference between the issue YTM and the 10-year constant maturity Treasury rate.

3.2. Methodology for estimating operating lease debt

We use the following notation for evaluating operating lease debt:

V_0 = debt equivalent value of operating leases

$RentExp_0$ = current year rental expense

MLP_t = minimum lease payments under the operating lease (t=1,…, 5 years)

K_d = cost of debt capital

N = estimated average useful life of property, plant, and equipments

τ_c = statutory maximum marginal corporate tax rate

*The truncated S&P method (*used by Graham et al., 1998). The first method replicates Graham et al. (1998), in which the value of the lease debt-equivalent is computed as the sum of the current year rental expense plus the present value of the minimum operating lease payments over the next five years, discounted at each of the three rates. Formally:

$$V_0 = RentExp_0 + \sum_{t=1}^{5} \frac{MPL_t}{(1+K_d)^t} \qquad (1)$$

Perpetuity Method. This method estimates the debt-equivalent value of leases as a perpetuity of the average of current year rental expense and next year's minimum operating lease payments, discounted at the cost of debt.[14]

$$V_0 = \left(\frac{RentExp_0 + MLP_1}{2} \right) \Big/ K_d \qquad (2)$$

Depreciation-adjusted Perpetuity Method. This method incorporates assumptions regarding depreciation charges, taxes, and estimated life of the leases. To find the depreciation-adjusted perpetuity estimate of V_0 (the unknown "debt-equivalent"), we use our previous definitions, plus we define P = operating lease payments.

The depreciation on the leased assets is assumed to be straight line:

$$Depreciation = V_0/N \qquad (3)$$

The cost of the depreciation to the lessees (borrowers) should be reduced by the tax benefit to the lessor (asset owner):

$$Depreciation\ charge = (V_0/N)\ (1-\tau_c) \qquad (4)$$

Note that the lessor will use accelerated depreciation schedules, and thus benefits from the tax shield at a rate faster than the tax shield is transferred to the lessee. This would allow the lessor to pass on the tax shield to the lessee as we assume above, while still keeping part of the

[14] We note that taking the average of current expense and next year's minimum commitments as an empirical proxy for the lease payment has both advantages and disadvantages. First, by taking the average we are "smoothing" away any jumps in the payment that may be due to temporary deviations. We acknowledge that the current year rent expense may also include contingent rent payments and short-term leases, which are not the subject of our estimations. Conversely, the scheduled minimum lease commitment for next year is a lower-bound estimate of the next year's actual expense, as we demonstrate in table 1. At the same time, the next year's scheduled minimum commitment is the one with the lowest underestimation bias among all future commitments. We are not aware, however, of any bias that the average of the two may introduce. We also use alternative empirical proxies for the lease payment in our tests, such as only the actual rental expense, or only the next year's minimum payment. Our overall inferences about the difference between our new methods and the existing S&P methodology are qualitatively the same.

tax shield gains for itself. In other words, with this scheme there is a sharing of the benefit. The interest charge should be based on the "debt equivalent value":

$$\textit{Interest charge} = K_d V_0 \tag{5}$$

The total payment then is comprised of the interest charge plus the depreciation charge:

$$\begin{aligned} P &= V_0 K_d + (V/N)(1-\tau_c) \\ &= V_0 [K_d + (1/N)(1-\tau_c)] \end{aligned} \tag{6}$$

so that

$$V_0 = P / [K_d + (1/N)(1-\tau_c)] \tag{7}$$

Empirically, we use the average of current year rental expense and next year minimum lease payment as our proxy for *P*. Then, under this method, the lease debt-equivalent value is estimated as:

$$V_0 = \left(\frac{RentExp_0 + MLP_1}{2} \right) \Big/ \left[K_d + \frac{1}{N}(1-\tau_c) \right] \tag{8}$$ [15]

We use the following statutory maximum tax rates: 46% up to 1987, 34% from 1988 through 1992, and 35% after 1993.

[15] We also considered an annuity method that estimates the value of the leases as the present value of an annuity of lease payments over the average asset life, instead of a perpetuity. Our goal is to estimate the value of the liability that the company would incur if it actually owned the asset. However, the life of such an asset is likely not perpetual. Once the asset is fully depreciated (in economic terms), the associated liability should also go away. Formally, we estimated the average useful life of PPE by dividing the PPE by the depreciation charge, and calculated the lease debt equivalent as the present value of annual payments over the life of the asset. This method theoretically adjusts the perpetuity method in a fashion similar to the depreciation-adjusted perpetuity. Empirically, it produced estimates virtually identical to depreciation-adjusted perpetuity. Therefore, we do not tabulate those results.

We require non-missing data for the relevant variables.[16] We estimate the useful life of property, plant, and equipment (PPE) by dividing average annual PPE by the annual depreciation expense. The average annual PPE is the simple average of beginning PPE and ending PPE. This lagging process has deleted the first data year (1980) from the final data set. The mean (median) useful life is 12.0 (10.9) years.[17] We document a significant decline in the minimum commitments: the mean (median) growth rate is -27% (-20%), and is negative for more than 94% of the sample firm-years.

3.3. The magnitude of off-balance sheet operating lease debt

We compare the relative magnitude of off-balance sheet operating lease debt to on-balance sheet debt represented by book value debt and capitalized leases. We calculate firm value as total assets minus book equity plus the market value of equity plus the estimated debt-equivalent value of the operating leases. In Table 1 we present annual mean and median values for debt, capital leases, and the debt-equivalent operating lease estimate as proportions of firm value, where the operating lease debt-equivalent is calculated using the truncated S&P method employed by Graham, Lemmon and Schallheim (1998).

Across all firms and years, long-term debt comprises, on average, about 14% of firm value (median value 10.4%). Capital leases add about 1.2% to firm value over the entire sample, but represent less than 1% of firm value for more recent years, as shown in Figure 2. The majority of the sample firms do not use any capital leases. On the other hand, operating leases

[16] Those variables are long-term debt (#9), capitalized lease obligation (#84), rental expense (#47), each of next five years' minimum operating lease payments (#96, #164, #165, #166, #167), total assets (#6), book value of common equity (#60), number of shares outstanding (#25), year-end stock price (#199), income tax expense (#16), pre-tax net income (#170), interest expense on long-term debt (#101), depreciation and amortization (#14), gross property, plant, and equipments (#7). Numbers in parenthesis are annual COMPUSTAT data item numbers.

[17] The useful life is estimated assuming the straight line method of depreciation. Accounting Trends and Technique (2000), annual survey by the American Institute of Certified Public Accountants, reports that more than 80% of firms use the straight line method of depreciation in their financial reports (p. 391).

represent about 8% of firm value (median value 4.5%). Thus, even using the method expected to substantially undervalue operating lease debt, including operating leases as debt increases the fixed clams-to-firm value ratio by more than 50%. Figure 2 presents the annual trends in the three ratios.

In the last two columns of Table 1 we compare the magnitude of annual interest expense and rental expense for the full sample period. The average rental expense is $24.1 million (median $2.4 million) relative to interest expense of $29.8 million (median $2.3 million), resulting in a ratio of debt charge-to-lease charge of 1.24:1 (0.97:1, based on the medians). At the same time, the imputed lease value relative to firm value is only 7.9% (median 4.5%), compared to long-term debt net of capital leases, which is, on average, 14% of firm value (median 10.4%), resulting in a ratio of long-term debt to leases of 1.77:1 (based on the means), and 2.31:1 (based on the medians).[18] In other words, firms in our sample incur essentially equal overall expense associated with lease financing and debt financing, yet the known value of long-term debt is around twice as high as the lease estimate provided by the truncated S&P method. Similarly to the Phillips example in subsection 2.4., the comparison of the lease value estimate from the S&P approach relative to the known on-balance sheet debt is hard to reconcile with the comparison of actual reported lease expense to debt expense, suggesting that the S&P estimate significantly underestimates the value of operating lease debt.

