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營運租賃與負債之關聯性研究

Are operating leases and debt substitutes or complements?

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中 華 民 國 九 十 六 年 六 月

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摘要

租賃融資和負債融資是現今公司對外籌資的最主要的來源，因此，在決定公司最適資結構時，租賃也扮演著相當重要的角色。本研究的主要目的是在檢視營運租賃和短期負債、長期負債、擔保負債以及無擔保負債的關聯性。假設承租人可以透過租賃將非負債稅盾出售、負債與非負債稅盾為負相關和公司的租賃和融資決策同時決定下，並且在考慮可能影響營運租賃和負債的控制變數後，分別探討營運租賃和負債的相關性。結果顯示，採用美國公司資料，使用 Tobit 模型迴歸分析的實證得出營運租賃和短期負債、長期負債和擔保負債為互補關係，而營運租賃和無擔保負債為替代關係。

關鍵字：營運租賃、短期負債、長期負債、擔保負債、無擔保負債。

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ABSTRACT

Debt and leases are both important financing instruments commonly used by companies nowadays. However, the relationship between leases and debt is controversial in the previous papers. This paper investigates the relationship between operating leases and debt, and debt is classified as short-term debt, long-term debt, secured debt, and unsecured debt. This paper assumes that the lessee has ability to sell the non-debt tax shield through leasing, the debt is negative to non-debt tax shield, and leasing decision and financing decision are determined simultaneously. Under controlling the explanatory variables to leases and debt, this study uses the Tobit regression model to explore the relationship between leases and debt. The empirical results show that operating leases are complements to short-term debt, long-term debt, and secured debt, but operating leases and unsecured debt are substitutes.

Keywords: operating leases, short-term debt, long-term debt, secured debt, unsecured debt.

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1. Introduction

A lease is a contract involving two parties: the lessee and the lessor. The lessee pays periodic amounts to the lessor to get the right to use the assets. The lessee can use the assets to create the cash flow and then increase the value of the company. Leasing involves a separation of the ownership and use right of the assets. For leasing financing, it is the use of the assets that is important, not who owns the assets. Both debt and leases are important financing instruments commonly used by companies nowadays. Not only the traditional external financing but the lease financing get the right of using the assets. Therefore, leasing plays a crucial role when the company decides the optimal corporate capital structure. It is regretful that the researchers do not pay attention on this issue during past few decades.

From the past articles, such as Lewellen, Long and McConnell (1976), Miller and Upton (1976), Myers, Dill and Battista (1976), Franks and Hodges (1987), and Johnson and Lewellen (1992), we find that those theoretical articles typically treat leases and debts as substitutes; for example, the greater use of lease financing should be associated with a lower level of conventional debt financing, especially in the valuation of the lease contracts. Nevertheless, when considering some variables as Ang and Peterson (1984), and Bowman (1980) present, researchers have the different result that the relationship between debt and leases are complements. They view the different result as a "puzzle."

In the latest paper Yan (2006), divides the lease contracts into capital leases and operating leases according to the Financial Accounting Standards Board's (FASB's) Statement of Financial Accounting Standards (SFAS) Statement NO.13 (1980) from the lessee perspective[1], and examines the relationship between the lease and long-term debt. The study presents that operating leases and long-term debt are substitutes.

[1] The detailed classification of leases is presented in Appendix A.

However, we know that the relationship would depend on the classification of the lease and debt. The division of the debt could be based not only on the maturity but also on the security provisions. Therefore, debt is classified into short-term debt and long-term debt by maturity, and divided into secured debt and unsecured debt in terms of the security provisions.

Donald E. Kieso and Jerry J. Weygandt (1992) point out that the lessee prefers operating leases because capital leases have to be recorded on the balance sheet but operating leases are just reflected on the off-balance sheet. Yan (2006) also shows that the importance of capital leases in corporate external obligations is deceasing.

Lewis and Schallheim (1992) demonstrate that debt and leases are complements because of the existence of the non-tax shield. Furthermore, debt financing creates the agency problems because of different interests between debtholders and stockholders. However, lease financing can alleviate the agency cost of debt related to the asset substitution problem. From the literatures, we know the relationship between the lease and the debt could be substitute, complementary or even irrelevant. The relationship has not reached a consensus yet.

The goal of this article is to explore the relationship, and especially we focus on operating leases. First, we examine the significant control variables for debt and leases. Subsequently, we divide debt into short-term debt and long-term debt[2] as well as secured debt and unsecured debt, and examine the relationship between operating leases and debt respectively.

The remainder of the thesis is organized as follows. Section 2 is the literature review. Section 3 describes the data and the measurement issues. Section 4 develops the empirical model. Section 5 presents the empirical results. And the last section

[2] The definition of short-term debt and long-term debt are in a comparative sense. See details in the Section 3.

concludes the study.

2. Literature Review

2.1 Lease-verse-Buy decision

Among the prevailing papers, Lewellen, Long and McConnell (1976), Miller and Upton (1976), Myers, Dill and Battista (1976), Franks and Hodges (1987), Johnson and Lewellen (1992), and Ross, Westerfield and Jaffe (1990), concentrate on the tax-related incentives to evaluate the decision of lease-versus-buy or lease-verse-borrow. Lewis and Schallheim (1992) rearrange Myers, Dill and Battista's (MDB) model of the valuation of financial lease contracts. The MDB model is as follows,

$$NPV = I_0 - \sum_{t=1}^{n} \frac{L_t(1-\tau_c) + \tau_e \Delta_t}{(1+r^*)^t}, \qquad (2.1)$$

where NPV is the net present value of leasing (to the lessee), I_0 is the cost of the asset excluding any lease payments at time 0, L_t is the lease payment at time t, τ_t is the corporate tax rate, Δ_t is the amount of depreciation at time t, and r^* is the after-tax cost of debt.

The first term on the right-hand side of Equation (2.1) represents the benefit by leasing. The second term on the right-hand side of the equation represents the present value of the "equivalent" loan if L_t is the interest payment at time t. The second term can view as the costs by leasing if L_t is the lease payment at time t. It means that the after-tax cash flow from leasing exactly equals the after-tax cash flow of the equivalent loan in the MDB model. From the model, we know that if the present value of the equivalent loan is less than the value of lease, NPV>0, leasing is preferred. In other words, the firm prefers to lease financing if the equivalent loans use less debt capacity than the lease creates. Otherwise, the firm would use debt financing.

In the MDB model, the cash flow between the lessee and the lessor is symmetric. That is the lessee faces the positive benefit but the lessor suffers the negatives under the same tax rate. Only if the tax rate of the lessor and lessee differ is there, the firm gain from lease contracts. Usually, the tax rate of the lessor is higher than the lessee.

