

# Financial Reporting Quality, Private Information, Monitoring, and the Lease-versus-Buy Decision

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**ABSTRACT:** A flourishing stream of research suggests that liquidity-constrained firms with low accounting quality have limited access to capital for investments. We extend this research by investigating whether these firms are more likely to lease their assets. Lessors' superior control rights allow them to provide capital to constrained firms with low-quality accounting reports. Consistent with this conjecture, we find that low accounting quality firms have a higher propensity to lease than purchase assets. To verify that leasing does not merely reflect these firms' desire for off-balance-sheet accounting, we investigate whether banks' access to private information and monitoring affect the relation between accounting quality and leasing. We find the association between accounting quality and leasing decreases when banks have higher monitoring incentives and when loans contain capital expenditure provisions. These results suggest that other mechanisms can substitute for the role of accounting quality in reducing information problems.

**Keywords:** *financial reporting quality; private information; monitoring; lease-versus-buy.*

**Data Availability:** *Data are available from sources identified in the text.*

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## I. INTRODUCTION

A growing body of accounting research concludes that higher financial reporting quality reduces the negative effects of financing constraints on investment by mitigating information asymmetry (e.g., [Biddle et al. 2009](#); [Lara et al. 2009](#); [Biddle and Hilary 2006](#); [Verdi 2006](#); [Bushman et al. 2008](#); [Hope et al. 2009](#)).<sup>1</sup> The research examining whether accounting quality reduces financing frictions and underinvestment focuses on asset purchases and R&D without considering alternative investment mechanisms, like leases. In another stream of literature, both [Sharpe and Nguyen \(1995\)](#) and [Eisfeldt and Rampini \(2009\)](#) argue that leases, which account for about one-third of new equipment investment for U.S. firms, provide creditors with more security, higher priority in bankruptcy, and an effective way of reducing adverse selection and moral hazard problems that arise from information asymmetries. Although these studies suggest that firms facing greater financing constraints have a higher propensity to engage in off-balance-sheet lease investments, they do not consider other mechanisms that reduce financing constraints, like accounting quality. We extend these two research streams by considering the role of accounting quality in the firm's propensity to lease assets (i.e., the proportion of assets that the firm leases).

We focus on the determinants of firms' propensities to acquire assets using operating leases (measured by the ratio of the capitalized minimum operating lease payment to the sum of that amount and the amount of property, plant, and equipment [PP&E]). By capitalizing operating leases, this measure is unlikely to be affected by the differences in accounting treatment for leased versus purchased assets. We conduct our analyses using a comprehensive sample of 3,033 manufacturing firms on the Compustat database. Our focus on manufacturing firms is consistent with previous research examining how financial constraints affect asset purchases. In addition, focusing on a single industry reduces concerns that our results are driven by industry-induced correlations between leasing, financing, and accounting.<sup>2</sup> To measure our primary variable of interest, financial reporting quality, we follow [Bharath et al. \(2008\)](#) by using the first principal component of three accrual-based accounting quality metrics.<sup>3</sup> We conduct cross-sectional regressions, examining the relationship between leasing propensity and accounting quality, controlling for size, tax incentives, financing constraints, and other factors expected to affect leasing decisions. We average all variables across the sample period, thereby treating each firm as one observation rather than using panel data.<sup>4</sup>

We find that firms with worse financial reporting quality have a greater propensity to lease their assets. This result highlights the importance of considering leasing when studying the effects of financial reporting quality on investments. Prior research concludes that firms with poor accounting quality have financial constraints, inhibiting their ability to invest in the periods in which they are liquidity-constrained. Our results extend this line of research, suggesting that although low-quality accounting firms are likely to forgo purchasing assets, they are more likely to lease assets in the periods in which they are liquidity-constrained.

One interpretation of our finding that poor accounting quality firms lease more of their assets is that these firms substitute lease financing for other forms of secured borrowing. An alternative

<sup>1</sup> See [Hope et al. \(2009\)](#) for a discussion of whether accounting quality (transparency) affects firms' ability to gain access to financing.

<sup>2</sup> The statistical significances of the coefficients on our variables of interest are not sensitive to this choice.

<sup>3</sup> As discussed in the Appendix, the three measures are [Teoh et al.'s \(1998\)](#) absolute value of current discretionary accruals, [Dechow et al.'s \(1995\)](#) absolute value of total discretionary accruals, and the cross-sectional version of [Dechow and Dichev's \(2002\)](#) absolute value of current discretionary accruals.

<sup>4</sup> Difficulties measuring inter-temporal variation in accounting quality and lease propensity make cross-sectional regressions more appropriate than time-series regressions in our setting. [Biddle et al. \(2009\)](#) use a panel data set to investigate the relationship between investment, the business cycle, and accounting quality.

explanation of our finding is that the negative association between the proportion of assets leased and accounting quality merely reflects the desire of low accounting quality firms to engage in off-balance-sheet financing. To distinguish between these alternatives, we investigate how other mechanisms that reduce information asymmetry and agency problems impact the relationship between accounting quality and leasing propensity. Specifically, we investigate how lenders' monitoring and loan covenants affect the association between accounting quality and leasing propensity. If the association between accounting quality and leasing reflects the role of accounting quality in reducing information asymmetry, then we would expect the negative relation between accounting quality and leasing to be mitigated by other information asymmetry and agency-cost-reducing mechanisms, suggesting that accounting quality and leasing are alternative ways to address financial constraints. Alternatively, if off-balance-sheet accounting motivates firms with poor accounting quality to lease, then the relationship between leasing and accounting quality should not be affected by other information-asymmetry-reducing mechanisms.

This analysis also allows us to extend [Biddle and Hilary's \(2006\)](#) investigation of whether cross-sectional differences in access and use of private information and monitoring affect the role of accounting quality in investment decisions. Specifically, [Biddle and Hilary \(2006\)](#) suggest that the role of accounting quality in capital investment decisions depends on the firm's use of other monitoring mechanisms that reduce information asymmetry. We expand this reasoning, suggesting that both the quality of banks' monitoring and the covenants banks use to restrict investment will affect the importance of accounting quality in the lease-versus-buy decision.

To test these hypotheses, we use a subsample of manufacturing firms with syndicated bank loan data on either the Loan Pricing Corporation (LPC) or Security Data Corporation (SDC) databases. There are two primary reasons why we focus on this important subsample of the debt market.<sup>5</sup> First, the variation in bank loan ownership provides cross-sectional variation in lenders' monitoring incentives. Lead lenders with proper financial incentives to conduct due diligence reviews prior to loan initiation and to provide loan monitoring over the life of the contract have incentives to reduce the agency problems induced by information asymmetries between lenders and opaque borrowers. Therefore, we hypothesize that when lead lenders have greater due diligence and monitoring incentives, the importance of the quality of accounting information in the lease-versus-buy decision will be mitigated.

The second advantage of focusing on syndicated loans is that, unlike public debt, there is cross-sectional variation in the use of contractual limitations on asset purchases in these loans.<sup>6</sup> When a firm's debt contract contains an investment-restriction covenant designed to mitigate the agency problems of debt, we expect the quality of accounting information will be less important in controlling information problems. Accordingly, we hypothesize that the effect of accounting quality in the lease-versus-buy decision decreases in the face of investment-restriction covenants.

We identify a subsample of 997 manufacturing firms with loan ownership data in the LPC database to test our predictions about the effects of banks' direct and indirect monitoring on the role of accounting quality in the lease-versus-buy decision. Based on [Sufi \(2007\)](#) and [Ball et al. \(2008\)](#), we use lead lender ownership to proxy for lenders' due diligence and monitoring incentives.<sup>7</sup> Consistent with bank monitoring substituting for accounting information, we find that accounting quality is less important in the lease-versus-buy decision when lead lenders' ownership is high.

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<sup>5</sup> [Sufi \(2007\)](#) reports that syndicated loans represent 51 percent of U.S. corporate finance originations, and generate more underwriting fees than both equity and debt underwriting. He also notes that almost 90 percent of the largest 500 nonfinancial Compustat firms obtained a syndicated loan between 1994 and 2002.

<sup>6</sup> [Nini et al. \(2009\)](#) find that 32 percent of U.S. bank loans contain this covenant, while we find that less than 5 percent of public debt uses this covenant to directly restrict firms' opportunistic investments.