Table 2 compares the present value of operating leases (in $ million) for all firm-years, obtained using the three methods (the truncated S&P, the perpetuity, and the depreciation-adjusted perpetuity) and three alternative proxies for cost of debt as discount rates – 10%, Moody's AAA bond yield, and Moody's BAA bond yields. As expected, the truncated S&P

[18] Note that in this calculation, we exclude short-term debt and capital leases, therefore understating the relative magnitude of on-balance sheet debt to the S&P lease estimate.

approach produces the lowest estimates (mean $77 million, median $8 million, using the 10% discount rate). The two perpetuity approaches, which assume that operating leases are as permanent a part of the capital structure as balance sheet debt, provide substantially higher estimates of the debt equivalent: the perpetuity estimate is 2 to 3 times as large as the truncated S&P estimate (average $208 million, median $22 million), with the depreciation-adjusted perpetuity approach approximately in the middle of the range, at $139 million (median $13 million).[19]

As Table 2 shows, adjusting the discount rate (instead of using 10% for all years) does not change the average estimate over the entire sample period much, most likely because the corporate yields during our sample period averaged fairly closely to 10% (for example, the mean for the Moody AAA yield for the sample period is 9.13%, with median 8.77%).

Figure 3 presents a graphical representation of industry variation in the use of operating leases. We notice that two industry groups use significantly higher amounts of operating leases, measured by their debt-equivalent value: 1) Transportation (SIC codes within SIC Division E), particularly *Air Transportation* (two-digit code 45), *Motor Freight Transportation* (two-digit code 42), and *Transportation Services* (two-digit code 47), and 2) Retail Trade (SIC codes within SIC Division G, 52-59). In the case of *Apparel And Accessory Stores* (two-digit code 56), the estimates of present value of operating leases relative to firm value range from almost 30% to almost 50%, depending on the estimation method. Note that the relative amount of leases in this

[19] If we use the current rental expense as an empirical proxy instead of the average of the current expense and next year's minimum commitment, the lease estimates slightly increase, as expected: the median estimate from the perpetuity method is $24 million, and from the depreciation-adjusted perpetuity method is $14 million. If we use the next year's minimum rental expense as an empirical proxy instead of the average of the current expense and next year's minimum commitment, the lease estimates slightly decrease, also as expected: the median estimate from the perpetuity method is $20 million, while from the depreciation-adjusted perpetuity method is $14 million $12 million. In each of these alternative specifications, however, the estimates are significantly and materially higher than the S&P estimate.

figure also represents the difference between the firm effective leverage (based on total fixed claims) and the raw leverage ratio reflecting only balance sheet debt, relative to firm value.

3.4. The effect of adding operating lease debt on capital structure ratios

In Panel A of Table 3, we investigate the effect of including off-balance sheet debt on a number of capital structure ratios. We find that firm leverage, measured by the value of fixed claims relative to firm market value, changes significantly when we account for the value of operating leases. We define fixed claims as the sum of long-term debt and the present value of operating leases. For example, the mean unadjusted leverage ratio is 0.167 (median 0.129). Adding the debt-equivalent value of leases (to both the numerator and the denominator) increases the mean estimate to 0.231 (median 0.199) using the truncated S&P method, and almost doubles the estimate when using the perpetuity method (mean 0.301, median 0.276). Once again, the depreciation-adjusted perpetuity method provides estimates in-between (mean 0.261, median 0.232, in both cases).

Similarly pronounced is the effect of debt-equivalent lease payment on the estimation of the firm debt-to-equity ratio. The mean value of the unadjusted ratio (calculated as long-term debt divided by book equity) for all firm-years is 0.936 (median 0.356). Adjusting for lease value using the S&P method provides a mean estimate of 1.443 (median 0.612), the perpetuity method more than doubles the original estimates (mean 2.222, median 0.935). The depreciation-adjusted perpetuity method and the annuity method fall between the others.

Finally, if we estimate the proportion of debt-equivalent lease value to fixed claims, we see that even under the assumptions of the most conservative method operating leases constitute 39.2% of fixed claims (median value 29.6%). Under the perpetuity method, lease financing

actually exceeds long-term debt as a source of funds as both the mean and the median ratios of present value of operating leases to fixed claims exceed one-half.

In panel B we examine the effect of the inclusion of leases on financial ratios that are used by credit agencies to help determine credit ratings.[20] Specifically, we calculate EBIT interest coverage, debt to capitalization, and funds from operation relative to total debt, as defined in the Standard & Poors "Corporate Rating Criteria," with adjustment for lease debt implied by each method. We demonstrate that the inclusion of operating leases increases the effective leverage, reduces interest coverage, and decreases the funds from operation-to-debt. For example, the interest coverage ratio, often considered being the single most important factor for ratings, decreases on average from 6.4 (median 3.0) to 2.2 (1.9), when we add the actual rental expense to both the numerator and the denominator. In other words, a firm that chooses to finance a project with off-balance sheet debt instead of regular debt will appear to be better credit quality. Moreover, because the S&P method underestimates the value of leases, it still does not fully account for the effective amount of debt in these ratios, relative to our new methods.

4. How does operating lease debt affect credit ratings and the cost of debt?

As indicated by Table 3, lease debt has a significant effect on financial ratios that affect credit risk. Consequently, we are interested in investigating whether the credit agencies and the market incorporate operating lease obligations in credit ratings and bond yields.

First, in Table 4 we present the medians for EBIT interest coverage ratio, debt to capitalization, and lease debt-equivalent to capitalization (calculated using the three different

[20] Some of these ratios are also components of Altman's Z score, which has been documented to predict bankruptcy.

methods) across existing S&P long-term issuer credit ratings, as reported by Compustat.[21] We observe that firms with lower credit ratings use more leases. Moreover, firms without rated debt, which are likely to be firms not using public debt, utilize almost twice as much leasing as rated firms, even though they use less straight debt overall. For example, using the GLS (perpetuity) method to estimate operating lease debt, Table 4 shows that operating lease debt is on the order of 4.7% (13.8%) of firm value for rated firms, compared to 7.8% (21.6%) of value for unrated firms.

Second, in Table 5 we examine the effect of off-balance sheet on existing credit rating in a multivariate setting. We assign the S&P ratings a numerical ranking in descending order. We estimate OLS regressions in Panel A and Ordered Logit regressions in Panel B of the existing S&P firm credit ratings on the factors that S&P considers in assigning credit ratings (such as coverage, leverage, and earnings to liabilities), operating lease debt, and control variables such as firm size and fixed asset ratio. We observe that on-balance sheet debt has significantly larger effect on credit ratings relative to off-balance sheet debt. For example, panel A of Table 5 reports OLS parameter estimates for balance sheet debt coefficients at about –6.4, compared to estimates of –4.8 and –2.0, respectively, for GLS and perpetuity operating lease debt estimates. In other words, balance sheet debt is considered significantly more important by rating agencies than operating lease debt for debt ratings. The results suggest that firms may be able to manage credit ratings by using off-balance sheet debt.

In Table 6, we extend the analysis of the effect of off-balance sheet debt on credit ratings to new debt issues. We examine from Thompson Financial's SDC New Issues Database the new straight debt issues issued by the firms in our sample. We assign the S&P and the Moody's

[21] We perform this analysis using both a book-value and a market-value definition for firm value in the calculation of debt to capitalization and lease debt to capitalization. Our results are qualitatively similar.

ratings of new debt a numerical ranking in descending order. We present OLS regressions on the S&P credit rating in Panel A and Moody's rating in Panel B.[22] Once again, we document that both on and off balance sheet debt affect credit ratings. However, the effect of on-balance sheet debt is significantly more pronounced than that of off-balance sheet debt: the coefficients of on-balance sheet debt are generally more than twice as high as those of off-balance sheet debt.[23] For example, in Panel A of table 6, the slope coefficient for balance sheet debt is -8.57, while the coefficient for the GLS estimate of leases is -4.09. The coefficients for the other two lease estimates are even lower.

In Table 7, we compare the market's evaluation of operating lease debt to balance sheet debt by examining the impact of balance sheet and off balance sheet obligations on the yield of new debt issues. We measure each firm's cost of debt for new issues as the spread between the yield to maturity of the issue and the contemporaneous yield on ten-year constant maturity Treasuries. If the market evaluates operating lease debt in the same manner as balance sheet debt, then debt should have the same effect whether it is on or off-balance sheet. Therefore our null hypothesis is that operating lease debt has the same impact as balance sheet debt. On the other hand, calls for increased disclosure suggest that firms are able to hide debt from the market participants by using operating leases. If so, we would expect operating lease debt to be less important than balance sheet debt, which is our alternative hypothesis.