2.2 Lease and Debt classification

Lewellen, Long and McConnell (1976), Miller and Upton (1976), Myers, Dill and Battista (1976), Franks and Hodges (1987), and Johnson and Lewellen (1992) do not classify the debt and lease when they evaluate the lease contract. Simiarily, when Ang and Perterson (1984) and Lewis and Schallheim (1992) examine the relationship between debt and the lease. Recently, Yan (2006) uses the long-term debt as debt to check the relationship with the operating lease.

Graham, Lemmon, and Schallheim (1998) present that a lease contract can be divided into two categories for the lessee. In financial accounting contexts, a lease is classified as either an operating lease or a capital lease, based on the criteria defined in SFAS NO. 13,"Accounting for Leases". In a capital lease contract, the lessee owns the leased property, and therefore depreciates the leased asset as well as amortizes the debt liability on the balance sheet. Hence, capital lease resembles purchases by the lessee and requires disclosures similar to asset purchases. On the contrary, operating leases represent the off-balance-sheet financing for the lessee and are reflected on the income statement as rent expense.

The dichotomy of these two classifications is complicated by the fact that Internal Revenue Service (IRS) has the different standards for the attitudes to ownership under tax and legal considerations. From a legal and tax point of view, a lease contract is either a true lease or a non-true lease, regulated by Revenue Ruling 55-540. In a true lease (a tax lease), the lessor (the owner) can deduct from

depreciations, which does not occur in a non-true lease (a non-tax lease). Graham, Lemmon, and Schallheim (1998) find out that capital leases are indeed a mixture of true and non-true leases. However, the standards from a tax perspective are not equal to those provided by SFAS NO.13 for accounting standpoints. Although the tax and accounting categories do not correspond identically, the inconsistency is not very large. Besides, only the accounting classifications do get from the financial statements. Thus, we will not distinguish the two categories in this paper.

Broadly speaking, we do not classify the debt when investigating the relationship between the lease and the debt. However, debt differs by maturity, priority, and covenant restrictions. First, Barclay and Smith (1995) presents that capital leases have the highest priority in bankruptcy. Default on a promised lease typically gives the right for lessors to repossess the leased property. If the lessee suffer from the bankruptcy and argues that the asset is essential to the ongoing operation of the firm, the court can detain the lessor from repossessing the leased asset, but require the lessee to continue making the specific lease payments to the lessor. The subsequent priority is secured debt, ordinary debt, subordinated debt and preferred stocks. As to the covenant restrictions, the lease contract might specify required maintenance activities or limit subleasing of the asset. However, the contract basically would not include provisions restraining the firm's financing or payout policies due to the prohibition by IRS. Comparing with lease contracts, debt contracts typically contain covenants restricting corporate operations like affirmative covenants or negative covenants.

Bodt, Filareto and Lobez (2001) propose an explanation of the structure of external financing by analyzing the consequences of a decision of financing by leasing, especially for the existing unsecured loans. From this study, a leasing decision generates two effects: the appearance of an agency cost related to the

retardation of the existing unsecured debt and a reduction in the agency cost of debt related to the asset substitution problems. In the following study, we will classify the lease as operating leases and divided the debt into short-term debt, long-term debt, secured debt, and unsecured debt, and examine the relationship subsequently.

2.3 The explanatory variables to Lease and Debt

Smith and Wakeman (1984) thoroughly analyze the tax and non-tax incentives of the lease-versus-buy decision and consider the determinants which influence the lessee and the lessor on leasing respectively. The analysis suggests that taxes are important in identifying potential lessees and lessors, but are less important in identifying the specific assets leased.

The non-tax incentives are organized to emphasize observable asset and firm characteristics. A lessee is affected by the financial incentives of leases, the compensation-related incentives to leases, the specialization in risk-bearing, the sensitivity to use and maintenance, the firm-specific assets, and the expected period of asset use. Among these determinants, the financial incentives show the agency problems of the asset substitution and the underinvestment between the corporates' fixed and residual claimholders. The firm can reduce the agency cost by leasing financing, issuing the secured securities and decreasing the issue of the unsecured debt. The firm-specific assets present that the organization-specific assets generate agency cost in the form of significant additional negotiation, administration, and enforcement costs due to conflicts between lessee and lessor. Although authors provide the comprehensive analysis of leasing decisions, but they do not investigate the relationship between leases and debt.

Sharpe and Hguyen (1995) present that firms' propensity to lease is influenced by the financial contracting costs associated with information problems. The result

shows that the lower-rated, non-dividend-paying, and cash-poor firms have substantial lease contracts and suggests that a complete analysis of corporate capital structure should not ignore the role of leasing, which serves as a means of alleviating financial contracting costs.

Graham, Lemmon and Schallheim (1998) examine the relation between tax rate and leases and between debts and tax rate under considering the corporate tax status is endogenous to financing decisions. This paper presents some incentives affect a firm's choice between debt and lease financing, for instance, financial distress, the investment opportunity set, collateral, regulation, firm size, and the before-financing marginal tax rate. Because of the endogeneity of the marginal tax rate, they use the before-financing marginal tax rate to check the relation between debt and leasing financing respectively. The result is consistent with the predictions.

Titman and Wessels (1988) analyze the explanatory power of optimal capital structure. This paper examines a broader set of capital structure theories, and divides measurements of debt into short-term, long-term, and convertible debt. The result presents a brief discussion of the attributes that may affect the firm's debt-equity choice. These attributes are asset structure, non-debt tax shield, growth, uniqueness, industry classification, size, earning volatility, and profitability.

2.4 The relationship between Leases and Debt

Ang and Peterson (1984) empirically investigate the extent to which leases displace debt. The debt-to-lease displacement ratio, α, is described as,

$$DR_{NL} = DR_L + \alpha LR_L = C(x_1, x_2, ...), \tag{2.4.1}$$

$$LR_L = \frac{-1}{\alpha} DR_L + \frac{1}{\alpha} C(x_1, x_2, ...), \tag{2.4.2}$$

where DR_{NL} is the debt ratio of a firm which does not lease, DR_L is the

corresponding debt ratio of a firm which does lease, LR_L is lease ratio of the latter, and C(x1, x2,……) is the set of financial variables that affect leasing decision. There are three possible values of α from a review of theories of finance. A common to these three values is that leases are expected to reduce debt capacity (α>0). A first view, debt displaced by leases is equal to one (α=1). The second view, a dollar of lease obligation replaces greater than a dollar of debt obligation (α>1). The last view holds that α is less than one, but greater than zero (0<α<1).