<sup>7</sup> In sensitivity tests, [Sufi \(2007\)](#) documents that the lead lender ownership measure is very robust.

We then examine the effects of contractual restrictions on asset purchases, using a subsample of 865 manufacturing firms with information on the investment-restriction covenant in the SDC database. We use an indicator variable to capture the effects of covenants on leasing decisions. Consistent with our previous analysis, we find that the magnitude of the correlation between our accounting quality measure and proportion of assets leased is lower in the presence of this covenant, suggesting that this covenant diminishes the importance of accounting information in the lease-versus-buy decision.

We examine the sensitivity of our results to a variety of different research design choices. Specifically, we consider the effect of limiting the sample to manufacturing firms and the choice of measures for leasing propensity, accounting quality, and lead lender measures. We also investigate the sensitivity of our results to the methods we use to address endogeneity and the methods we use to address missing lease data. Finally, we investigate whether our results are affected when we use an alternative research design to address cross-sectional variation in financing constraints. Each of these research design modifications produces robust results.

Our study contributes to the accounting literature examining the role of accounting quality in investment decisions, and to the finance literature examining the determinants of the decision to lease-versus-buy assets, by showing that firms with information asymmetries due to poor accounting quality are more likely to lease their assets. Results also suggest that accounting quality is important in mitigating the financing constraints that lead firms to lease rather than buy assets.

Our setting also allows us to test the conjecture made in previous research that banks' use of covenants, access to private information, and monitoring are substitutes for accounting information in reducing information asymmetries. Results suggest that bank monitoring and covenant restrictions are substitutes for the influence of accounting quality on investment decisions.

Section II provides the background to our study, Section III contains the hypothesis development, Section IV discusses the sample selection and database, Section V displays the model specification, Section VI presents the results, Section VII reports robustness checks, and Section VIII concludes.

## II. BACKGROUND

### Information Asymmetry and Investment

Fazzari et al. (1988) examine the importance of capital market imperfections caused by information asymmetry between managers and outside capital providers on firms' optimal investment decisions. They find that financially constrained firms rely on internally generated cash flows to fund their investments, increasing the sensitivity of their investments to cash flows.<sup>8</sup>

Many studies, such as Bushman et al. (2005), Biddle and Hilary (2006), Verdi (2006), Biddle et al. (2009), and Lara et al. (2009), suggest that aspects of the firms' accounting reports may affect the extent to which firms' information asymmetry problems affect their investments. Despite the fact that these studies have used a variety of measures of both investment efficiency and accounting quality, the results of these studies have all been consistent. When accounting quality is high, the reduction in information asymmetry leads to an improvement in investments.

Bushman et al. (2005) investigate cross-country variation in the timeliness of loss recognition and the timeliness of change in investment policy. They find that firms in countries with more timely loss recognition respond more quickly to declining investment opportunities by reducing net inflows of capital to new investments. Their study implies that better accounting quality leads to increased investment efficiency.

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<sup>8</sup> Although many studies conclude that information asymmetry and financing constraints decrease investment efficiency, using investment-cash flow sensitivity to proxy for investment efficiency has been controversial (e.g., Kaplan and Zingales 1997, 2000; Bushman et al. 2008).

Biddle and Hilary (2006) examine how accounting quality affects firms' investment-cash flow sensitivity.<sup>9</sup> They examine the effect of accounting quality on investment shocks, finding that higher accounting quality is associated with lower investment-cash flow sensitivity. They also find that accounting quality plays a relatively more important role in economies where the capital is primarily provided through arm's-length transactions and investors do not have access to private information. At the extreme, Biddle and Hilary (2006) find that in Japan, where capital is typically provided by keiretsu and banks, accounting quality does not affect the association between investment and cash flows. One of the implications of Biddle and Hilary's (2006) results is that firms with poor accounting quality are more likely to rely on internally generated cash flows to fund their investments, and thus have more difficulty obtaining external financing to fund their investments. Their results also imply that the role of accounting quality in capital investment decisions depends on whether the firm uses other monitoring mechanisms that reduce information asymmetry.

Verdi (2006) and Biddle et al. (2009) are concerned with both whether firms overinvest in losing projects and whether they underinvest in positive net-present-value projects. Both Verdi (2006) and Biddle et al. (2009) find that financial reporting quality is positively correlated with investment when firms are prone to underinvest and is negatively correlated with investment when firms are prone to overinvest. Biddle et al. (2009) conclude that, "higher reporting quality is associated with both lower over- and underinvestment." Lara et al. (2009), draw similar conclusions from a related study using an alternative measure of accounting quality.<sup>10</sup>

These studies focus on the role of accounting quality on firms' decisions to purchase assets (like PP&E). A related literature examines the role of accounting quality on firms' ability to obtain traditional financing (like debt or equity).<sup>11</sup> These studies find that firms with poor accounting quality have difficulty raising capital from either debt or equity markets, and thus invest suboptimally. For example, Bharath et al. (2008) find that firms with poor accounting quality have to pay higher interest rates. Further, Francis et al. (2004) find that firms with better accounting quality bear lower cost of equity.<sup>12</sup> Most recently, Hope et al. (2009) investigate the relationship between financial reporting transparency and firms' ability to access capital. They identify a sample of privately held firms with cross-sectional variation in whether an audit has been conducted, and find that audited firms with more transparent financial statements have better access to external financing. Their results imply that financial transparency influences information asymmetries, and thus influence firms' access to capital from traditional debt markets. Thus, firms with lower quality accounting are inefficient (have lower investment efficiency). We extend this research by investigating whether firms with lower quality accounting are precluded from investment, or whether they can use an alternative form of financing (an operating lease).

### Leasing and Financing Constraints

Eisfeldt and Rampini (2009) and Sharpe and Nguyen (1995) find that firms with larger information asymmetries (greater financing constraints) are more likely to obtain their assets through leases. Sharpe and Nguyen (1995) suggest that institutional features specific to operating

<sup>9</sup> Biddle and Hilary (2006) employ Dechow and Dichev's (2002) measure to capture accounting quality.

<sup>10</sup> Verdi (2006) and Biddle et al. (2009) augment the Dechow and Dichev (2002) measure of accounting quality according to McNichols (2002). Lara et al. (2009) use conditional conservatism to capture accounting quality.

<sup>11</sup> The examination of the effects of financing constraints on investment in balance sheet assets (like PP&E) is not unique to these studies. Most of the related finance research follows this same approach.

<sup>12</sup> Francis et al. (2004) use multiple variables to measure accounting quality, including earnings persistence, predictability, smoothness, relevance, timeliness, accounting conservatism, and accrual quality measured using the Dechow and Dichev (2002) model.

leases provide lessors with important advantages in bankruptcy.<sup>13</sup> If the lessee goes bankrupt, then the lessee can either accept or breach all lease obligations. If the lessee accepts the obligations, then the lessor is entitled to continue receiving payments based on the original lease agreement. The rental expenses, along with lessors' other claims, are classified as administrative expenses in the bankruptcy code, which must be paid immediately or "within a reasonable period."<sup>14</sup> In this case, the bankruptcy filing does not change the status of the lessor's claims. Alternatively, if the lessee breaches the lease obligations, then the lessor can immediately repossess the property. Any economic losses accompanied with this repossession, including unpaid rents, late fees, or the loss regarding the re-lease or sale of the property, is an unsecured claim against the lessee. In contrast, other creditors are left with no assurance that their claims will be recovered.<sup>15</sup>

Sharpe and Nguyen (1995) argue that the preferential treatment of leases in bankruptcy causes financially constrained firms to prefer to lease assets rather than borrow to buy assets. Consistent with this prediction, they find firms that are non-dividend-paying, lower-rated, or cash-poor are more inclined to lease than nonfinancially constrained firms. This suggests that firms with information asymmetries due to poor accounting quality may prefer other alternatives, like leases.