Table 7 presents OLS regressions of the spread between the yield-to-maturity (YTM) at issuance and the yield on 10-year constant maturity Treasuries for the new public straight debt issuances by our sample firms, as reported by Thompson Financial SDC database. As the yield

[22] Since credit ratings are a discrete ranked variable, we also analyzed them with a Ordered Logit model, and found qualitatively the same results.
[23] In all cases, we reject the null hypothesis of equality of the slope coefficients of debt vs. leases at significance level of 1% or better.

spread is calculated relative to a common maturity benchmark, we control for the individual issue maturity. Elton, Gruber, Agrawal, and Mann (2002) hypothesize that there are issue- and firm-specific characteristics that affect bond yields beyond the credit rating. Therefore, we include as additional control variables the amount of proceeds relative to total assets, and firm size. Table 7 indicates that operating lease debt is at least as important as balance sheet debt in determining the yield of new bond issues. When measured by the truncated S&P method, a dollar of operating leases debt is twice as important as balance sheet debt in increasing the cost of debt (their slope coefficients are 2.07 vs. 0.95, respectively, significantly different from each other at 1%). On the other hand, using the perpetuity methods to estimate operating lease debt, we are unable to reject the null hypothesis that on and off-balance sheet debt have the same impact on the cost of debt. In other words, our evidence indicates that the market finds operating lease debt to be at least as important as balance sheet debt in the pricing of new debt issues. Therefore, while operating lease debt may allow firms to manage their credit rating, the market appears to assign at least as much importance to operating lease debt as balance sheet debt in its pricing of debt issues.

Our evidence on the relationships between estimated operating lease debt and credit ratings and the cost of debt also provides evidence on how the market evaluates the magnitude of operating lease debt. No matter which method we use to estimate operating leases, balance sheet debt is substantially more important for credit ratings, which is not particularly helpful in determining which method has more validity, as credit ratings are set by credit agencies, not the market. But the impact on the cost of debt is more illuminating. Using the S&P approach, operating leases appear twice as important as balance sheet debt for the cost of debt. However, using the perpetuity approach, we fail to reject the null hypothesis that operating lease debt is

evaluated in the same manner as balance sheet debt. We interpret this evidence to suggest that the market evaluates operating leases as a perpetual obligation in its pricing of new debt issues. The other alternative, that operating lease debt is more important than balance sheet debt, is contradicted by the credit rating results (table 5 and 6) and seems counterintuitive.

5. How well do minimum commitments predict future operating lease obligations?

The S&P approach to estimating operating lease debt evaluates only reported future minimum operating lease commitments, implicitly assuming that firms will reduce operating lease debt in the future. On the other hand, the perpetuity approach implicitly assumes that operating leases are a permanent component of the capital structure. In this section we examine the reasonableness of each alternative assumption by comparing implied future operating lease obligations predicted by the S&P approach to the obligations predicted by the perpetuity approach.

Because leases are typically structured as short-to-medium term contracts, we expect that the aggregate firm-level minimum commitments will gradually decline as leases expire. If those leases are generally not renewed, a similar decline must be observed in the actual lease payments as well. However, if the expired leases are renewed, the actual rental expense will not exhibit a decline. To examine this hypothesis, we analyze all firm years between 1980 and 1999 on Compustat with SIC codes between 2000 and 5999, and present the results in Table 8. First, in Panel A we present the mean and median values for the actual rental expense in a given year, and the future minimum commitment made in the past that corresponds to the current year. The overall average (median) rental expense is $33.5 ($3) million, while the corresponding minimum commitments made in the past (presented in the first column) gradually decline from $22 ($2)

million, for the commitment from the previous year, to \$9 (\$0.5) million for the commitment for this year made five years ago. In the second column we calculate the difference between the actual payment, and each of the five previous commitments, and observe that the difference increases. In column (3) we calculate the same difference as proportion of the actual payments, and observe that while minimum commitment for next year underestimates the true payment, on average, by 14%, the minimum commitment for five years from now will underestimate the actual payment by 67%.[24]

Panel B of Table 8 reports regressions of current-year rental expense against each of the corresponding prior five years minimum commitments, reporting the results in columns (1) to (5).[25] We observe that the underestimation significantly increases from the first year to the fifth year. Specifically, we observe two primary facts. First, the intercept is positive and steadily increasing in all cases, indicating underestimation. Second, slope coefficients steadily increase from 1.4 times the predicted payment in year one to 2.3 times the predicted payment in year five, indicating that minimum commitments are substantially downwardly biased predictors of future operating lease obligations.

We provide a related set of results using predicted future lease payments using alternative estimates of operating lease debt and comparing predictions to actual expenses. Formally, we estimate for each method *j* and year *t* the following regression:

$$Rental\ Expense_{j\,t} = \alpha_j + \beta_j\,(Kd_{(t-1)}\,PV_{j\,(t-1)}) + \varepsilon_{j\,t} \qquad (9)$$

[24] We note that the distributions of the minimum commitments, and the difference between the minimum commitments and the actual payment, are highly skewed. The difference as proportion of the actual payment, however, is more symmetric.
[25] We thank Craig Lewis for this suggestion.

where Rental Expense $_t$ is the actual rental expense in year *t*, $PV_{j\ (t-1)}$ is the debt-equivalent value in year *t-1* estimated by method *j*, and $Kd_{(t-1)}$ is the cost of debt in year *t-1*. Once again, for cost of debt we use each of the three different rates defined before: Moody's AAA and BAA index yields, as well as a flat 10%. To account for the possible changes in the future payments due to firm growth, in an alternative specification we adjust the estimation for growth as follows:

$$Rental\ Expense_{j\,t} = \alpha_j + \beta_j\,(Kd_{(t-1)}\,PV_{j\,(t-1)}\,G_t) + \varepsilon_{j\,t} \qquad (10)$$

where G_t is the firm growth between year t-1 and year t, defined as the firm Property, Plant, and Equipment (PPE) in year t divided by the firm PPE in year t-1. We use growth in Property, Plant, and Equipment following Marston's (2002) argument that fixed assets provide better control for asset leasability than total assets, since the leased assets exclusively fall into the long-term fixed asset category.[26]

If the implied payment is greater than the actual rental expense, i.e., if the method overestimates the amount of leases, the slope coefficient will be less than one; if the implied payment is less than the actual rental expense (i.e., if the method underestimates the amount of leases), the slope coefficient will be greater than one; finally, if the method generates a perfect estimator for the rental expense, the slope coefficient will be exactly one.

The results of this estimation are presented in Table 9, which presents pooled regressions of actual rental expense in year *t* against the lease payment implied by the lease debt-equivalent in year *t-1*, as estimated by the three models, with and without adjustment for firm growth. The perpetuity approaches predict future payments "better" (in the sense of regression R-square) than the S&P approach. Further, as hypothesized, the slope estimate for the truncated S&P method is

[26] We also run these regressions controlling for growth in total assets, and obtain qualitatively similar results.

significantly higher than one, ranging from 3.2 to 3.8 across specifications, significantly underestimating future lease payments by a more than three. The unadjusted perpetuity is the best predictor of subsequent operating lease expense: its slope estimate ranges from 1.15 to 1.25, thus perhaps still slightly underestimating future payments.

Our results are robust to alternative specifications. First, Compustat had historically reported only the current year rental expense and the minimum commitments for each of the next five years, while in their 10-K footnotes firms typically also report the value of the minimum commitment for operating leases after the fifth year (or "thereafter"). We note that Compustat has recently added the "thereafter" minimum commitments as a new data item, for the years 1998-2001. For those firm-years, we calculated the lease debt equivalent including the "thereafter" commitments, and replicated the results from table 9, and concluded that both the truncated and the normal S&P methods significantly understate the amount of the next year's payment. We also confirmed this result by examining a random sample of 100 firm-year observations for which we hand-collected information on operating leases directly from their 10Ks. Second, our results are robust if we use the current rental expense or next year's minimum rental expense as an empirical proxy of the lease payment.