The paper uses the Tobit model to examine the relation because of the characteristics of lease obsevations. However, the finding of the empirical investigate is different to the common views. The observed relationship between leasing and debt is positive, α is less than zero, implying that an increase in debt is associated with an increase in lease. In other words, the lease and debt are complements.

Lewis and Schallheim (1992) demonstrate that leases and debt are complements because non-tax deductions are sold by leasing. They do not assume the substitution is between debt and leases because the optimal leasing and capital structure is determined simultaneously. The benefit from leasing is realized even the marginal tax rate is the same for the lessee and lessor. As the same with the capital structure model of DeAngelo and Masulis (1980), the paper supposes debt and non-tax shields are substitutes. A non-debt tax shields are sold, via leasing, thereby reducing the potential redundancy with depreciation deductions and making the marginal value of debt is positive. The lessee responds by issuing additional debt, which explains the positive relation between the lease and debt. In other words, debt and the lease are complements.

Yan (2006) examines the relationship between leases and debt, and differs from the prevailing literatures. First, the firm's joint financing cost function is used to explain the substitutability or complementarity in the paper. Second, the paper applies

a generalized method of moments (GMM) technique to control the endogeneity and the firm's fixed effect, and to test this relationship. Using this technique, the result presents that the long-term debt and operating leases are substitutes. Third, the paper additional investigates the extent of the substitutability between the lease and debt. It finds that the firms paying less dividends and with less redundant tax shield are more likely to use lease and debt are substitutes.

3. Data and Measurement Issues

3.1 Debt and Lease

This study uses panel data constructed from the Standard and Poor's COMPUSTAT of North American Database. Included in this sample are annual observations from 1996-2005 for the firms with SIC code between 0100 and 5999 on the active files. We exclude the financial industry because the observations are unavailable in the database. We also exclude the public administration industry because this industry is controlled by the government. The full sample contains 2710 observations according to above collection criteria.

Based on the accounting standard of operating leases[3], we defined "shorter" debt as debt mature shorter than five years and "longer" debt as debt mature longer than five years. Our definition of the short-term debt is measured as the ratio of book value of total shorter debt excluding capital leases to the market value of the firm. The market value of the firm is the book value of total debt plus the market value of equity and plus operating leases. The short-term debt (STDR) is as follows,

$$STDR = \frac{shorter\ debt - capital\ leases}{book\ value\ of\ total\ debt + market\ value\ of\ equity + operating\ leases} \quad (3.1.1)$$

Long-term debt is measured as the ratio of book value of total longer debt excluding

[3] The accounting standard is presented in Appendix B.

capital leases to the market value of the firm. Based on the accounting standard of operating leases, we calculate the below five years debt as the short-term debt and above five years debt as the long-term debt. The long-term debt (LTDR) is as follows,

$$LTDR = \frac{longer\ debt - capital\ leases}{book\ value\ of\ total\ debt + market\ value\ of\ equity + operating\ leases} \quad (3.1.2)$$

As to security provision, followed by Stulz and Johnson (1985), the secured debt is measured as the ratio of book value of total secured debt excluding capital leases to the market value of the firm. The secured debt (SDR) is as follows,

$$SDR = \frac{secured\ debt - capital\ leases}{book\ value\ of\ total\ debt + market\ value\ of\ equity + operating\ leases} \quad (3.1.3)$$

Unsecured debt is measured as the ratio of book value of total unsecured debt to the market value of the firm. The unsecured debt (USDR) is as follows,

$$USDR = \frac{unsecured\ debt}{book\ value\ of\ total\ debt + market\ value\ of\ equity + operating\ leases} \quad (3.1.4)$$

Operating leases is measured as the ratio of current year rental expense plus present value of rental commitments over the next five years (discounted at 6.6 percent)[4] to the market value of the firm. In the remainder of this section, we describe the variables which are used to explain the relationship between debt and lease financing.

3.2 Explanatory variables to Debt and Lease Financing

In the following section, we describe the measurement of the explanatory variables to debt and lease financing.

(1) Non-debt tax shield (NDT)

To measure the non-debt tax shield, we include the expense which could create the non-debt tax shield, such as depreciation expenses. The measurement of NDT is as

[4] Because there are many missing values of short-term borrowing rate, we use the average borrowing rate as the short-term borrowing rate for all firms.

follows,

$$NDT = \frac{EBDIT - IE - \frac{ITAX}{TAX}}{TA}, \quad (3.2.1)$$

where IE is the interest expenses, ITAX is the income tax amounts of the specific year, TAX is the tax rate, and TA is the total asset.

(2) Financial distress (Z_score)

We use the modified version of Altman's Z-score to measure the ex post financial distress. Our measurement of Z-score[5] is as follows,

$$Z - score = 3.3\frac{EBIT}{TA} + 1.0\frac{Sales}{TA} + 1.4\frac{RE}{TA} + 1.2\frac{WC}{TA}, \quad (3.2.2)$$

where RE is the retained earnings, WC is the working capital, and TA is the total asset. A higher value of Z_score indicates a low level of financial distress.

(3) Collateral

Since fixed assets are more valuable in liquidation and support a higher external obligation capacity, we measures collateral as net property, plants, and equipment divided by total assets. The measurement of collateral is as follows,

$$Collataral = \frac{PP\ \&\ E}{TA} \quad (3.2.3)$$

(4) Uniqueness

The lessor and debtholders probably suffer relatively high cost in the event that liquidate the firms of produce unique or specialized products. Hence, we measure uniqueness as research and development expenses divided by total assets. The measurement of uniqueness is as follows,

$$Uniqueness = \frac{R\ \&\ D\ \text{exp}enses}{TA} \quad (3.2.4)$$

(5) Firm size (Size)

Firm size is a proxy for the quality of outsider's information about a firm's

[5] The calculation of Z_score is the same to the calculation of Graham, Lemmon and Schallheim(1998).

operation and prospect. Thus, we define firm size as the natural logarithm of the total assets. The measurement of firm size is as follows,

$$Size = \ln(TA) \tag{3.2.5}$$

(6) Profitability (prof)

According to Pecking-Order theory, a firm may reduce the external funds if the firm has sufficient retained earnings for new investment. We use the ratio of operating income over total assets to measure profitability. The measurement of profitability is given as follows,

$$prof = \frac{operating\ income}{TA} \tag{3.2.6}$$

(7) Cash Dividend (Dv)

Since firms that do not pay cash dividends are likely to be burdened by asymmetric information, we construct a dummy variable to investigate the effect of dividend policy. The dummy variable is set to one if the firms paid no cash dividend and zero otherwise. The measurement of cash dividend is as follows,

$$Dv = \begin{cases} 1 & \text{if the firm does not pay cash dividend} \\ 0 & \text{otherwise} \end{cases} \tag{3.2.7}$$