### **Banks' Private Information and Monitoring**

Biddle and Hilary (2006) suggest that there are other mechanisms that may substitute for accounting quality in reducing information asymmetry, thereby alleviating financing restrictions and increasing investment efficiency. In contrast to their findings for the U.S., Biddle and Hilary (2006) find that investment-cash flow sensitivities do not vary with accounting quality in Japan. They conjecture that, unlike U.S. markets, Japanese capital markets resolve information asymmetry problems through relationship banking, such that public information loses its importance in affecting firm operations. Biddle and Hilary (2006) argue that banks' superior private information should serve as a substitute for accounting quality in determining the sensitivity of investment to internally generated cash flows.<sup>16</sup>

In addition to having access to private information, Nini et al. (2009) suggest that banks often include loan covenants setting an upper limit on capital expenditures and find that this capital expenditure restriction provision successfully reduces firms' capital expenditures. They argue that the investment-restriction covenant mitigates the asset substitution and overinvestment problems. Typically, these covenants define capital expenditures as assets included in the property, plant, and equipment accounts under GAAP. Therefore, the covenants would restrict asset purchases and capital leases, but not operating leases, and are thus likely to affect both the use of operating leases and the importance of accounting information in the leasing decision.

The following excerpt from Georgia Pacific's December 2005 syndicated loan agreement is an illustration of a typical capital expenditure restriction:

<sup>13</sup> SFAS No. 13 requires leases to be classified as either operating or capital. A lease meeting any of the following four criteria is classified as a capital lease: (1) ownership of the leased asset is transferred to the lessee at lease maturity, (2) a bargain purchase option is available, (3) the lease term is equal to 75 percent or more of the remaining economic life of the leased asset, and (4) the present value of the minimum lease payments equals or exceeds 90 percent of the asset's market value.

<sup>14</sup> Lessors' other claims might include delinquencies, late fees, and other damages suffered.

<sup>15</sup> This provision applies to operating leases, but not capital leases. If the original lease contract stipulates that the lessor does not retain property ownership at lease maturity, then the lease is treated as secured debt.

<sup>16</sup> This prediction is consistent with theoretical models such as Holthausen and Verrecchia (1988).

## FINANCIAL COVENANTS

Maximum Capital Expenditures of up to:

Fiscal Year	Capital Expenditures
2006	\$900,000,000
2007	\$1,100,000,000
2008	\$1,100,000,000
2009	\$900,000,000
2010 and thereafter	\$700,000,000

The lesser of (a) 100 percent of the unused amounts allocated to any year and (b) 50 percent of the maximum Capital Expenditures permitted in such year shall be available for Capital Expenditures in the following fiscal year only. In addition, the Capital Expenditure covenant will permit the amount permitted, but not used, for Restricted Payments and investments in joint ventures under clause (12) of the definition of “Permitted Investments” to be used to make additional Capital Expenditures. Capital Expenditures shall exclude, whether such a designation would be in conformity with GAAP, expenditures made in connection with the replacement or restoration of property, to the extent reimbursed or financed from insurance or condemnation proceeds.

## CERTAIN DEFINITIONS

“*Capital Expenditures*” means, for any period and with respect to any Person, any and all expenditures made by the Parent or any of its Subsidiaries in such period for assets added to or reflected in its property, plant, and equipment accounts or other similar capital asset accounts or comparable items or any other capital expenditures that are, or should be, set forth as “additions to plant, property, and equipment” on the consolidated financial statements of the Parent prepared in accordance with GAAP, whether such asset is purchased for cash or financed as an account payable or by the incurrence of Indebtedness, accrued as a liability or otherwise.

## III. HYPOTHESIS DEVELOPMENT

Two streams of research consider how firms mitigate the effects of financing constraints on investment. The first suggests that firms can reduce information asymmetry and financing constraints by committing to better accounting quality. The second finds that firms with larger financing constraints lease more of their assets. Together, these two streams of research lead us to predict that firms with worse accounting quality are more likely to obtain their assets through operating leases.

**H1:** A firm’s propensity to lease-versus-buy assets is declining in its accounting quality.

An alternative explanation for a negative association between a firm’s accounting quality and its propensity to enter into operating leases is that firms with poor accounting quality prefer off-balance-sheet financing. Under this alternative, we would expect the relationship between leasing and accounting quality to be unaffected by other mechanisms that reduce information asymmetry.

One mechanism that is likely to affect the extent of the firm’s information asymmetry problem is whether the outside suppliers of capital, such as banks, have incentives to obtain information through private channels and thus reduce information asymmetry. If better accounting quality reduces information asymmetry and thus reduces a firm’s leasing propensity, then other mecha-

nisms that reduce information asymmetry like the lenders' incentives to access private information and monitor the borrower are likely to affect the importance of accounting quality on the lease-versus-buy decision, motivating our second hypothesis.

**H2:** The importance of accounting quality in the lease-versus-buy decision decreases with banks' incentives to perform due diligence.

Capital expenditure covenants are another mechanism that lenders use to reduce agency costs.<sup>17</sup> If these covenants are effective at reducing agency costs and financing constraints, then the importance of accounting quality in the lease-versus-buy decision will also be reduced by capital expenditure covenants. In other words, accounting quality affects the lease-versus-buy decision (i.e., low-quality accounting limits or makes it more costly for firms to engage in capital spending so they turn to leasing). However, capital expenditure covenants, by their very nature, also limit the ability of firms to engage in capital spending. Therefore, when a covenant is already in place, the incremental impact of accounting quality on the lease-versus-buy decision is reduced. For example, a firm with a covenant in place could have to opt for leasing, even though it has high-quality accounting.<sup>18</sup>

Similar to our monitoring hypothesis, the negative association between a firm's accounting quality and their propensity to enter into operating leases could be due to firms with poor accounting quality preferring off-balance-sheet financing. Under this alternative hypothesis, we would expect the relationship between leasing and accounting quality to be unaffected by the use of capital investment restrictions. We test this reasoning in our third hypothesis.

**H3:** The importance of accounting quality in the lease-versus-buy decision is lower in the presence of capital expenditure restriction provisions.

#### IV. SAMPLE SELECTION

We use three different samples to test our hypotheses. The first is a comprehensive sample of manufacturing firms included on Compustat. Our second and third samples are subsamples of the first sample. The first subsample is restricted to firms with data on lead lenders contained on the LPC database. The second subsample requires data on capital expenditure covenants on the SDC database.

##### Comprehensive Sample

We test our first hypothesis on the role of accounting quality in the leasing decision using a comprehensive sample of Compustat manufacturing firms, identifying 3,033 firms in SIC codes (2000–3999) during the period 1995–2006 with the necessary data.

##### Subsamples with Lead Lender and Capital Expenditure Covenant Data

We use a subsample of firms that borrow in the syndicated loan market to probe the cross-sectional variation in the effect of accounting quality on leasing activities and to ensure that our results are not an artifact of a desire for off-balance-sheet accounting. We focus on the syndicated loan market for two reasons. First, the variation in bank loan ownership provides cross-sectional variation in lenders' private information and monitoring incentives. As we discuss above, the

<sup>17</sup> We focus on this covenant rather than other financial covenants for two reasons. First, this covenant restricting asset purchases impacts the lease-versus-buy decision on which we focus. Second, this covenant is not based on any financial numbers, so it is unaffected by the method of accounting for operating leases.

<sup>18</sup> This argument might suggest that this covenant should not be required for high-accounting quality firms. In our investment covenant model (see Table 7) we find that beyond accounting quality there are many other important determinants of these covenants suggesting high accounting quality firms might have these covenants.



syndicate structure provides loan owners varying incentives to incur costs to collect private information and to monitor management (Sufi 2007). Therefore, lead arrangers' ownership is an established proxy for the private information acquired and the quality of monitoring imposed by banks.

The second reason we focus on this market rests on the use of debt covenants in this market. Since private lenders have informational and monitoring advantage over public debtholders in writing and enforcing debt covenants that mitigate the agency problems of debt (e.g., Fama 1985; Diamond 1984), bank loans provide cross-sectional variation in the use of debt covenants that is rare in corporate bonds. We exploit the variation of the use of the covenant restricting capital expenditures to investigate the effect of direct monitoring by banks on the lease-versus-buy decision.

To test the relation between accounting quality and banks' private information and monitoring quality, we use a sample of 997 manufacturing firms that are covered by the LPC database and have loan ownership data. Consistent with prior research, to test our third hypothesis we use a sample of firms listed in the SDC syndicated loan database to identify firms that have investment-restriction covenants. We identified 865 firms that are listed in the SDC database.