6. Conclusion

Recently, media and regulators have openly questioned whether firms should be allowed to "hide" debt by moving obligations off balance sheet. We examine whether the market recognizes the magnitude of operating leases, the most common form of off-balance sheet financing, which are subject to very limited disclosure requirements and reported only in the financial statement footnotes.

We document that magnitude of operating lease obligations are reflected in the market's assessment of firm credit risk, and have the similar impact as balance sheet debt on the yields of new bond issues. However, operating leases do not appear to be fully reflected in the firm debt ratings – they have significantly lower effect on ratings than balance sheet debt. Combined, these findings indicate that while moving debt off-balance sheet may be an effective strategy for maintaining higher debt ratings, it does not fool the market, as bond yields recognize debt obligations, regardless of their accounting treatment as on- or off-balance sheet, and despite the limited disclosure of leases.

Finally, we provide evidence that a commonly employed measure of effective off-balance operating lease obligations that discounts the future minimum commitments understates the market's valuation of the lease debt equivalent by a factor of at least two. Our evidence indicates that a simple perpetuity approach to estimating operating lease debt appears to be most consistent with the market evaluation. Using the perpetuity method, we estimate operating lease debt to be of comparable magnitude to balance sheet long-term debt.

References

AAA Financial Accounting Standards Committee, 2001, Evaluation of the Lease Accounting Proposed in G4+1 Special Report, *Accounting Horizons* 15 (3), 289-298.

Barclay, M., and C. Smith, Jr., 1995, The Maturity Structure of Corporate Debt, *Journal of Finance* 50 (2), 609-631.

Brealey, R., and S. Myers, 2002, *Principles of Corporate Finance* (McGraw-Hill/Irwin, New York, NY).

Ely, K., 1995, Operating Lease Accounting and the Market's Assessment of Equity Risk, *Journal of Accounting Research* 33 (2), 397-415.

Elton, E., M. Gruber, D. Agrawal, and C. Mann, 2002, Factors Affecting the Valuation of Corporate Bonds, New York University, working paper.

Financial Accounting Standards Board, 1976, *Accounting for Leases*. Statement of Financial Accounting Standards No. 13. Stamford, CT: FASB.

Gilson, S., and J. Warner, 1998, Junk Bonds, Bank Debt and Financing Corporate Growth, Harvard Business School, working paper.

Graham, J., M. Lemmon, and J. Schallheim, 1998, Debt, Leases, and the Endogeneity of Corporate Tax Status, *Journal of Finance* 53 (1), 131-162.

Gramlich, J., M. McAnally, and J. Thomas, 2001, Balance Sheet Management: The Case of Short-Term Obligations Reclassified as Long-Term Debt, *Journal of Accounting Research* 39 (2), 283-295.

Imhoff, E., R. Lipe, and D. Wright, 1991, Operating Leases: Impact of Constructive Capitalization, *Accounting Horizon* 5(1), 51-63.

Imhoff, E., R. Lipe, and D. Wright, 1993, The Effect of Recognition Versus Disclosure On Shareholder Risk and Executive Compensation, *Journal of Accounting, Auditing & Finance* 8(4), 335-368.

Levitt, A., 2003, The SEC's Repair Job, *The Wall Street Journal*, February 10, A14.

Lewis, C., and J. Schallheim, 1992, Are Debt and Leases Substitutes?, *Journal of Financial and Quantitative Analysis* 27 (4), 497-511.

Lipe, R. 2001, Lease Accounting Research and the G4+1 Proposal, *Accounting Horizons* 15 (3), 299-310.

Kalay, A., 1982, Stockholder-Bondholder Conflict and Dividend Constraints, *Journal of Financial Economics* 10, 211-233.

Marston, F., 2002, Measurement of Off-Balance Sheet Debt: Biases and Implications for Empirical Research, working paper, University of Virginia.

McConnell, J., and J. Schallheim, 1983, Valuation of Asset Leasing Contracts, *Journal of Financial Economics* 12 (2), 237-262.

McGregor, W., 1996, *Accounting for Leases: A New Approach-Recognition by Leases of Assets and Liabilities Arising under Lease Contracts*. FASB Financial Accounting Series-Special Report, Norwalk, CT: FASB

Myers, S., 1977, Determinants of Corporate Borrowing, *Journal of Financial Economics* 20, 293-315.

Nailor, H., and A. Lennard, 2000, *LEASES: Implementation of a New Approach*. FASB Financial Accounting Series-Special Report, Norwalk, CT: FASB

Reither, C., 1998, What Are The Best and Worst Accounting Standards? *Accounting Horizons* 12(3), 283-292.

Smith, C., and J. Warner, 1979, On Financial Contracting: An Analysis of Bond Covenants, *Journal of Financial Economics* 7, 117-161.

Stohs, M., and D. Mauer, 1996, The Determinants of Corporate Debt Maturity Structure, *Journal of Business* 69 (3), 279-312.

Appendix

Estimating lease values using the Phillips 10-K for fiscal 2001

For fiscal year 2001, Phillips reported operating lease rental expense of $249 million, and the following future minimum commitments:

Year	minimum obligation ($ millions)
2002	431
2003	389
2004	328
2005	277
2006	220
thereafter	1,116

The truncated S&P approach (GLS 1998) calculates the value of leases as the current year rental expense plus the discounted commitments through 2006. Discounting the future commitments at 8% (the Moody's BAA yield at year-end 2001) generates a lease value estimate of $1.595 billion. Note that if we use a 10% discount rate as in GLS 1998, the value of leases will be even lower.

The normal S&P approach uses the "thereafter" component by dividing the thereafter amount by the year 5 amount to estimate remaining years, then assumes that the year 5 amount will continue for those years. In this case, the thereafter amount of $1.116 billion is divided by $220 million to produce a 5-year projection of $220 million. Discounting the ten-year projection at 8% (the Moody's BAA yield at year-end 2001), plus the current rental expense, provides a lease value estimate of $2.200 billion.

The perpetuity approach averages net rental expense for 2001 ($249 million) and the minimum payment for 2002 ($431 million), then divides by the BAA yield (8%) to generate a perpetuity value estimate of $V = \frac{\$249 + \$430}{2} \times \frac{1}{0.08} = \$4.250$ billion.

We note the minimum commitment for 2002 is much larger than the actual expense for 2001, which is not typical. In Phillips' case, the 2002 minimum (and other future minimums) are probably upwardly biased because Phillips separately reports expected sublease income. Regardless, the minimum commitments exclude $1.8 billion of future obligations listed as "guaranteed residual values."

The entire footnote is included below:

Note 16--Non-Mineral Leases

The company leases ocean transport vessels, tank railcars, corporate aircraft, service stations, computers, office buildings and other facilities and equipment. Phillips has sale-leaseback transactions involving office buildings, corporate aircraft, retail service stations, railroad tank cars, and ocean-going vessels. Certain leases include

escalation clauses for adjusting rentals to reflect changes in price indices, as well as renewal options and/or options to purchase the leased property for the fair market value at the end of the lease term. There are no significant restrictions on Phillips imposed by the leasing agreements in regards to dividends, asset dispositions or borrowing ability. Leased assets under capital leases in the gross and net amounts of $31 million and $24 million, respectively, were included in the RM&T segment's "properties, plants and equipment" balance at December 31, 2001.

Phillips has leasing arrangements with several special purpose entities (SPEs) that are third-party trusts established by a trustee and funded by financial institutions. Other than the leasing arrangement, Phillips has no other direct or indirect relationship with the trusts or their investors. Each SPE from which Phillips leases assets is funded by at least 3 percent substantive third-party residual equity capital investment, which is at-risk during the entire term of the lease. Except in an event of default under the terms of the lease agreements, there are not any circumstances at this time under which Phillips would be required to record the assets and/or liabilities of the SPEs in its financial statements in the future, based on the terms and provisions within the various arrangements. Phillips considers an event of default under the terms of the lease agreements to be remote. Phillips does have various purchase options to acquire the leased assets from the SPEs at the end of the lease term, but those purchase options are not required to be exercised by Phillips under any circumstances.