(8) Industry Effect

Several researchers have documented industry effect associated with debt and leasing policy. To control for industry effect in the regression, we include three dummy variables for each one-digit SIC code grouping. The first dummy is set to one for firms with SIC code between 0100 and 1999 and zero otherwise; the second dummy is set to one for firms with SIC code between 2000 and 3999 and zero otherwise; the third dummy is set to one for firms with SIC code between 4000 and 4999 and zero otherwise. The measurement of profitability Dvis given as follows,

$$\text{Dummy1} = \begin{cases} 1 & \text{if } 0 \leqq \text{SIC} \leqq 1999 \\ 0 & \text{otherwise} \end{cases}$$

$$\text{Dummy2} = \begin{cases} 1 & \text{if } 2000 \leqq \text{SIC} \leqq 3999 \\ 0 & \text{otherwise} \end{cases} \qquad (3.2.7)$$

$$\text{Dummy3} = \begin{cases} 1 & \text{if } 4000 \leqq \text{SIC} \leqq 4999 \\ 0 & \text{otherwise} \end{cases}$$

Table 1 reports descriptive statistics for all the variables. Operating leases account for 2.1 percent of the firm value on average; short-term debt, long-term debt, secured debt, and unsecured debt account for 19.7 percent, 5.4 percent, 6.7 percent, and 1.1 percent of firm value, respectively. There are 245 missing numbers of operating leases. These numerous missing numbers represent that operating leases are censored data.

Table 2 shows the Pearson correlation coefficients of all variables. These positive coefficients between operating leases and various debts as short-term debt, long-term debt, and secured debt seem to suggest that leases and debt are complements. And the negative coefficient between operating leases and unsecured debt seems to imply that the lease and debt are substitutes. Later, we further investigate the relationship with appropriate control for the heteroskedasticity of disturbance term's variance and the endogeneity of debt. We also find that both leases and debt are significantly correlated with most of control variables. These correlations exhibit that proper control of control variables is potentially important for an accurate measurement of the relationship between leases and debt.

4. Methodology

In this section, we present the methodology used to examine the relationship between lease and debt. The Tobit model would be utilized in this study because of

the characteristic of the lease observations. The characteristics of operating leases observations are censored data. It means that the information of operating leases is not observed for some companies. However, it does not mean that these firms have no lease financing. Ordinary lease squares estimation of this model would not produce unbiased, consistent, and efficient estimates due to the violation of basic assumption of the regression model regarding the normality of dependent variable. In order to solve the problem, we use the Tobit model or Censored regression model in our study. Tobit model is a maximum likelihood estimation method designed specifically for the limited dependent variable models. The Tobit model is given by the following,

$$y_{it}^{*} = X_{it}^{'}\beta + \varepsilon_{it}, \quad y_{it} = \begin{cases} 0 & if \ y_{it}^{*} \le 0 \\ y_{it}^{*} & if \ y_{it}^{*} \ge 0 \end{cases} \tag{4.1}$$

The maximum likelihood estimation is the following function,

$$\ln L(\beta,\alpha) = \sum_{y_i>0} \ln\left[\frac{1}{\sigma}\phi\left(\frac{y_{it} - X_{it}^{'}\beta}{\sigma^2}\right)\right] + \sum_{y_i=0} \ln\left[1 - \Phi\left(\frac{X_{it}^{'}\beta}{\sigma}\right)\right], \tag{4.2}$$

where y_{it}^{*} is the vector of observed and unobserved data of operating leases, $X_{it}^{'}$ is matrix of independent variables, β is the vector of slope coefficients, ε_{it} is the error term, $\ln L$ is the log of the likelihood function, $\phi(.)$ is the normal probability density function, and $\Phi(.)$ is the cumulative density function. Because the debt data is not the censored data, we use the ordinary least square method to estimate the coefficients.

We analyze the determinants of operating leases, short-term debt, long-term debt, secured debt, and unsecured debt. These models employed to examine the relationship are as follows,

$$LRO_{it} = \alpha_0 + \alpha_1 NDT_{it} + \alpha_2 Z\_score_{it} + \alpha_3 Collateral_{it} + \alpha_4 Uniuqeness_{it} + \alpha_5 Size_{it} + \alpha_6 prof_{it} + \alpha_7 Dv_{it} + \alpha_8 dummy1 + \alpha_9 dummy2 + \alpha_{10} dummy3 + \varepsilon_{LRO,it} \quad (4.3)$$

$$STDR_{it} = \delta_0 + \delta_1 NDT_{it} + \delta_2 Z\_score_{it} + \delta_3 Collateral_{it} + \delta_4 Uniuqeness_{it} + \delta_5 Size_{it} + \delta_6 prof_{it} + \delta_7 Dv_{it} + \delta_8 dummy1 + \delta_9 dummy2 + \delta_{10} dummy3 + \varepsilon_{STDR,it} \quad (4.4)$$

$$LTDR_{it} = \gamma_0 + \gamma_1 NDT_{it} + \gamma_2 Z\_score_{it} + \gamma_3 Collateral_{it} + \gamma_4 Uniuqeness_{it} + \gamma_5 Size_{it} + \gamma_6 prof_{it} + \gamma_7 Dv_{it} + \gamma_8 dummy1 + \gamma_8 dummy2 + \gamma_{10} dummy3 + \varepsilon_{LTDR,it} \quad (4.5)$$

$$SDR_{it} = \lambda_0 + \lambda_1 NDT_{it} + \lambda_2 Z\_score_{it} + \lambda_3 Collateral_{it} + \lambda_4 Uniuqeness_{it} + \lambda_5 Size_{it} + \lambda_6 prof_{it} + \lambda_7 Dv_{it} + \lambda_8 dummy1 + \lambda_8 dummy2 + \lambda_{10} dummy3 + \varepsilon_{SDR,it} \quad (4.6)$$

$$USDR_{it} = \omega_0 + \omega_1 NDT_{it} + \omega_2 Z\_score_{it} + \omega_3 Collateral_{it} + \omega_4 Uniuqeness_{it} + \omega_5 Size_{it} + \omega_6 prof_{it} + \omega_7 Dv_{it} + \omega_8 dummy1 + \omega_9 dummy2 + \omega_{10} dummy3 + \varepsilon_{USDR,it} \quad (4.7)$$

where i is the number of firms, t is the number of periods, the LRO is the operating lease ratio, $STDR$ is the short-term debt ratio, $LTDR$ is the long-term ratio, SDR is the secured debt ratio, and $USDR$ is the unsecured debt ratio. The explanatory variables are non-tax shield (NDT), financial distress (Z_score), collateral ($Collateral$), uniqueness ($Uniqueness$), firm size ($Size$), profitability ($\Pr of$), cash dividend (Dv) and the dummy variables of industry effect ($Dummy1$, $Dummy2$ *and* $Dummy3$).