## V. RESEARCH DESIGN AND PROXIES

The basic model that we use to test all three of our hypotheses is the same, although the samples studied and the estimation techniques used to estimate the models differ across our tests. To test our hypotheses, we estimate the following model:

$$\begin{aligned} Lease = & \beta_0 + \beta_1 * AccQual + \beta_2 * Nodiv + \beta_3 * Unrated + \beta_4 * Rating + \beta_5 * Size \\ & + \beta_6 * Loss + \beta_7 * MTR + \varepsilon \end{aligned} \quad (1)$$

where:<sup>19</sup>

*Lease* = the average of the capitalized lease expenditure (lagged Compustat #96 multiplied by 10) over the sum of PP&E and capitalized lease expenditure (Compustat #8 + lagged Compustat #96 × 10);

*AccQual* = the first principal component of three accrual-based accounting quality metrics based on Bharath et al. (2008; described in the Appendix);

*Nodiv* = an indicator variable equal to 1 if the firm never pays dividends (Compustat #21) during the sample period, and 0 otherwise;

*Unrated* = an indicator variable equal to 1 if the firm is never rated by the S&P (Compustat #280) during the sample period, and 0 otherwise;

*Rating* = the average of S&P ratings when the firm is rated by the S&P; following Sharpe and Nguyen (1995), the rating is coded 1 if the S&P rating is between AAA and A-, 2 if the rating is between A+ and A-, 3 if the rating is between BBB+ and BBB-, and 4 if the rating is between BB+ and D;

*Size* = the decile ranking of average of the natural log of sales (Compustat #12);

*Loss* = the average of the indicator variable for loss year, where the indicator variable equals 1 when the Compustat #123 is less than 0; and

*MTR* = the average of the marginal tax rates, based on John Graham's simulation technique, as reported on his website.<sup>20</sup>

<sup>19</sup> All OLS t-statistics are based on standard errors clustered at the three-digit industry level.

<sup>20</sup> To see a summary of the approach he uses to obtain marginal tax rates, and request access to the underlying data, please visit the following website: <http://faculty.fuqua.duke.edu/~jgraham/>.

We capitalize the minimum lease payment assuming a cost of capital of 10 percent and that the lease payments are a perpetuity.<sup>21</sup> As such, the measure will be unaffected by the differences in accounting treatment for these two investment strategies.<sup>22</sup>

Accounting quality has numerous dimensions (Dechow et al. 2009). The literature arguing that accounting quality reduces investment frictions focuses on accounting quality's ability to reduce information asymmetries (Biddle et al. 2009). This literature is not concerned with whether accounting quality reflects lower earnings management, less business uncertainty, more stable cash flows, or some other factor that reduces information asymmetry. Similar to the prior research, we do not distinguish among these sources of accounting quality. Instead we follow Bharath et al. (2008), using a principal-component analysis to isolate the common component of three common firm level measures of accounting quality (*AccQual*). The accruals measures are based on Teoh et al. (1998), Dechow et al. (1995), and Dechow and Dichev (2002). The Appendix includes a description of our implementation of the Bharath et al. (2008) measure.

Our definition of variables differs from theirs slightly because we modify the deflator used in constructing these variables to accommodate differences in accounting for operating leases versus asset purchase. The total asset deflator used in prior research would be affected by the off-balance-sheet accounting treatment for operating leases. Instead, we use the sum of PP&E and capitalized minimum lease payment, which is the same deflator used in calculating our dependent variable (see Christie 1987).<sup>23</sup>

The lease-versus-buy decision is likely to be affected by a variety of other factors (see Smith and Wakeman 1985). Taxes are one of the primary motivations for leasing. Firms that are not paying taxes (or have low marginal tax rates) prefer to lease as opposed to buy, as leasing allows firms in a higher tax bracket to take more advantage of the depreciation deduction.

Leasing is also likely to be related to whether the firm faces financing constraints. Following Sharpe and Nguyen (1995) and Eisfeldt and Rampini (2009), we include three variables to capture the financing constraints: *Nodiv*, *Unrated*, and *Rating*. Non-dividend-paying firms are expected to have more financing constraints and, therefore, are more likely to lease. Unrated firms are also expected to have higher leasing propensity. We expect that worse-rated firms have greater difficulties in raising capital, so this variable should be positively correlated with *Lease*.

We also include *Size* and *Loss* as control variables. Larger firms are likely to be less financially constrained and, therefore, *Size* is expected to have a negative coefficient. Finally, we assume loss firms have a lower marginal tax rate and are thus unable to take full advantage of the tax benefits of ownership of equipment. Therefore, we expect *Loss* to be positively correlated with lease activity.

It is important to note that we average all variables across the sample period, thereby treating each firm as one observation rather than using panel data. There are several justifications for this research design choice. First, our primary variable of interest is a stock measure of the leasing propensity. This measure, as well as our financial reporting quality measure, is highly correlated through time. Averaging our variables reduces the independence problems that arise from the

<sup>21</sup> While parsimonious, we recognize that this approach has drawbacks because the exact discount rate and payment timing is not known. To address these concerns, we also construct the variable discounting all future lease payments disclosed in the lease footnotes (five years of payments and the thereafter piece), and varying the discount rate (between 8 and 12 percent) and the results of our main tests are consistent with those reported. Thus, our capitalization assumptions do not appear to be driving our results.

<sup>22</sup> In our study, leases represent operating leases and therefore use of Compustat #96 to measure lease activities should be appropriate. Since we classify capital leases as borrow-and-buy and since Compustat #8 includes capital lease expenditures, our choice of this variable should be comprehensive.

<sup>23</sup> We also use total assets, total assets excluding property, plant, and equipment (Compustat #8) and sales (Compustat #12) as deflators, the results in the main analysis continue to hold.

serial correlation. Although this approach only captures the between-firms effect, it eliminates within-firm correlation issues. We investigate the sensitivity of our results to this research design choice using a variety of analyses that are discussed in depth in the sensitivity analysis section. In particular, we replace the stock measure of leasing with a flow measure, and replace our accounting quality measure with a measure using three years of data prior to the leasing decision, finding similar results.

### Comprehensive Sample

To test H1, we estimate Equation (1) using OLS estimation for our comprehensive Compustat sample of manufacturing firms averaged over 1995–2006. If accounting quality and leasing are two alternative mechanisms for dealing with financing constraints, then we expect better accounting quality to be associated with a lower propensity to lease (i.e.,  $\beta_1$  should be negative).

### Analysis of Due Diligence Efforts

To test H2, we follow Bharath et al. (2008) and estimate an endogenous switching model (Lee 1978) for our subsample of 997 manufacturing firms that are covered by the LPC database and have loan ownership data. The endogenous switching model allows us to control for the endogeneity of the syndicate participants' choice to require a larger lead arranger ownership position in the loan to enhance their due diligence and monitoring efforts when the borrower has more serious information asymmetries and higher credit risk (Sufi 2007).

More specifically, the endogenous switching model has a “selection” equation modeling the syndication's decision to require lead lenders to hold a significant ownership position and two second-stage “regime” equations modeling the determinants of the firm's leasing propensity (one for firms where the lead lender holds a significant position, and another for firms where the lead lender holds a relatively small amount of the loan). The three regressions are estimated simultaneously using full information maximum likelihood. As discussed in Bharath et al. (2008), this approach controls for the self-selection associated with the decision by the syndicate to require the lead arranger to hold a relatively larger proportion of the loan and allows us to compare the effects of accounting quality on the firm's leasing propensity across the two “regimes.” It also has the benefit of not requiring the coefficients on the determinants to lease to be the same across the two different regimes.

The first-stage probit model of the proportion of the loan held by the lead bank is as follows:

$$\begin{aligned} \text{Lead Rank} = & \beta_0 + \beta_1 * \text{AccQual} + \beta_2 * \text{Nodiv} + \beta_3 * \text{Unrated} + \beta_4 * \text{Rating} + \beta_5 * \text{Size} \\ & + \beta_6 * \text{Loss} + \beta_7 * \text{MTR} + \beta_8 * \text{Loan} + \beta_9 * \text{Maturity} + \varepsilon. \end{aligned} \quad (2)$$

Most of the variables in Equation (2) are also included in Equation (1) and are defined above. To capture lead banks' incentives to acquire private information and monitor management we develop the measure *Lead Rank*. This variable is an indicator variable equal to 1 if the average of the lead arrangers' ownership of the firm's bank loans exceeds the median of all sample firms, and 0 otherwise.<sup>24</sup> We also include two exogenous variables (exogenous in the sense that they are likely to be associated with the syndicate's decision to require the lead lender to hold a significant proportion of the loan, but not associated with the firm's leasing propensity). The first exogenous variable is the size of the deal (*Loan*) and the second exogenous variable is the maturity of the debt

<sup>24</sup> Since firms may have more than one loan during the sample period, lead arranger ownership and other loan characteristics are weighted (by deal amount) and averaged over all bank loans issued during the sample period. Using equally weighted values does not change the tenor of the results. We examine the sensitivity of our results to the median cut-off in the robustness section.