At December 31, 2001, future minimum rental payments due under non-cancelable leases were:

	Millions of Dollars	
	Operating Leases	Capital Leases
2002	$ 431	9
2003	389	9
2004	328	9
2005	277	10
2006	220	10
Remaining years	1,116	150
Total	2,761	197
Less imputed interest		99
Less current portion of capital leases		1
Long-term capital lease obligations*		$97
Less income from subleases	583	
Net minimum operating lease payments	$2,178	

*Includes $67 million of above-market capital lease obligations acquired in an acquisition, which are presented as part of Other liabilities and deferred credits on the balance sheet.

The above amounts exclude guaranteed residual value payments totaling $197 million in 2003, $262 million in 2004, $866 million in 2005, $52 million in 2006, and $434 million in the remaining years, due at the end of lease terms, which would be reduced by the fair market value of the leased assets returned.

Phillips has agreements with a shipping company for the long-term chartering of five crude oil tankers that are currently under construction. The charters will be accounted for as operating leases upon delivery, which is expected in the third and fourth quarters of 2003. If the completed tankers are not delivered to Phillips before specified dates in 2004, the chartering commitments are cancelable by Phillips. Upon delivery, the base term of the charter agreements is 12 years, with certain renewal options by Phillips. Phillips has options to cancel the charter agreements at any time, including during construction or after delivery. After delivery, if Phillips were to exercise its cancellation options, the company's maximum commitment for the five tankers together would be $92 million. If Phillips does not exercise its cancellation options, the total operating lease commitment over the 12-year term for the five tankers would be $383 million on an estimated bareboat basis.

Operating lease rental expense for years ended December 31 was:

	Millions of Dollars		
	2001	2000	1999
Total rentals	$271	128	143
Less sublease rentals	22	2	2
	$249	126	141

Contingent rentals were not significant in any year presented.

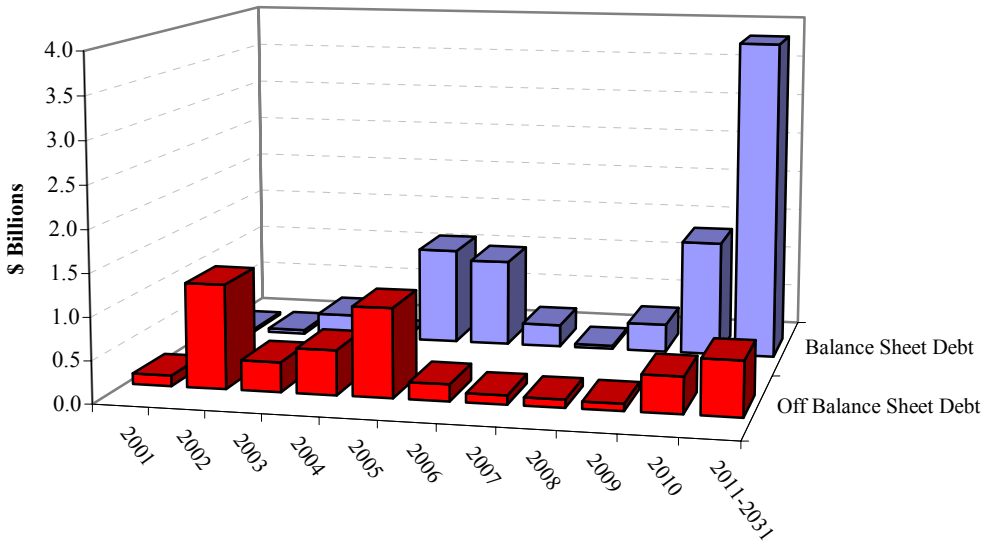

Figure 1. Phillips Petroleum debt maturity schedule: October 31, 2001. The graph represents Phillips Petroleum's maturity schedule for balance sheet and off-balance sheet debt as of October 31, 2001, as presented to analysts. Source: http://www.phillips66.com/anmtg01/financial_files/frame.htm.

Table 1
The Use of Long-term Debt, Capital Leases, and Operating Leases

The sample consists of 39,418 COMPUSTAT firm-years with SIC codes between 2000 and 5999, during 1980-1999. Columns (3)-(5) present the mean values (medians in parentheses) of the ratios of book value of long-term debt net of capital leases, capital leases, and the present value of operating leases, to firm value. The present value of operating leases is calculated using the truncated S&P method, also used by Graham et al (1998). Firm value is calculated as the book value of total assets minus the book value of common equity plus the market value of common equity and the present value of operating lease. Columns (6)-(7) present the mean values (medians in parentheses) of interest expense and rental expense in millions of current dollars.

Years (1)	Number of Observations (2)	Debt / Firm Value (3)	Capital Lease / Firm Value (4)	Operating Lease / Firm Value (5)	Interest Expense (6)	Operating Lease Expense (7)
1981-1999	39,418	0.140 (0.104)	0.012 (0.000)	0.079 (0.045)	29.785 (2.334)	24.118 (2.401)

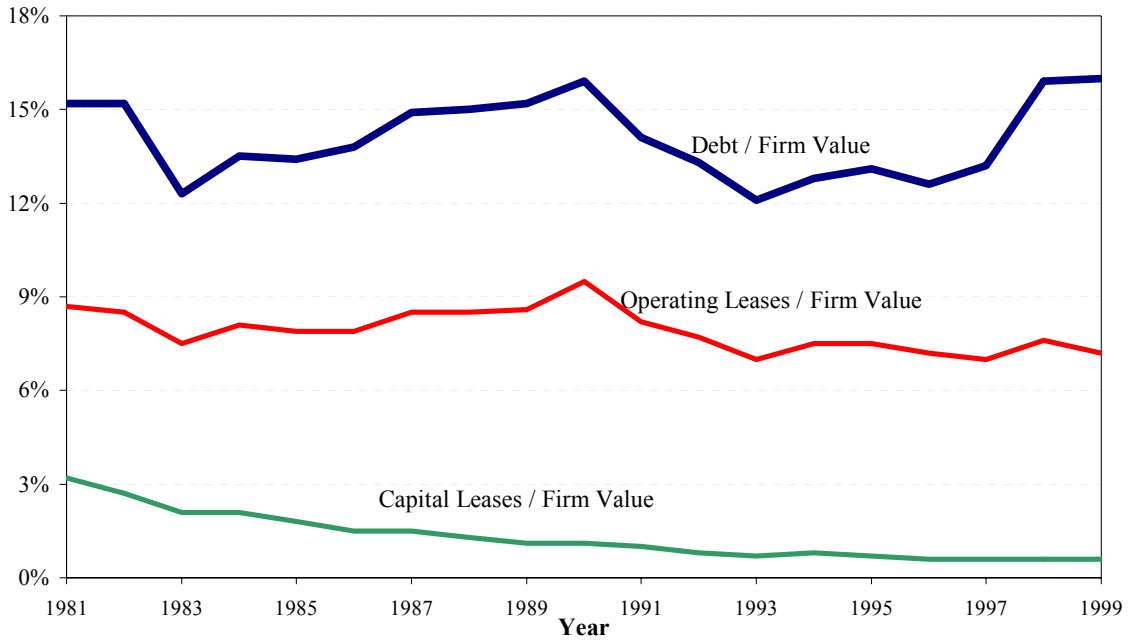

Figure 2. **Long-term Debt, Capital Leases, and Operating Leases as Proportion of Firm Value.** The figure presents the annual mean values of the ratios of book value of long-term debt net of capital leases, capital leases, and the present value of operating leases, to firm market value, for a sample of 39,418 COMPUSTAT firm-years with SIC codes between 2000 and 5999, during 1981-1999. The present value of operating leases is calculated using the truncated S&P method. Firm market value is calculated as the book value of total assets minus the book value of common equity plus the market value of common equity and the present value of operating lease.

Table 2
Present Value of Operating Leases

The table presents the means (medians in parentheses) of the present value of operating leases (in $ million) for a sample of 39,418 COMPUSTAT firm-years with SIC codes between 2000 and 5999, during 1981-1999. The truncated S&P method estimates the value of leases as the present value of the future through year five. The perpetuity method calculates the present value of the operating leases as a perpetuity of the average of current year rental expense and next year's minimum operating lease payments. The depreciation-adjusted perpetuity method modifies the perpetuity by adjusting for the rate of depreciation of fixed assets and tax effects.