We assume that the variance of disturbance term is heteroskedastic in the operating leases equation. We specify the error terms as $\sigma_i^2 = e^{X'r}$, which allows each independent variable to enter in estimation of error term, where the vector γ represents the influence of each variable and X' the matrix of observations on all independent variables. For equation (4.2) to (4.5), we calculate the White's

Heteroskedasticity- Consistent Variances to check the heteroskedasticity. According to the hypothesis results, we use the heteroskedastic model to check the relationship between the financial variables and debt, and the leases.

We use the Tobit model with control for the heteroskedasticity to examine the relationship between operating leases and debt. These models to investigate the relationship between debt and leases as follows,

$$LRO_{it} = \varphi_0 + \varphi_1 STDR_{it} + \varphi_k C_{it,k}^{LRO} + \varepsilon_{LRO,it} \quad (4.8)$$

$$LRO_{it} = \eta_0 + \eta_1 LTDR_{it} + \eta_k C_{it,k}^{LRO} + \varepsilon_{LRO,it} \quad (4.9)$$

$$LRO_{it} = \theta_0 + \theta_1 SDR_{it} + \theta_k C_{it,k}^{LRO} + \varepsilon_{LRO,it} \quad (4.10)$$

$$LRO_{it} = \rho_0 + \rho_1 USDR_{it} + \rho_k C_{it,k}^{LRO} + \varepsilon_{LRO,it} \quad (4.11)$$

where k is the number of explanatory variables, $C_{it,k}^{LRO}$ are all significant explanatory variables to operating leases. These equations mentioned above are primary to examine the relationship between debt and leases.

Broadly speaking, we conventionally regard the debt as the endogenous variable because the covariance between the debt and error term is not equal to zero. Hence, before examining the relationship between debt and leases, we apply the method by Smith and Blundell (1986) to test if debt is endogenous in the operating leases or not. First, we regress debt on significant explanatory variables of the debt and to get the residual term. Second, we regress operating leases on the debt, significant explanatory variables of the lease, and the residual term from the first step. And we adopt the Tobit model to get the coefficients of debt, explanatory variables, and residual term. If the coefficient of the residual term is significant, it presents that the debt is endogenous in the operating leases equation. Accordingly, if the debt is endogenous to the lease, we adopt the Full Maximum Likelihood approach of Wooldridge to test the relationship

between operating leases and debt in our study. Otherwise, we apply the Tobit model with control for the heteroskedasticity to investigate the relationship.

5. Empirical Results

5.1 The Financial Variables to the Lease and Debt

Table 3 presents the result from the Tobit regression of leases and the OLS regressions of the debt. From the table we can see operating leases are significantly negative related to Z_score, Size, Prof, Dummy1, Dummy2, and Dummy3 and are significantly positive to NDT, Collateral, and Dv. Next, short-term debt is significantly negative related to Z_score, Uniqueness, Size, Prof, Dv, Dummy1, and Dummy2. Furthermore, long-term debt is significant positively related to Collateral and is significantly negative related to Z_score, Uniqueness, Size, Prof, Dv, Dummy1, Dummy2, and Dummy3. Moreover, secured debt is significantly negative related to Z_score, Uniqueness, Size, Prof, and Dummy3 and is significant positively related to Collateral. Finally, unsecured debt is significantly positive related to Collateral, Size and is significantly negative related to Z_score, Prof, and Dummy3.

These significant coefficients are consistent with the findings of previous studies. Our measure of financial distress (Z_score) is negatively related to debt, which supports that firms in financial distress are likely to have high ratio of debt because of the deterioration in equity value. The use of debt is related positively to Collateral and related negatively to Uniqueness. The reason is that if firms with more assets that to be used as collaterals, the debtholders have more protections in the bankrupt state. On the contrary, firms with more specialized products, the debtholders have less shelter in the bankrupt state because it is hard for them to deal with these unique assets. Besides, debt is negatively related to profitability, the result supports the pecking order theory that firm prefers internal to external financing.

But, the negative relation between size and debt is not consistent with those existing studies. Conventionally, the larger firm has more stable operation and better ability to diverse the risk. Thus, the firm uses lot of debt financing. However, we get the opposite relation. One possible reason is that although the bigger firm can decrease the risk of the bankruptcy with the sufficient cash flows, it could also increase the operation risk and then enlarge the total risk of the firm. Moreover, the measurement of NDT is insignificantly positive related to the debt, except for unsecured debts, which conflicts with the previous paper. The calculation of the NDT could be the reason to generate the different result.

Although most of these significant relations to leases are so far consistent with our expectations, these estimators are not necessary because we do not take into account debt as part of the explanatory variables. Hence, we will discuss the relations between the lease and independent variables in the reminder of this section.

5.2 The Endogeneity of Debt

As mentioned above, the lease and debt are affected by these explanatory variables at the same time. Hence, it is important to test the endogeneity of debt before examining the relationship between leases and debt. We use the method of Smith and Blundell (1986) to explore whether the debt is endogenous to leases.

Since the goal is to check the endogeneity of debt, we only focus on the estimated coefficients for residual term of debt. These four estimated coefficients of debt's residual term are presented on the second row of Table 4. All of these estimated coefficients are statistically insignificant to operating leases and then do not reject the null hypothesis. It means that debt is not endogenous in the operating lease equation. As a result, we use the Tobit model with control for the heteroskedasticity to explore the relationship between operating leases and debt.

5.3 Complement or Substitute

Table 5 reports the relationship between operating leases and debt with the general Tobit model. From the table we can see operating leases are negative significantly related to Z_score, Size, Prof, Dummy1, Dummy2, and Dummy3 and are positive significantly to NDT, Collateral, and Dv. These significant coefficients to leases also are in line with the findings of previous studies. The positive relationship between operating leases and Z_score supports that firms in financial distress are likely to have high ratio of lease because of the deterioration in equity value. Operating leases are negative to Size and Dv, both of which confirm informational asymmetry between the firm and the market. Firms with non-dividend paying are more likely to use leases financing because of the relatively high cost of external funds. Operating leases is negatively related to profitability (prof), thus exhibits the pecking order theory that firm prefers internal to external financing. The positive relationship between operating leases and Collateral supports the lessor has more protection when the firm is in the bankrupt status. Operating leases is significantly positive to NDT, which is inconsistent with Lewis and Schallheim (1992). The operating leases are negative related to the dummy2 variable because the manufacturing industry owned more unique assets. It is difficult for the lessor to deal with these unique assets when the firm is in the bankrupt status if the firm owned more specific assets.