(*Maturity*). The choice of these two instruments is motivated by Sufi (2007). Larger loans and loans with longer maturities are likely to be made to borrowers with better credit quality, reducing the importance of the monitoring provided by the lead lender. This suggests a negative relationship between loan size, maturity, and the extent of the lead lender's holdings. Alternatively, larger loans and loans with longer maturities are likely to require more monitoring, suggesting that syndicate members might require the lead lender to hold larger shares of these loans, suggesting a positive relation. Thus, we do not predict a signed relationship between the lead lender's share of the loan, maturity, and the size of the loan.

We use maximum likelihood estimation for our two "regime" regressions. If debtholder monitoring is a potential substitute for accounting quality in solving information problems, then, in the regime regressions, we expect the effect of accounting quality (*AccQual*) on the leasing propensity to be relatively larger for firms where the lead lender holds a relatively smaller proportion of the loan. We test this using a Chi-squared test of the equality of the coefficient on accounting quality across the two regime regressions.

### Analysis of Capital Expenditure Covenant

Similar to our tests of H2, we again employ an endogenous switching model to test H3, which predicts that the effects of investment restrictions on the importance of accounting quality on the firm's leasing propensity. The selection model we employ in this analysis is as follows:

$$\begin{aligned} Inv\_Cov = & \beta_0 + \beta_1 * AccQual + \beta_2 * Nodiv + \beta_3 * Unrated + \beta_4 * Rating + \beta_5 * Size \\ & + \beta_6 * Loss + \beta_7 * MTR + \beta_8 * Loan + \beta_9 * Maturity + \varepsilon. \end{aligned} \quad (3)$$

Most of the variables in Equation (3) are also included in Equation (1) and are defined above. *Inv\_Cov* is an indicator variable that equals 1 if the firm ever includes a capital expenditure restriction provision in its bank loans during the sample period. The two "regime" regressions are the same as Equation (1), except that the partition is based on whether the firm's debt has an investment restriction. If this covenant is useful in reducing the asset substitution or overinvestment problem, then we expect the effect of accounting quality (*AccQual*) on the lease-versus-buy decision to be reduced in the presence of this restrictive covenant.

## VI. RESULTS

### Descriptive Statistics

Table 1 provides descriptive statistics for our comprehensive sample partitioned by whether firms are relatively more likely to lease assets (the high lease group) or less likely to lease assets (the low lease group). The partition is based on the median lease propensity in the sample. By construction, the high lease group has a higher leasing propensity than the low lease group. The high lease group also has lower accounting quality than the low lease group. They are also less likely to pay dividends, less likely to be rated, and if they are rated, then they are likely to have a poor credit rating, suggesting that firms that lease are more likely to face financing constraints. Finally, firms with a higher propensity to lease have more losses, and have lower marginal tax rates.

Pearson correlations are reported in Table 2. The variables in this table are highly correlated, in a statistical sense, with p-values less than 1 percent. Consistent with H1, *AccQual* and *Lease* are negatively correlated. Also consistent with prior discussions, firms with financing constraints are more likely to lease than to purchase assets. In addition, *Size* and most variables (*Nodiv*, *Unrated*, *Rating*, and *Loss*) are highly correlated (over 50 percent). *Loss* and *MTR* are also highly correlated.

Table 3 reports descriptive statistics for the subsample of firms with syndicated loan data. In the second and third columns of Table 3, we partition the sample firms by the level of lead

**TABLE 1**  
**Descriptive Statistics (Means and Medians) for Sample Firms Partitioned by Their Leasing Propensity for the Period 1995–2006**

	High Lease		Low Lease	
	Mean	Median	Mean (t-stat for High Lease- Low Lease)	Median (Wilcoxon z-stat for High Lease-Low Lease)
<i>Lease</i>	0.650	0.652	0.223 (94.54)***	0.223 (47.69)***
<i>AccQual</i>	-0.147	0.079	0.217 (-18.11)***	0.348 (-22.63)***
<i>Nodiv</i>	0.822	1.000	0.464 (22.15)***	0.000 (20.55)***
<i>Unrated</i>	0.880	1.000	0.584 (19.50)***	1.000 (18.38)***
<i>Rating<sup>a</sup></i>	3.604	4.000	3.134 (6.53)***	3.250 (6.67)***
<i>Size</i>	3.194	3.000	5.807 (-28.14)***	6.000 (-25.06)***
<i>Loss</i>	0.580	0.600	0.282 (25.73)***	0.200 (23.23)***
<i>MTR</i>	0.108	0.054	0.198 (-20.58)***	0.214 (-20.20)***
<i>n</i>	1,517	1,517	1,516	1,516

\*, \*\*, \*\*\* Significant at the 10 percent, 5 percent, and 1 percent levels, respectively. High Lease (Low Lease) include firms with Lease above (below) the median.

<sup>a</sup> The mean (median) values of this variable only apply to firms rated by the S&P.

Variable Definitions:

*Lease* = average of the capitalized lease expenditure (lagged Compustat #96 × 10) over the sum of PP&E and capitalized lease expenditure (Compustat #8 + lagged Compustat #96 × 10);

*AccQual* = average of the first principal component of three accrual-based accounting quality metrics based on [Bharath et al. \(2008\)](#), described in the Appendix;

*Nodiv* = indicator variable equal to 1 if the firm never pays dividend (Compustat #21) during the sample period, and 0 otherwise;

*Unrated* = indicator variable equal to 1 if the firm is never rated by the S&P (Compustat #280) during the sample period, and 0 otherwise;

*Rating* = average of S&P ratings when the firm is rated by the S&P. Following [Sharpe and Nguyen \(1995\)](#), the rating is coded 1 if the S&P rating is between AAA and A-, 2 if the rating is between A+ and A-, 3 if the rating is between BBB+ and BBB-, and 4 if the rating is between BB+ and D;

*Size* = decile ranking of average of the natural log of sales (Compustat #12);

*Loss* = average of the indicator variable for loss year, where the indicator variable equals 1 when the Compustat #123 is less than 0; and

*MTR* = average of the marginal tax rates, based on John Graham's simulation technique, as reported on his website.

arranger ownership for the LPC subsample. Firms with better private information and monitoring quality tend to be smaller, have worse accounting quality, and face more financial constraints. These firms are also characterized by a smaller debt size and shorter maturities. The fact that these firms have a greater propensity to lease is consistent with [Sufi's \(2007\)](#) finding that a high lead arranger ownership is associated with high information asymmetries and financing constraints. This observation suggests that it is important to control for endogeneity before drawing any inferences.

**TABLE 2**  
**Pearson Correlation Coefficients (p-values) for Lease Model Variables during the Period 1995–2006**

<b>Variables</b>	<b>Lease</b>	<b>AccQual</b>	<b>Nodiv</b>	<b>Unrated</b>	<b>Rating</b>	<b>Size</b>	<b>Loss</b>	<b>MTR</b>
<i>Lease</i>	1	−0.351 (0.001)	0.399 (0.001)	0.369 (0.001)	0.298 (0.001)	−0.532 (0.001)	0.471 (0.001)	−0.387 (0.001)
<i>AccQual</i>		1	−0.301 (0.001)	−0.233 (0.001)	−0.191 (0.001)	0.398 (0.001)	−0.398 (0.001)	0.318 (0.001)
<i>Nodiv</i>			1	0.363 (0.001)	0.482 (0.001)	−0.552 (0.001)	0.501 (0.001)	−0.417 (0.001)
<i>Unrated</i>				1	NA	−0.658 (0.001)	0.312 (0.001)	−0.192 (0.001)
<i>Rating</i>					1	−0.568 (0.001)	0.495 (0.001)	−0.309 (0.001)
<i>Size</i>						1	−0.644 (0.001)	0.492 (0.001)
<i>Loss</i>							1	−0.695 (0.001)
<i>MTR</i>								1

Correlations with *Rating* only apply to firms that are rated by the S&P.  
 See Table 1 for variable definitions.