	Truncated S&P estimate	Perpetuity estimate	Depreciation-adjusted perpetuity estimate
Panel A (discount rate = 10%)			
Present value of operating leases (in $ million)	76.65 (8.02)	207.93 (22.44)	139.01 (13.48)
Panel B (discount rate = Moody's seasoned AAA corporate bonds yield)			
Present value of operating leases (in $ million)	78.48 (8.14)	252.86 (25.29)	155.76 (14.16)
Panel C (discount rate = Moody's seasoned BAA corporate bonds yield)			
Present value of operating leases (in $ million)	77.27 (8.02)	227.97 (22.66)	145.46 (13.24)

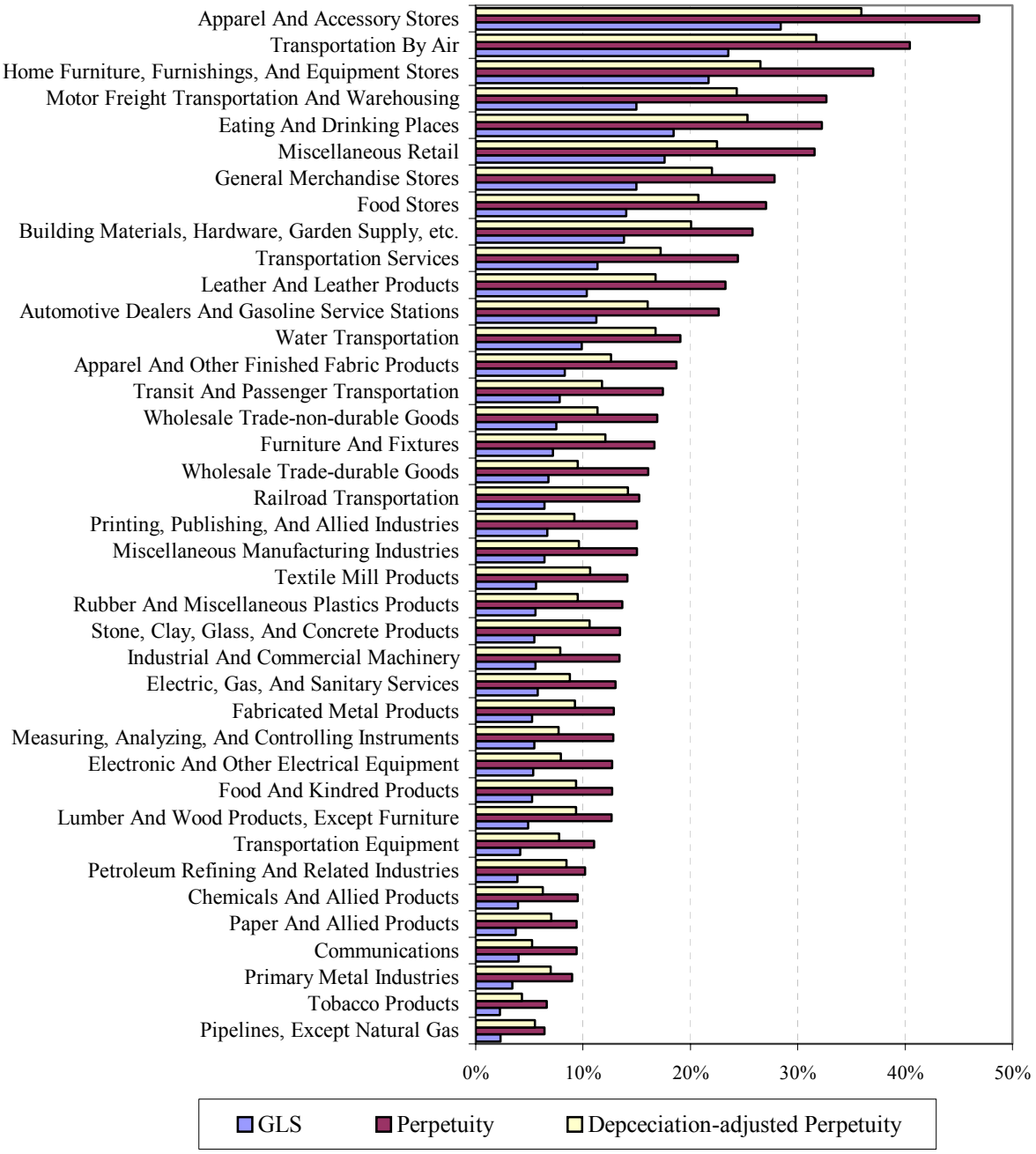

Figure 3. **Industry Variation in the Use of Operating Leases**. The figure presents the industry means of the ratio of the present value of operating leases to firm value. Industries are defined by two-digit SIC code. The present value of operating leases is obtained using three different methods. GLS is the method used by Graham et al. The perpetuity method calculates the present value of the operating leases as a perpetuity of the average of current year rental expense and next year's minimum operating lease payments. The depreciation-adjusted perpetuity method modifies the perpetuity for asset depreciation and taxes. In this figure the discount rate used is equal to 10%. Firm value is measured as the book value of total assets minus the book value of common equity plus the market value of common equity and the present value of operating leases.

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Table 3. Effect of Leases on Financial Ratios

Panel A presents the mean values (medians in parentheses) of selected firm characteristics in with and without adjustment for the present value of operating leases, for a sample of 39,418 COMPUSTAT firm-years with SIC codes between 2000 and 5999, during 1981-1999. The truncated S&P method estimates the value of leases as the present value of minimum commitments in years one through five. The perpetuity method calculates the present value of the operating leases as a perpetuity of the average of current year rental expense and next year's minimum operating lease payments. The depreciation-adjusted perpetuity estimates the value of leases by accounting for asset depreciation and taxes. In all methods, the discount rate used is equal to 10%. Firm value is measured as the book value of total assets minus the book value of common equity plus the market value of common equity plus the present value of operating leases (when adjusting for it).

Panel B reports key financial ratios used by credit agencies to help determine credit ratings, with and without adjustment for leases. Fixed claims are defined as the sum of long-term debt (including capital leases) and the present value of operating leases. Debt to capitalization is calculated as long-term debt (including capital leases) plus debt in current liability divided by liabilities and shareholders' equity. That ratio is adjusted by adding the lease debt equivalent in both the numerator and the denominator. Interest coverage is calculated as earnings from continuing operations before interest and taxes divided by interest expense. The adjusted coverage adds the rental expense implied from each method to both the numerator and denominator. Funds from operations to total debt is calculated as pretax income plus interest expense minus interest capitalized minus special items plus depreciation and amortization plus deferred taxes plus other funds from operations divided by total asset less shareholders' equity. Then, the debt-equivalent from each method is added to the denominator, and the implied rental expense is added to the numerator.

Panel A	No adjustment	Truncated S&P method	Perpetuity Method	Depreciation-adjusted perpetuity
Operating Leases to Firm Value	N.A.	0.079 (0.045)	0.167 (0.119)	0.116 (0.076)
Fixed Claims to Firm Value	0.167 (0.129)	0.231 (0.199)	0.301 (0.276)	0.261 (0.232)
Fixed Claims to Book Equity	0.936 (0.356)	1.443 (0.612)	2.222 (0.935)	1.735 (0.736)
Operating Leases to Fixed Claims	N.A.	0.392 (0.296)	0.558 (0.541)	0.474 (0.425)
Panel B				
Debt to Capitalization	0.314 (0.278)	0.383 (0.356)	0.456 (0.434)	0.412 (0.390)
EBIT Interest Coverage	6.43 (3.02)	3.18 (2.40)	2.34 (1.96)	2.53 (2.19)
Funds from operations / Total debt	0.232 (0.245)	0.218 (0.220)	0.198 (0.195)	0.205 (0.209)

Table 4. Bond Ratings and Lease Debt-Equivalents

The table presents the medians of two financial ratios used by rating agencies to help determine bond ratings, and the value of operating leases, across bond ratings, for a sample of 39,418 COMPUSTAT firm-years with SIC codes between 2000 and 5999, during 1980-1999. Bond ratings represent the firm debt ratings assigned by Standard & Poors, as reported by COMPUSTAT. The estimates of the value of operating leases are obtained from the three methods described previously, using a 10% discount rate. The leverage ratio is long-term debt (including capital leases) plus debt in current liabilities divided by liabilities and shareholders' equity. Coverage is calculated as earnings from continuing operations before interest and taxes divided by interest expense.