The operating leases are positive significantly related to shot-term debt, long-term debt, and secured debt, and are negative significantly related to unsecured debt. The positive relationships mean that the operating leases are complements to short-term debt, long-term debt, and secured debt. And the negative relationship presents that the operating leases and unsecured debt are substitutes.

The positive relationships between operating leases and short-term debt,

long-term debt, or secured debt are consistent with the result of Ang and Peterson (1984) that shows the debt-to-lease displacement ratio, α, is less than zero. And the negative relationship between operating leases and unsecured debt is consistent with the result of Bodt, Filareto and Lobez (2001), which presents the lease can reduce the agency cost of unsecured debt related to asset substitution problem. The positive result between operating leases and long-term debt in our study is inconsistent with Yan (2006) presents. This is possibly because the different definition of long-term debt and the different model used to examine the relationship between the leases and debt.

6. Conclusion

This paper investigates the relationship between operating leases financing and debt financing. Debt and leases are both important financing instruments commonly used by companies nowadays. However, the relationship between leases and debt is controversial in the previous papers, particularly after Ang and Peterson (1984) present that leases and debt are components. Additionally, Yan (2006) empirically shows that operating leases and long-term debt is negatively related.

We first classify debt into short-term debt and long-term debt on the basis of maturity, and into secured debt and unsecured debt on the basis of security provision, and next examine their relationships with operating leases respectively. Besides, we also check operating leases related to financial variables. Second, after controlling the heteroskedasticity of disturbance term's variance and the endogeneity of debt, we apply the general Tobit model to test this relationship. Finally, these empirical results demonstrate that operating leases are complements to short-tem debt, long-term debt and secured debt, and are substitutes to unsecured debt.

This paper shows a broader investigation between leases and debt, and provides

that a complete analysis of optimal capital structure should not ignore the role of leasing financing. In the future research, the consideration of marginal tax rate to calculate the NDT might get more precise result and the consideration of the management compensation policy that Smith and Wakeman (1984) present could make the investigation complete.

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Table 1
Descriptive Statistics

The summary statistics are based on 2710 observations for firms on COMPUSTAT with SIC code between 0110 and 5999 over the period 1996 through 2005. Operating leases-to-value (LRO) is the ratio of current- year rental expense plus present value of rental commitments over the next five years (discounted at 6.6 percent) to the market value of the firm, where market value is the book value of total debt plus the market value of equity and plus the net present value of operating leases. Short-term debt-to-value (STDR) is the ratio of the book value of "shorter" debt to the market value of the firm. Long-term debt-to-value (LTDR) is the ratio of the book value of "longer" debt to the market value of the firm. Secured debt-to-value (SDR) is the ratio of the book value of total secured debt to the market value of the firm. Unsecured debt-to-value (USDR) is the ratio of the book value of total unsecured debt to the market value of the firm. NDT is the non-debt tax shields. Z_score is a modified version of Altman's (1968) Z_score. Collateral is equal to net property, plants, and equipment divided by total assets. Uniqueness is research and development expenses divided by total assets. Size is the natural logarithm of the total assets. Profitability (Prof) is the ratio of operating income over total assets.

Variables	Mean	Std. Dev.	Maximum	Minimum
LRO	0.02069	0.02236	0.21799	0.00000
STDR	0.19409	0.11914	0.93305	0.00406
LTDR	0.05379	0.07412	0.67133	-0.16495
SDR	0.06645	0.09567	0.93785	-0.06585
USDR	0.01121	0.02662	0.26389	0.00000
NDT	0.04568	0.03895	0.52410	-0.24884
Z_score	2.31080	0.72207	5.60384	-0.82649
Collateral	0.28233	0.14751	0.75917	0.02760
Uniqueness	0.03741	0.03677	0.26751	0.00024
Size	7.12611	2.01427	12.24690	1.85144
Prof	0.16270	0.07911	0.62222	1.85144

Table 2
Pearson Correlation Coefficients for Variables

The summary statistics are based on 2710 observations for firms on COMPUSTAT with SIC code between 0110 and 5999 over the period 1996 through 2005. Operating leases-to-value (LRO) is the ratio of current- year rental expense plus present value of rental commitments over the next five years (discounted at 6.6 percent) to the market value of the firm, where market value is the book value of total debt plus the market value of equity and plus the net present value of operating leases. Short-term debt-to-value (STDR) is the ratio of the book value of "shorter" debt to the market value of the firm. Long-term debt-to-value (LTDR) is the ratio of the book value of "longer" debt to the market value of the firm. Secured debt-to-value (SDR) is the ratio of the book value of total secured debt to the market value of the firm. Unsecured debt-to-value (USDR) is the ratio of the book value of total unsecured debt to the market value of the firm. NDT is the non-debt tax shields. Z_score is a modified version of Altman's (1968) Z_score. Collateral is equal to net property, plants, and equipment divided by total assets. Uniqueness is research and development expenses divided by total assets. Size is the natural logarithm of the total assets. Profitability (Prof) is the ratio of operating income over total assets. No dividend is a dummy variable equal to one if the firm does not pay dividends.

(*continue*)