The fourth and fifth columns in Table 3 partition the SDC subsample firms by whether the firm's bank loans contain the capital expenditure restriction. Firms that use this restrictive covenant tend to be smaller, lease less, face more financing constraints, and have lower performance. These firms also have smaller loans with longer maturities.

### Multivariate Results

Panel A of Table 4 provides the results of the OLS estimation of Equation (1) for the comprehensive sample of manufacturing firms. Consistent with H1, we find that firms with worse accounting quality (i.e., low *AccQual*) have a greater propensity to lease assets. This result is both statistically and economically significant. For example, a standard deviation change in *AccQual* (standard deviation = 0.583) is associated with a 7.1 percent change in the mean *Lease* (mean = 0.436).<sup>25</sup>

As for control variables, results on *Nodiv*, *Unrated*, *Size*, *Loss*, and *MTR* are consistent with the reasoning that firms with more financial constraints have a greater propensity to lease assets. For comparative purposes, we repeat the analysis for the comprehensive sample on our lead lender subsample and report the results for this subsample in Panel B of Table 4. The results on both our test and control variables are quite similar across these two samples, suggesting that any differences between our comprehensive sample of Compustat manufacturing firms and the subsample of these firms with syndicated loans do not affect our lease-versus-buy findings.

<sup>25</sup> While not reported, we find that the VIF of our accounting quality measure is 1.25, so our finding that financial reporting quality influences leasing activities is not driven by multi-collinearity.

**TABLE 3**  
**Descriptive Statistics (means) for Sample Firms Partitioned on Whether the Firm Uses a Capital Expenditure Restriction in Bank Loans and the Lead Lenders' Ownership of Bank Loans for the Period 1995–2006**

	High Lead Arrangers' Ownership	Low Ownership (t-stat for difference)	With Capital Expenditure Restrictions	Without Restrictions (t-stat for difference)
<i>Lease</i>	0.458	0.316 (10.58) ***	0.371	0.325 (3.40) ***
<i>AccQual</i>	0.071	0.302 (-9.94) ***	0.223	0.249 (-1.02)
<i>Nodiv</i>	0.728	0.315 (14.29) ***	0.556	0.391 (4.82) ***
<i>Unrated</i>	0.888	0.359 (20.52) ***	0.497	0.493 (0.13)
<i>Rating<sup>a</sup></i>	3.802	3.097 (6.19) ***	3.792	3.002 (12.17) ***
<i>Size</i>	3.814	7.424 (-32.14) ***	6.158	6.632 (-3.75) ***
<i>Loss</i>	0.423	0.183 (14.00) ***	0.319	0.226 (5.16) ***
<i>MTR</i>	0.157	0.213 (-7.45) ***	0.185	0.208 (-2.90) ***
<i>Lead Own</i>	89.624	24.218 (69.44) ***	NA	NA
<i>Loan</i>	16.364	19.433 (-41.35) ***	18.091	18.326 (-2.13) **
<i>Maturity</i>	3.367	3.869 (-12.80) ***	3.770	3.591 (5.16) ***
<i>n</i>	499	498	374	491

\*, \*\*, \*\*\* Significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

<sup>a</sup> The mean values of this variable only apply to firms that are rated by the S&P.

Variable Definitions:

*Lead Own* = weighted average of the lead arrangers' ownership of the bank loan issued in the sample period;

*Loan* = natural of log of the amount of bank loan issued in the sample period; and

*Maturity* = natural of log of the maturity (in months) of bank loan issued in the sample period.

See Table 1 for definitions of other variables.

We present the results on our tests of the effect of banks' due diligence incentives on the lease-versus-buy decision in Table 5. In the first column of results, we report the determinants of the leasing propensity for firms where the lead lender holds a relatively larger proportion of the loan (i.e., *Lead Rank* = 1). In the second column of results, we report the determinants of the leasing propensity for firms where the lead lender holds a relatively smaller proportion of the loan (i.e., *Lead Rank* = 0).

Focusing on the determinants to lease for firms where the lead lender has a stronger incentive to monitor, we find that smaller firms, firms that suffer a loss, and firms that are not paying

**TABLE 4**  
**Coefficients (and t-statistics) from OLS Estimations of the Determinants of the Extent of Firms' Expenditures on Operating Leases**

<b>Panel A: Complete Sample</b>			
<b>Variables</b>	<b>Predicted Sign</b>	<b>Coefficients</b>	<b>t-stats</b>
Intercept	+/-	0.442	10.18***
<i>AccQual</i>	-	-0.053	-4.00***
<i>Nodiv</i>	+	0.048	3.35***
<i>Unrated</i>	+	0.057	1.67*
<i>Rating</i>	+	0.003	0.34
<i>Size</i>	-	-0.022	-7.26***
<i>Loss</i>	+	0.094	3.75***
<i>MTR</i>	-	-0.143	-2.88***
n		3,033	
R <sup>2</sup>		0.3382	

  

<b>Panel B: Syndicated Loan Sample</b>			
<b>Variables</b>	<b>Predicted Sign</b>	<b>Coefficients</b>	<b>t-stats</b>
Intercept	+/-	0.467	7.37***
<i>AccQual</i>	-	-0.074	-3.32***
<i>Nodiv</i>	+	0.036	2.21**
<i>Unrated</i>	+	0.028	0.73
<i>Rating</i>	+	0.003	0.32
<i>Size</i>	-	-0.021	-4.32***
<i>Loss</i>	+	0.085	2.66***
<i>MTR</i>	-	-0.102	-1.86*
n		1,314	
R <sup>2</sup>		0.2414	

\*, \*\*, \*\*\* Significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

All t-statistics are based on clustering at the three-digit industry level.

See Table 1 for variable definitions.

dividends are more likely to lease. These results suggest that firms facing financing constraints are more likely to lease, consistent with Eisfeldt and Rampini (2009) and Sharpe and Nguyen (1995). We also find that *AccQual* has a significant negative coefficient, indicating that worse accounting quality is associated with a greater leasing propensity for firms with a high lead arranger ownership in bank loans.

For firms where the lead lender has less monitoring incentives, we again find that *AccQual* has a significant negative coefficient. Consistent with the results reported in the first column, lower accounting quality is associated with a greater leasing propensity. We conduct a Chi-squared test on the coefficient on accounting quality across these two regressions to test H2. We find that the coefficient on accounting quality is statistically larger for firms that have lenders with fewer monitoring incentives. Thus, when information asymmetry problems are likely to be larger, accounting quality plays a relatively more important role in the leasing decision.



**TABLE 5**  
**Coefficients (and t-statistics) from Endogenous Switching Models Estimating How Monitoring by Banks, Measured by Lead Lenders' Ownership, Affects the Effect of Accounting Quality on Lease Expenditures**

Variables	Predicted Sign	Lead Rank = 1	Lead Rank = 0
		Coefficients (z-stats)	Coefficients (z-stats)
Intercept	+/-	0.455 (1.75) *	0.402 (4.78)***
<i>AccQual</i>	-	-0.053 (-2.22) **	-0.211 (-6.48)***
<i>Nodiv</i>	+	0.073 (3.11) ***	0.043 (2.26)**
<i>Unrated</i>	+	0.044 (0.17)	0.063 (1.29)
<i>Rating</i>	+	0.006 (0.10)	0.011 (0.83)
<i>Size</i>	-	-0.020 (-2.73) ***	-0.011 (-1.45)
<i>Loss</i>	+	0.090 (1.98) **	0.053 (1.24)
<i>MTR</i>	-	-0.253 (-2.26) **	-0.015 (-0.21)
n		472	492

Differences in the impact of accounting quality on the lease-versus-buy decision

$$H_0: AccQual_{(Lead\ Rank=1)} = AccQual_{(Lead\ Rank=0)}$$

$$\chi^2 (1) = 15.42$$

$$p\text{-value} = 0.0001$$

\*, \*\*, \*\*\* Significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

See Table 1 for variable definitions.