		Financial Ratios				
Bond ratings	Number of Observations	Coverage Ratio	Leverage Ratio	V(GLS)/ Total Assets	V(Perpetuity) / Total Assets	V(Depreciation-adjusted Perpetuity) / Total Assets
AAA	107	9.5	0.168	0.033	0.100	0.075
AA	514	7.3	0.229	0.031	0.097	0.067
A	1,850	5.7	0.237	0.040	0.122	0.080
BBB	2,425	4.2	0.271	0.052	0.147	0.096
BB	1,864	3.3	0.325	0.055	0.158	0.101
B	1,338	1.8	0.402	0.053	0.153	0.086
CCC	72	0.9	0.446	0.076	0.212	0.120
CC	19	1.3	0.399	0.036	0.109	0.088
D	151	1.9	0.403	0.056	0.156	0.095
Rated, all	8,340	4.2	0.282	0.047	0.138	0.088
Not Rated, all	30,990	2.6	0.255	0.078	0.216	0.127
Investment grade, all	4,896	5.2	0.250	0.043	0.128	0.084
Sub-investment grade, all	3,444	2.6	0.354	0.055	0.156	0.096

Table 5. The Effect of Off-Balance Sheet Debt on Existing Credit Rating

The table presents OLS regressions in Panel A and Ordered Logit regressions in Panel B of the existing S&P firm credit rating as reported by Compustat for a sample of U.S. non- financial firms (SIC codes 2000-5999) on Compustat. We assign the S&P ratings a numerical ranking in descending order. Firm value is equal to total assets minus book value of equity plus market value of equity (number of shares times price). Sales are measured in constant 2001 dollars. Total debt is equal to short-term debt plus long-term debt. Leases are measured by one of the three methods described previously. Coverage ratio is equal to (EBITDA+rent expense)/(rent expense+interest expense). Panel B does not report individual intercepts for each rating category that the logit estimates. The hypothesis for equality of the slope coefficient on debt and on each of the three different lease estimates is rejected in all models at the 1% level of significance.

Panel A: OLS

Variable	Parameter Estimate	P-value	Parameter Estimate	P-value	Parameter Estimate	P-value
Intercept	5.606	0.000	5.602	0.000	5.538	0.000
Log (Sales)	1.198	0.000	1.208	0.000	1.212	0.000
PPE/Total Assets	0.691	0.000	0.646	0.000	0.719	0.000
Coverage ratio	0.044	0.000	0.042	0.000	0.039	0.000
EBITDA / Total Liabilities	4.205	0.000	4.279	0.000	4.332	0.000
Total Debt / Firm Values	-6.399	0.000	-6.385	0.000	-6.401	0.000
PV(Leases $_{GLS}$)/Firm Value	-4.816	0.000				
PV(Leases $_{Perp}$)/ Firm Value			-2.041	0.000		
PV(Leases $_{DAPerp}$)/ Firm Value					-3.269	0.000
Number of Observations	8,114		8,367		8,344	
Adjusted R-square	0.605		0.608		0.606	

Panel B: Ordered Logit

Variable	Parameter Estimate	P-value	Standardized Estimate	Parameter Estimate	P-value	Standardized Estimate	Parameter Estimate	P-value	Standardized Estimate
Log (Sales)	0.897	0.000	0.786	0.900	0.000	0.790	0.901	0.000	0.788
PPE/Total Assets	0.484	0.000	0.091	0.456	0.000	0.086	0.500	0.000	0.094
Coverage ratio	0.075	0.000	0.166	0.070	0.000	0.156	0.070	0.000	0.157
EBITDA / Total Liabilities	3.132	0.000	0.309	3.270	0.000	0.326	3.258	0.000	0.324
Total Debt / Firm Values	-4.788	0.000	-0.457	-4.770	0.000	-0.454	-4.766	0.000	-0.454
PV(Leases $_{GLS}$)/Firm Value	-3.365	0.000	-0.220						
PV(Leases $_{Perp}$)/ Firm Value				-1.369	0.000	-0.210			
PV(Leases $_{DAPerp}$)/ Firm Value							-2.086	0.000	-0.196
Number of observations	8,114			8,367			8,344		
Pseudo R-square	0.650			0.653			0.650		

Table 6. The Effect of Off-Balance Sheet Debt on the Credit Rating of New Debt Issues

The table presents OLS regressions on the S&P credit rating in Panel A and Moody's rating in Panel B for a sample of public straight debt issuances during 1980-1999 by U.S. non-financial firms (SIC codes 2000-5999) from Thompson Financial SDC database. We assign the S&P and the Moody's ratings a numerical ranking in descending order. Firm value is equal to total assets minus book value of equity plus market value of equity. Sales are measured in constant 2001 dollars. Total debt is equal to short-term debt plus long-term debt. Leases are measured by one of the three methods described previously. Coverage ratio is adjusted for rental expense. All firm-level characteristics are measured as of the end of the fiscal year preceding issuance. The hypothesis for equality of the slope coefficient on debt and on each of the three different lease estimates is rejected in all models at the 1% level of significance.

Variable	Estimate	P-value	Estimate	P-value	Estimate	P-value	Estimate	P-value	Estimate	P-value	Estimate	P-value
Panel A: Dependent Variable is S&P New Debt Rating												
Intercept	6.317	0.000	6.706	0.000	6.470	0.000	7.040	0.000	6.458	0.000	7.015	0.000
Log(Sales)	0.986	0.000	0.965	0.000	0.980	0.000	0.960	0.000	0.977	0.000	0.957	0.000
Proceeds / Total Assets	-2.684	0.000	-2.638	0.000	-2.719	0.000	-2.692	0.000	-2.772	0.000	-2.746	0.000
Maturity	0.015	0.000	0.015	0.000	0.014	0.000	0.014	0.000	0.014	0.000	0.014	0.000
PPE / Total Assets	0.472	0.000	0.444	0.001	0.368	0.005	0.361	0.007	0.407	0.002	0.388	0.004
Coverage ratio	2.771	0.000			2.942	0.000			2.929	0.000		
EBITDA / Total Liabilities			0.124	0.000			0.106	0.000			0.108	0.000
Total Debt / Firm Values	-8.568	0.000	-8.955	0.000	-8.623	0.000	-9.305	0.000	-8.623	0.000	-9.269	0.000
PV(Leases GLS)/Firm Value	-4.093	0.000	-3.011	0.000								
PV(Leases Perp)/ Firm Value					-1.653	0.000	-1.290	0.000				
PV(Leases DAPerp)/ Firm Value									-2.159	0.000	-1.649	0.000
Number of Observations	2,527		2,525		2,566		2,564		2,563		2,561	
Adjusted R-square	0.580		0.5771		0.579		0.574		0.576		0.572	
Panel A: Dependent Variable is Moody's New Debt Rating												
Intercept	6.065	0.000	5.461	0.000	6.433	0.000	5.590	0.000	5.458	0.000	6.392	0.000
Log(Sales)	1.001	0.000	1.024	0.000	0.997	0.000	1.020	0.000	1.022	0.000	0.995	0.000
Proceeds / Total Assets	-2.185	0.000	-2.266	0.000	-2.241	0.000	-2.297	0.000	-2.250	0.000	-2.278	0.000
Maturity	0.010	0.003	0.011	0.001	0.009	0.007	0.010	0.004	0.010	0.004	0.009	0.007
PPE / Total Assets	0.708	0.000	0.701	0.000	0.628	0.000	0.603	0.000	0.644	0.000	0.662	0.000
Coverage ratio	0.126	0.000			0.102	0.000			3.749	0.000		
EBITDA / Total Liabilities			3.379	0.000			3.559	0.000			0.105	0.000
Total Debt / Firm Values	-8.205	0.000	-7.480	0.000	-8.599	0.000	-7.497	0.000	-7.417	0.000	-8.579	0.000
PV(Leases GLS)/Firm Value	-3.265	0.000	-4.218	0.000								
PV(Leases Perp)/ Firm Value					-1.474	0.000	-1.767	0.000				
PV(Leases DAPerp)/ Firm Value									-2.266	0.000	-1.865	0.000
Number of Observations	2,531		2,530		2,573		2,572		2,569		2,568	
Adjusted R-square	0.602		0.611		0.597		0.608		0.605		0.593	

Table 7. The Effect of Off-Balance Sheet Debt on Cost of New Debt

The table presents OLS regressions of the spread between the yield-to-maturity (YTM) at issuance and the yield on 10-year constant maturity Treasuries for a sample of public straight debt issuances during 1980-1999 by U.S. non-financial firms (SIC codes 2000-5999) from Thompson Financial SDC database. The S&P and Moody ratings are the ratings of the issue by Standard and Poors and Moody's, respectively. The ratings assigned a numerical ranking in descending order. Maturity is measured in years. Firm value is equal to total assets minus book value of equity plus market value of equity (number of shares times price). Sales are measured in constant 2001 dollars. Total debt is equal to short-term debt plus long-term debt. Leases are measured by one of the three methods described previously. All firm-level characteristics are measured as of the end of the fiscal year preceding issuance.