Variables	LRO	STDR	LTDR	SDR	USDR	NDT	Z_score	Collateral	Uniqueness	Size	Prof	Dv
LRO	1.00000	0.27532	0.09850	0.12032	-0.03845	0.14785	0.02647	0.01124	-0.02125	-0.13191	-0.37890	0.07279
		(<.0001)	(<.0001)	(<.0001)	(0.0454)	(<.0001)	(0.1684)	(0.5587)	(0.2687)	(<.0001)	(<.0001)	(0.0001)
STDR	0.27532	1.00000	0.08434	0.50176	0.12813	0.06257	-0.30188	-0.01278	-0.20093	-0.07726	-0.48473	-0.00071
	(<.0001)		(<.0001)	(<.0001)	(<.0001)	(0.0011)	(<.0001)	(0.5061)	(<.0001)	(<.0001)	(<.0001)	(0.9704)
LTDR	0.09850	0.08434	1.00000	0.35202	0.20852	0.03581	-0.35977	0.10752	-0.23279	0.12613	-0.07184	-0.10360
	(<.0001)	(<.0001)		(<.0001)	(<.0001)	(0.0623)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0002)	(<.0001)
SDR	0.12032	0.50176	0.35202	1.00000	-0.01498	0.04880	-0.25022	0.08419	-0.19323	-0.16660	-0.17779	0.06069
	(<.0001)	(<.0001)	(<.0001)		(0.4358)	(0.0111)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0016)
USDR	-0.03845	0.12813	0.20852	-0.01498	1.00000	0.04130	-0.21886	0.19920	-0.11348	0.23843	-0.02868	-0.14301
	(0.0454)	(<.0001)	(<.0001)	(0.4358)		(0.0315)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.1356)	(<.0001)
NDT	0.14785	0.06257	0.03581	0.04880	0.04130	1.00000	-0.08301	0.23164	0.07082	0.00527	-0.03129	-0.02755
	(<.0001)	(0.0011)	(0.0623)	(0.0111)	(0.0315)		(<.0001)	(<.0001)	(0.0002)	(0.7837)	(0.1034)	(0.1517)
Z_score	0.02647	-0.30188	-0.35977	-0.25022	-0.21886	-0.08301	1.00000	-0.07884	0.11138	-0.32206	-0.02758	-0.02298
	(0.1684)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)		(<.0001)	(<.0001)	(<.0001)	(0.1511)	(0.2317)
Collateral	0.01124	-0.01278	0.10752	0.08419	0.19920	0.23164	-0.07884	1.00000	-0.19671	0.11782	0.14207	-0.19249
	(0.5587)	(0.5061)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)		(<.0001)	(<.0001)	(<.0001)	(<.0001)
Uniqueness	-0.02125	-0.20093	-0.23279	-0.19323	-0.11348	0.07082	0.11138	-0.19671	1.00000	0.11782	0.14207	0.21041
	(0.2687)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0002)	(<.0001)	(<.0001)		(<.0001)	(<.0001)	(<.0001)
Size	-0.13191	-0.07726	0.12613	-0.16660	0.23843	0.00527	-0.32206	0.11782	0.11782	1.00000	0.26615	-0.44459
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.7837)	(<.0001)	(<.0001)	(<.0001)		(<.0001)	(<.0001)
Prof	-0.37890	-0.48473	-0.07184	-0.17779	-0.02868	-0.03129	-0.02758	0.14207	0.14207	0.26615	1.00000	-0.04032
	(<.0001)	(<.0001)	(0.0002)	(<.0001)	(0.1356)	(0.1034)	(0.1511)	(<.0001)	(<.0001)	(<.0001)		(0.0358)
Dv	0.07279	-0.00071	-0.10360	0.06069	-0.14301	-0.02755	-0.02298	-0.19249	0.21041	-0.44459	-0.04032	1.00000
	(0.0001)	(0.9704)	(<.0001)	(0.0016)	(<.0001)	(0.1517)	(0.2317)	(<.0001)	(<.0001)	(<.0001)	(0.0358)	

Note: 1. Parenthetic value is p-value.

Table 3
Censored (Tobit) Regressions of leases and OLS regressions of debt

The table summarizes the result from several time-series cross-sectional regressions. The sample consists of 2710 observations for firms with SIC code between 0110 and 5999 over the period 1996 through 2005. These models as follows,

$$LRO_{it} = \alpha_0 + \alpha_1 NDT_{it} + \alpha_2 Z\_score_{it} + \alpha_3 Collateral_{it} + \alpha_4 Uniuqeness_{it} + \alpha_5 Size_{it} + \alpha_6 prof_{it} + \alpha_7 Dv_{it} + \alpha_8 dummy1 + \alpha_9 dummy2 + \alpha_{10} dummy3 + \varepsilon_{LRO,it}$$

$$STDR_{it} = \delta_0 + \delta_1 NDT_{it} + \delta_2 Z\_score_{it} + \delta_3 Collateral_{it} + \delta_4 Uniuqeness_{it} + \delta_5 Size_{it} + \delta_6 prof_{it} + \delta_7 Dv_{it} + \delta_8 dummy1 + \delta_9 dummy2 + \delta_{10} dummy3 + \varepsilon_{STDR,it}$$

$$LTDR_{it} = \gamma_0 + \gamma_1 NDT_{it} + \gamma_2 Z\_score_{it} + \gamma_3 Collateral_{it} + \gamma_4 Uniuqeness_{it} + \gamma_5 Size_{it} + \gamma_6 prof_{it} + \gamma_7 Dv_{it} + \gamma_8 dummy1 + \gamma_8 dummy2 + \gamma_{10} dummy3 + \varepsilon_{LTDR,it}$$

$$SDR_{it} = \lambda_0 + \lambda_1 NDT_{it} + \lambda_2 Z\_score_{it} + \lambda_3 Collateral_{it} + \lambda_4 Uniuqeness_{it} + \lambda_5 Size_{it} + \lambda_6 prof_{it} + \lambda_7 Dv_{it} + \lambda_8 dummy1 + \lambda_8 dummy2 + \lambda_{10} dummy3 + \varepsilon_{SDR,it}$$

$$USDR_{it} = \omega_0 + \omega_1 NDT_{it} + \omega_2 Z\_score_{it} + \omega_3 Collateral_{it} + \omega_4 Uniuqeness_{it} + \omega_5 Size_{it} + \omega_6 prof_{it} + \omega_7 Dv_{it} + \omega_8 dummy1 + \omega_9 dummy2 + \omega_{10} dummy3 + \varepsilon_{USDR,it}$$

(*continue*)

Variables	LRO	STDR	LTDR	SDR	USDR
Intercept	0.1600***	0.6098***	0.2140***	0.3111***	0.00014
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.9852)
NDT	0.0246***	0.06967	0.00127	0.0377	-0.01692
	(0.0002)	(0.1574)	(0.9708)	(0.3993)	(0.1865)
Z_score	-0.0027***	-0.0581***	-0.0377***	-0.0438***	-0.0049***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Collateral	0.0046***	-0.0019	0.0233**	0.0489***	0.0293***
	(0.0054)	(0.8897)	(0.0161)	(<.0001)	(<.0001)
Uniqueness	-0.0058	-0.3756***	-0.3257***	-0.4179***	-0.0181
	(0.3968)	(<.0001)	(<.0001)	(<.0001)	(0.1941)
Size	-0.0011***	-0.0064***	-0.0014*	-0.0133***	0.0022***
	(<.0001)	(<.0001)	(0.0872)	(<.0001)	(<.0001)
Prof	-0.0490***	-0.6683***	-0.0516***	-0.1152***	-0.0402***
	(<.0001)	(<.0001)	(0.0038)	(<.0001)	(<.0001)
Dv	0.0018**	-0.0147***	-0.0154***	-0.0065	-0.0020
	(0.0195)	(0.0030)	(<.0001)	(0.1463)	(0.1157)
Dummy1	-0.1353***	-0.1370***	-0.0612***	-0.0548**	0.0073
	(<.0001)	(<.0001)	(0.0008)	(0.0203)	(0.2773)
Dummy2	-0.1234***	-0.1122***	-0.0452***	-0.02757	0.0066
	(<.0001)	(<.0001)	(0.0042)	(0.1757)	(0.2597)
Dummy3	-0.1229***	-0.05593	-0.0409	-0.0705**	0.0644***
	(<.0001)	(0.1474)	(0.1324)	(0.0445)	(<.0001)
Ln L	6403	-	-	-	-
Adj R-Sq	-	0.3602	0.1795	0.1803	0.1337

Note: 1. "***" is statistically significant at 1%, and "**" is statistically significant at 5%.