We report the results of our tests of H3 on the effects of direct monitoring via the capital expenditure covenant on the leasing propensity in Table 6. The first column reports the results on the determinants of the leasing propensity for firms with investment-restriction covenants. The second results column reports the determinants of the leasing propensity for firms without investment-restriction covenants.

We find that for the subset of firms with investment covenants, the firms that are unrated, or are rated and have relatively poor ratings have a greater propensity to lease assets. Similarly, for the subset of firms without investment covenants, we find that smaller firms and firms that have suffered losses have a greater propensity to lease assets. Similar to the results discussed above, these findings support the findings in Eisfeldt and Rampini (2009) and Sharpe and Nguyen (1995) that firms that are more likely to have financing constraints are more likely to lease.

We find that accounting quality is an important determinant of leasing propensity for firms without investment covenants and is not a significant determinant of the leasing propensity for firms with these covenants. A Chi-squared test confirms that the effect of accounting quality on leasing propensity is significantly different across these regressions. These results support our

**TABLE 6**  
**Coefficients (and t-statistics) from Endogenous Switching Model Estimation of the Effect of Capital Expenditure Restrictions on Firms' Leasing Propensity**

Variables	Predicted Sign	<i>Inv_Cov</i> = 1	<i>Inv_Cov</i> = 0
		Coefficients (z-stats)	Coefficients (z-stats)
Intercept	+/-	-0.602 (-2.66)***	0.364 (5.18)***
<i>AccQual</i>	-	-0.005 (-0.15)	-0.104 (-4.51)***
<i>Nodiv</i>	+	0.038 (1.31)	0.133 (0.66)
<i>Unrated</i>	+	0.841 (4.61)***	0.084 (1.24)
<i>Rating</i>	+	0.234 (4.77)***	0.018 (0.93)
<i>Size</i>	-	-0.018 (-1.89)*	-0.013 (-2.40)**
<i>Loss</i>	+	0.053 (0.89)	0.114 (2.75)***
<i>MTR</i>	-	-0.184 (-1.38)	-0.027 (-0.35)
n		373	483

Differences in the impact of accounting quality on the lease-versus-buy decision

$$H0: AccQual_{(Inv\_Cov=1)} = AccQual_{(Inv\_Cov=0)}$$

$$\chi^2(1) = 5.66$$

$$p\text{-value} = 0.017$$

\*, \*\*, \*\*\* Significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

Variable Definition:

*Inv\_Cov* = indicator variable that equals 1 if the firm ever includes a capital expenditure restriction provision in its bank loans during the sample period.

See Table 1 for definition of other variables.

prediction in H3 that accounting quality is less important in leasing decisions when other mechanisms, like capital expenditure covenants, limit the ability of firms to engage in capital spending.

For completeness, we report the results of our “selection” regressions in Table 7. Although we do not develop hypotheses about the determinants of lead arranger’s monitoring incentives or of investment covenants, we find that many of the explanatory variables included in the models are statistically significant. Of particular importance are the coefficients on the variables that serve as exogenous instruments. We find that large lead arranger ownership decreases with loan amounts and maturities, while capital expenditure provisions increases with loan amount and maturities. While not a direct test of “exogeneity,” these results suggest that our exogenous instruments explain variation in investment covenants, and lead-ownership holdings.

**TABLE 7**  
**Coefficients (and z-statistics) from Probit Models Examining the Determinants of the Lead Lenders' Ownership and Use of Capital Expenditure Provisions for the Period 1995–2006**

Variables	Prediction	Dependent Variable:	Dependent Variable:
		<i>Lead Rank</i>	<i>Inv_Cov</i>
		Coefficients (z-stats)	Coefficients (z-stats)
Intercept	+/-	23.211 (10.98)***	-6.531 (-5.82)***
<i>AccQual</i>	-	0.055 (0.25)	0.104 (0.82)
<i>Nodiv</i>	+	-0.041 (-0.27)	0.077 (0.71)
<i>Unrated</i>	+	-1.228 (-1.73)*	3.396 (6.15)***
<i>Rating</i>	+	-0.250 (-1.28)	0.984 (6.52)***
<i>Size</i>	-	-0.146 (-2.76)***	-0.104 (-2.25)**
<i>Loss</i>	+	0.391 (1.19)	0.486 (2.35)**
MTR	+/-	1.111 (1.96)**	0.051 (0.11)
Loan	+/-	-1.132 (-10.81)***	0.010 (1.78)*
Maturity	+/-	-0.314 (-2.43)**	0.440 (4.28)***
n		964	856
Pseudo R <sup>2</sup>		0.6732	0.1442

\*, \*\*, \*\*\* Significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

All z-statistics are based on clustering at the three-digit industry level.

Variable Definitions:

*Lead Rank* = indicator variable equals 1 if the average of the lead arrangers' ownership of the firm's bank loans exceeds the median of all sample firms, and 0 otherwise; and

*Inv\_Cov* = indicator variable that equals 1 if the firm ever includes a capital expenditure restriction provision in its bank loans during the sample period.

See Table 1 for variable definitions.

## VII. ROBUSTNESS CHECKS

### Industry Composition

We focus on the manufacturing industry to avoid the heterogeneity in financing, leasing, and financial reporting choices across various industries. Untabulated results show that our findings continue to hold in analyses that include all industries and control for fixed industry effects.

### Lease Measure

The main tabulated results are based on an approach that averages all variables across the sample period, where *Lease* is a stock measure. To show that our results are not driven by this

specific design, we also conduct a panel data analysis, where we measure accounting quality by averaging the absolute value of discretionary accruals over the three years prior to the measurement year of our leasing propensity variable.

Consistent with [Sharpe and Nguyen \(1995\)](#) and [Eisfeldt and Rampini \(2009\)](#), we also define *Lease* using a flow measure in the panel data framework. The flow measure of *Lease* is defined as the minimum lease payment (lagged Compustat #96) divided by the sum of lease and capital expenditures (Compustat #128). Table 8 shows that this alternative measure in our panel data analysis generates results consistent with our main approach, firms with higher accounting quality are less likely to lease than to buy.

We also replace the scalar in our model with the sum of total assets and capitalized lease obligations (Compustat # 6 + lagged Compustat #96  $\times$  10). We continue to observe a significantly negative association between accounting quality and leasing. Finally, Tobit estimation including firms with missing lease data (about 8 percent of firms) produces similar results.

### Accounting Quality Measure

In addition to using the principal-component approach to measuring accruals quality, we also derive measures based on the underlying variables, and include those measures in the model. Our

**TABLE 8**  
**Coefficients (and t-statistics) from OLS Estimations of the Determinants of the Extent of Firms' Expenditures on Operating Leases for the Period 1995–2006 Estimated Using an Annual Regression and Flow Measures of Lease Proclivity**

Variables	Predicted Sign	Coefficients	t-stats
Intercept	+/-	0.522	19.68***
<i>AccQual</i>	-	-0.042	-5.98***
<i>Nodiv</i>	+	0.070	6.54***
<i>Unrated</i>	+	0.056	2.27**
<i>Rating</i>	+	0.005	0.69
<i>Size</i>	-	-0.029	-14.69***
<i>Loss</i>	+	0.030	4.14***
<i>MTR</i>	-	-0.135	-5.50***
n		15,055	
R <sup>2</sup>		0.3021	

\*, \*\*, \*\*\* Significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

All t-statistics are based on clustering at the firm level. Results on time fixed effects are omitted.

#### Variable Definitions:

*Lease* = lease expenditure (lagged Compustat #96) divided by the sum of capital and lease expenditures (Compustat #128 + lagged Compustat #96);

*AccQual* = average of first principal component of three accrual-based accounting quality metrics based on [Bharath et al. \(2008\)](#) over three years prior to the year *Lease* is measured (described in the Appendix);

*Nodiv* = indicator variable equal to 1 if the firm does not pay a dividend (Compustat #21), and 0 otherwise;

*Unrated* = indicator variable equal to 1 if the firm is not rated by the S&P (Compustat #280), and 0 otherwise;

*Rating* = S&P ratings when the firm is rated by the S&P. Following [Sharpe and Nguyen \(1995\)](#), the rating is coded 1 if the S&P rating is between AAA and A-, 2 if the rating is between A+ and A-, 3 if the rating is between BBB+ and BBB-, and 4 if the rating is between BB+ and D;

*Size* = decile ranking of average of the natural log of sales (Compustat #12);

*Loss* = indicator variable for loss year, where the indicator variable equals 1 when the Compustat #123 is less than 0; and

*MTR* = marginal tax rates based on John Graham's simulation technique, as reported on his website.

results continue to hold when we use these underlying variables. To ensure that the decision to use cross-sectional estimation is not affecting our results, we also use a time-series measure of the extent of current accruals mapping into future, current, and future operating cash flows (Dechow and Dichev 2002) as a metric for accounting quality. The results of using this time-series measure are consistent with the results of using cross-sectional models.