Dependent Variable: Spread Between the Issue Yield to Maturity and the 10-year Constant Maturity Treasury Rate

Variable	Parameter Estimate	P-value	Parameter Estimate	P-value	Parameter Estimate	P-value
Intercept	4.828	0.000	4.797	0.000	4.763	0.000
S&P Rating	-0.274	0.000	-0.273	0.000	-0.278	0.000
Maturity	0.022	0.000	0.021	0.000	0.021	0.000
Proceeds / Total Assets	1.055	0.000	1.066	0.000	1.121	0.000
Log(Sales), constant dollars	-0.052	0.005	-0.048	0.009	-0.033	0.082
Total Debt / Firm Value	0.950	0.000	0.925	0.000	0.851	0.000
PV(Leases $_{GLS}$)/Firm Value	2.066	0.000				
PV(Leases $_{Perp}$)/ Firm Value			0.790	0.000		
PV(Leases $_{DAPerp}$)/ Firm Value					1.020	0.000
Number of Observations	2,036		2,062		2,040	
Adjusted R-square	0.642		0.637		0.637	
Test for the equality of coefficients of Total Debt / Firm Value and PV(Leases) / Firm Value		0.003		0.549		0.523

Variable	Parameter Estimate	P-value	Parameter Estimate	P-value	Parameter Estimate	P-value
Intercept	4.629	0.000	4.590	0.000	4.560	0.000
Moody Rating	-0.298	0.000	-0.296	0.000	-0.298	0.000
Maturity	0.021	0.000	0.020	0.000	0.020	0.000
Proceeds / Total Assets	1.192	0.000	1.207	0.000	1.274	0.000
Log(Sales), constant dollars	0.013	0.477	0.016	0.392	0.024	0.201
Total Debt / Firm Value	0.796	0.000	0.795	0.000	0.738	0.000
PV(Leases $_{GLS}$)/Firm Value	1.962	0.000				
PV(Leases $_{Perp}$)/Firm Value			0.732	0.000		
PV(Leases $_{DAPerp}$)/Firm Value					1.047	0.000
Number of Observations	2,049		2,076		2,055	
Adjusted R-square	0.633		0.629		0.626	
Test for the equality of coefficients of Total Debt / Firm Value and PV(Leases) / Firm Value		0.002		0.784		0.256

Table 8. Minimum Lease Commitments vs. Actual Rental Expense

The table presents comparisons between minimum future lease commitments and the corresponding rental expense for a sample of 39,418 COMPUSTAT firm-years with SIC codes between 2000 and 5999, during 1980-1999. We present in panel A, column (1), the average (median in parentheses) of the actual rental expense for a year *t* and the minimum future lease commitment for year *i* made (*t-i)* years ago, where *i* is 1, 2, ..5 years; the average (median) difference between each of the commitments and the actual rental expense in column (2); and the average (median) of that difference as proportion of the actual rental expense in column (3). In columns (1)-(5) of panel B, the actual rental expense for year *t* is regressed against the minimum commitment for year *i* made (*t-i)* years ago, where *i* is 1, 2, ..5 years. In panel B, we present in parentheses the p-values from the test that the intercept is equal to 0 and the slope coefficient is equal to 1. The number of observations in all columns is 28,454, due to the lagging process.

Panel A

	Average (median) in $ million (1)	Average (median) difference from rental expense, in $ million (2)	Difference as proportion of rental expense (3)
Rental Expense	33.52 (3.11)		
Minimum Commitment, Year 1	22.34 (2.30)	11.18 (0.52)	0.14 (0.22)
Minimum Commitment, Year 2	18.10 (1.75)	15.42 (1.06)	0.28 (0.41)
Minimum Commitment, Year 3	14.50 (1.25)	19.02 (1.52)	0.43 (0.59)
Minimum Commitment, Year 4	11.58 (0.85)	21.93 (1.89)	0.56 (0.73)
Minimum Commitment, Year 5	9.29 (0.55)	24.22 (2.21)	0.67 (0.83)

Panel B

	(1)	(2)	(3)	(4)	(5)
Intercept	1.80 (0.00)	3.38 (0.00)	6.54 (0.00)	9.64 (0.00)	12.20 (0.00)
Minimum Commitment, Year 1	1.42 (0.00)				
Minimum Commitment, Year 2		1.66 (0.00)			
Minimum Commitment, Year 3			1.86 (0.00)		
Minimum Commitment, Year 4				2.06 (0.00)	
Minimum Commitment, Year 5					2.29 (0.00)
Adjusted R-square	0.89	0.87	0.80	0.73	0.67

Table 9. Implied vs. Actual Lease Payments

Pooled regressions of actual rental expense in year *t* against the lease payment implied by the lease debt-equivalent in year *t-1*, as estimated by the five models described previously. The implied lease payment is calculated analogously to interest charge as the amount of lease debt-equivalent in year *t-1* times the cost of debt in year *t-1*. The implied lease payment, adjusted for firm growth, is calculated as the implied lease payment in year *t-1* times the ratio of firm Property, Plant, and Equipment in year *t* relative to firm Property, Plant, and Equipment in year *t-1*. The sample consists of 39,418 COMPUSTAT firms-years with SIC codes between 2000 and 5999, during 1981-1999. P-values for the test that the intercept is equal to 0 and the slope coefficient is equal to 1 are in parentheses

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	Truncated S&P method	Perpetuity method	Depreciation-adjusted perpetuity method
Panel A (cost of debt = 10%)			
Intercept	2.267	0.362	2.289
	(0.00)	(0.00)	(0.00)
Implied Lease Payment	3.145	1.241	1.626
	(0.00)	(0.00)	(0.00)
Number of observations	30,579	30,579	30,579
R-square	0.892	0.960	0.950
Intercept	2.698	0.041	2.118
	(0.00)	(0.75)	(0.00)
Implied Lease Payment, adjusted for firm growth	2.817	1.149	1.642
	(0.00)	(0.00)	(0.00)
Number of observations	30,579	30,579	30,579
R-square	0.864	0.958	0.956
Panel B (cost of debt = Moody's seasoned AAA corporate bonds yield)			
Intercept	0.523	0.303	1.168
	(0.00)	(0.00)	(0.00))
Implied Lease Payment	3.812	1.245	1.894
	(0.00)	(0.00)	(0.00)
Number of observations	30,511	30,511	30,511
R-square	0.907	0.962	0.956
Intercept	0.097	-0.159	0.796
	(0.61)	(0.18)	(0.00)
Implied Lease Payment, adjusted for firm growth	3.553	1.159	1.767
	(0.00)	(0.00)	(0.00)
Number of observations	30,511	30,511	30,511
R-square	0.905	0.963	0.959
Panel C (cost of debt = Moody's seasoned BAA corporate bonds yield)			
Intercept	0.426	0.303	1.090
	(0.00)	(0.01)	(0.00)
Implied Lease Payment	3.495	1.245	1.835
	(0.00)	(0.00)	(0.00)
Number of observations	30,553	30,553	30,553
R-square	0.908	0.962	0.958
Intercept	-0.004	-0.161	0.791
	(0.98)	(0.17)	(0.00)
Implied Lease Payment, adjusted for firm growth	3.239	1.159	1.712
	(0.00)	(0.00)	(0.00)
Number of observations	30,553	30,553	30,553
R-square	0.906	0.963	0.961