Similarly, we change the scalar used in the accounting quality measures to be consistent with the scalar used on the independent variable, and to ensure that differences in the accounting treatment for leases are not driving our results. If we use total assets as the scalar, we find results similar to those that we tabulate.

### **Lead Rank Measure**

To test the sensitivity of our results to our measure of lead ranks, we examined two alternative cutoffs. Setting this variable equal to 1 if the average of the lead arrangers' ownership of the firm's bank loans exceeds either the 33rd or the 66th percentile of all sample firms, and 0 otherwise, produces similar results.<sup>26</sup> The results of these alternative specifications suggest that our results are not driven by our median cutoff.<sup>27</sup>

### **Financial Constraints**

Finally, when the firm has lower free cash flow, information problems are more likely to affect the firm's investment behavior through their effect on external financing. We interact accounting quality proxies with an indicator variable for high free cash flow. We find that the importance of accounting quality affecting leasing activities decreases with free cash flow, consistent with our prediction.

## **VIII. CONCLUSION**

This study extends prior research on the relation between financial reporting quality and firms' investment and financing choices by investigating the effect of financial reporting quality on the lease-versus-buy decision. Our research design complements prior studies that focus exclusively on asset purchases when examining the effect of accounting quality on firm's investment decisions. We find that the leasing propensity is declining in accounting quality. This finding suggests that although previous research shows that firms with poor accounting quality buy fewer assets, they lease more of their assets, indicating that poor accounting quality may not result in lower total investment.

To distinguish between two alternative explanations of this finding, we also examine the mechanisms that lenders use to mitigate the agency problems arising from information asymmetries. Only if better accounting quality and leasing are two alternative mechanisms for addressing financial constraints would we expect the negative relation between accounting quality and leasing to be mitigated by other mechanism that reduce information asymmetry and agency costs. We find that accounting information is less important in the decision to lease when lenders' incentives to conduct due diligence are higher. The importance of financial reporting quality in the lease-versus-buy decision is also decreasing in the existence of capital expenditure covenants. Although the relation between leasing and accounting quality might be indicative of a propensity of firms with otherwise poor accounting quality to engage in off-balance-sheet financing, our results are more consistent with accounting quality and leasing serving as substitute mechanisms for reducing financing constraints.

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<sup>26</sup> Similar to Sufi (2007), we find consistent results using a Herfindahl index of bank loan ownership.

<sup>27</sup> We also interacted a continuous lead-ownership measure with our accounting quality measure. The *AccQual* coefficient magnitude decreases with lead-ownership, consistent with the dichotomize approach.

Overall, our results highlight the importance of considering leasing when studying the effects of financial reporting quality on investments. Prior research suggests that firms with poor accounting quality have financial constraints, inhibiting their ability to invest in the periods in which they are liquidity constrained. Our results extend this line of research, suggesting that while low-quality accounting firms are likely to forgo purchasing assets, they are more likely to lease assets when they are liquidity constrained. Our analyses also contribute to the literature examining the importance of accounting information in firms' investment decisions by considering how banks' private information and monitoring can substitute for accounting information.

## APPENDIX

### Construction of *AccQual*

**ABACC1:** The absolute value of current discretionary accruals calculated based on [Teoh et al. \(1998\)](#). The model is estimated annually for each [Fama and French \(1997\)](#) industry group and each industry-year regression requires at least 20 observations. Based on [Teoh et al. \(1998\)](#), we first estimate the following regression to get the estimated coefficients (variables are defined below):

$$\frac{\text{Current\_Acc}}{\text{Total\_Inv}} = \gamma_1 \frac{1}{\text{Total\_Inv}} + \gamma_2 \frac{\Delta \text{Re } v}{\text{Total\_Inv}} + \eta.$$

The second step calculates the absolute value of discretionary accruals as:

$$\left| \frac{\text{Current\_Acc}}{\text{Total\_Inv}} - \hat{\gamma}_1 \frac{1}{\text{Total\_Inv}} - \hat{\gamma}_2 \frac{(\Delta \text{Re } v - \Delta \text{AR})}{\text{Total\_Inv}} \right|.$$

**ABACC2:** The absolute value of total discretionary accruals calculated based on [Dechow et al. \(1995\)](#). The model is estimated annually for each [Fama and French \(1997\)](#) industry group and each industry-year regression requires at least 20 observations. We first estimate the following regression to get the estimated coefficients (variables are defined below):

$$\frac{\text{Total\_Acc}}{\text{Total\_Inv}} = \alpha_1 \frac{1}{\text{Total\_Inv}} + \alpha_2 \frac{\Delta \text{Re } v}{\text{Total\_Inv}} + \alpha_3 \frac{\text{PPE}}{\text{Total\_Inv}} + \varepsilon.$$

The second step calculates the absolute value of discretionary accruals as:

$$\left| \frac{\text{Total\_Acc}}{\text{Total\_Inv}} - \hat{\alpha}_1 \frac{1}{\text{Total\_Inv}} - \hat{\alpha}_2 \frac{(\Delta \text{Re } v - \Delta \text{AR})}{\text{Total\_Inv}} - \hat{\alpha}_3 \frac{\text{PPE}}{\text{Total\_Inv}} \right|.$$

**ABACC3:** The absolute value of total current accruals calculated based on [Dechow and Dichev \(2002\)](#). The model is estimated annually for each [Fama and French \(1997\)](#) industry group and each industry-year regression requires at least 20 observations. ABACC3 is the absolute value of the estimated residual from the following model.

$$\frac{\text{Current\_Acc}}{\text{Total\_Inv}} = \theta_0 + \theta_1 \left( \frac{\text{CFO}}{\text{Total\_Inv}} \right)_{t-1} + \theta_2 \left( \frac{\text{CFO}}{\text{Total\_Inv}} \right)_t + \theta_3 \left( \frac{\text{CFO}}{\text{Total\_Inv}} \right)_{t+1} + v,$$

where:

$Current\_Acc$  = earnings before extraordinary items–cash flow from operating activities–depreciation (Compustat #123 – #308 + #14);<sup>28</sup>

$Total\_Acc$  = earnings before extraordinary items–cash flow from operating activities (Compustat #123 – #308);

$Total\_Inv$  = the sum of PP&E and capitalized lease expenditure (Compustat #8 + lagged Compustat #96 multiplied by 10);

$CFO$  = cash flow from operating activities (Compustat #308);

$\Delta Rev$  = change in sales (Compustat #12);

$\Delta AR$  = change in accounts receivables (Compustat #2).

$PPE$  = property, plant, and equipment (Compustat #8).

We standardize each of the three measures by subtracting the mean and dividing by the standard deviation, and then extract the first principal component from the three proxies.<sup>29</sup> Our accounting quality variable ( $AccQual$ ) is thus defined as the average of the following metric over the sample period 1995–2006:

$$-1 * [\text{standardizedABACC1} * 0.38538 + \text{standardizedABACC2} * 0.38371 + \text{standardizedABACC3} * 0.32568].^{30}$$

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<sup>28</sup> In robustness checks, we adjust the current accruals by excluding change in prepaid rental expenses to accommodate differences in accounting for operating leases versus asset purchase, and this adjustment does not affect the results.

<sup>29</sup> The first principal component explains that, on average, about 80 percent of the corresponding cross-sectional sample variance and only the first eigenvalue is greater than 1. We therefore conclude that the first principal component captures most of the common variation among the three proxies.

<sup>30</sup> We multiply by  $-1$  to make the metric higher for firms with better accounting quality. The Pearson correlations between the first principal component and the three accounting quality proxies are very high, ranging from  $-80$  percent to  $-95$  percent.

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