2. Parenthetic value is p-value.

Table 4
The Endogeneity of Debt

The table summarizes the endogeneity of the debt on leases from several censored (Tobit) regressions. The sample consists of 2710 observations for firms with SIC code between 0110 and 5999 over the period 1996 through 2005. These models as follows,

$$LRO_{it} = \beta_0 + \beta_1 (STDR\_residual)_{it} + \beta_2 STDR_{it} + \beta_3 NDT_{it} + \beta_4 Z\_score_{it} + \beta_5 Collateral_{it} + \beta_6 Size_{it} + \beta_7 prof_{it} + \beta_8 Dv_{it} + \beta_9 dummy1 + \beta_{10} dummy2 + \beta_{11} dummy3 + \varepsilon_{LRO,it}$$

$$STDR\_resudual_{it} = STDR_{it} - \hat{S}TDR_{it}$$

$$LRO_{it} = \beta_0 + \beta_1 (LTDR\_residual)_{it} + \beta_2 LTDR_{it} + \beta_3 NDT_{it} + \beta_4 Z\_score_{it} + \beta_5 Collateral_{it} + \beta_6 Size_{it} + \beta_7 prof_{it} + \beta_8 Dv_{it} + \beta_9 dummy1 + \beta_{10} dummy2 + \beta_{11} dummy3 + \varepsilon_{LRO,it}$$

$$LTDR\_resudual_{it} = LTDR_{it} - \widehat{LTDR}_{it}$$

$$LRO_{it} = \beta_0 + \beta_1 (SDR\_residual)_{it} + \beta_2 SDR_{it} + \beta_3 NDT_{it} + \beta_4 Z\_score_{it} + \beta_5 Collateral_{it} + \beta_6 Size_{it} + \beta_7 prof_{it} + \beta_8 Dv_{it} + \beta_9 dummy1 + \beta_{10} dummy2 + \beta_{10} dummy3 + \varepsilon_{LRO,it}$$

$$SDR\_resudual_{it} = SDR_{it} - \widehat{SDR}_{it}$$

$$LRO_{it} = \beta_0 + \beta_1 (USDR\_residual)_{it} + \beta_2 USDR_{it} + \beta_3 NDT_{it} + \beta_4 Z\_score_{it} + \beta_5 Collateral_{it} + \beta_6 Size_{it} + \beta_7 prof_{it} + \beta_8 Dv_{it} + \beta_9 dummy1 + \beta_{10} dummy2 + \beta_{11} dummy3 + \varepsilon_{LRO,it}$$

$$USDR\_resudual_{it} = USDR_{it} - \widehat{USDR}_{it}$$

(*continue*)

The Endogeneity of the Debt to Operating Leases				
Variables	STDR	LTDR	SDR	USDR
Intercept	0.1593***	0.1558***	0.1554***	0.1607***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Debt_Residual	0.0188	-0.0120	-0.0055	-0.0230
	(0.2418)	(0.5680)	(0.7320)	(0.1207)
Debt	0.0241	0.0242	0.0220	-0.0240*
	(0.1243)	(0.2499)	(0.1700)	(0.0891)
NDT	0.0227***	0.0246***	0.0252***	0.0296***
	(<.0001)	(0.0002)	(<.0001)	(<.0001)
Z_score	-0.0022**	-0.0018	-0.0019**	-0.0027***
	(0.0343)	(0.0058)	(0.0347)	(<.0001)
Collateral	0.0051***	0.0041**	0.0043**	0.0042**
	(0.0006)	(0.0233)	(0.0310)	(0.0128)
Size	-0.0011***	-0.0010***	-0.0009***	-0.0011***
	(<.0001)	(<.0001)	(0.0009)	(<.0001)
Prof	-0.0489***	-0.0464***	-0.04610***	-0.0535***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Dv	0.0018**	0.0020**	0.0019**	0.0019**
	(0.0108)	(0.0177)	(0.0109)	(0.0146)
Dummy1	-0.13572***	-0.1349***	-0.1349***	-0.1333***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Dummy2	-0.1187***	-0.1233***	-0.1237***	-0.1228***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Dummy3	-0.1271***	-0.1235***	-0.1223***	-0.1219
	(<.0001)	(<.0001)	(<.0001)	(0.9443)
lnL	6608	6407	6411	6361

Note: 1. "***" is statistically significant at 1%, and "**" is statistically significant at 5%.

2. Parenthetic value is p-value.

Table 5
Censored (Tobit) Regressions of the relationship between operating leases and debt

The table summarizes the relationship between capital leases and the debt from several censored (Tobit) regressions. The sample consists of 2710 observations for firms with SIC code between 0110 and 5999 over the period 1996 through 2005. These models as follows,

$$LRO_{it} = \varphi_0 + \varphi_1 STDR_{it} + \varphi_2 NDT_{it} + \varphi_3 Z\_score_{it} + \varphi_4 Collateral_{it} + \varphi_5 Size_{it} + \varphi_6 \Pr of_{iy} + \varphi_7 Dv_{it} + \varphi_8 Dummy1 + \varphi_9 Dummy3 + \varphi_{10} Dummy3 + \varepsilon_{LRO,it}$$

$$LRO_{it} = \eta_0 + \eta_1 LTDR_{it} + \eta_2 NDT_{it} + \eta_3 Z\_score_{it} + \eta_4 Collateral_{it} + \eta_5 Size_{it} + \eta_6 \Pr of_{iy} + \eta_7 Dv_{it} + \eta_8 Dummy1 + \eta_9 Dummy3 + \eta_{10} Dummy3 + \varepsilon_{LRO,it}$$

$$LRO_{it} = \theta_0 + \theta_1 SDR_{it} + \theta_2 NDT_{it} + \theta_3 Z\_score_{it} + \theta_4 Collateral_{it} + \theta_5 Size_{it} + \theta_6 \Pr of_{iy} + \theta_7 Dv_{it} + \theta_8 Dummy1 + \theta_9 Dummy3 + \theta_{10} Dummy3 + \varepsilon_{LRO,it}$$

$$LRO_{it} = \rho_0 + \rho_1 USDR_{it} + \rho_2 NDT_{it} + \rho_3 Z\_score_{it} + \rho_4 Collateral_{it} + \rho_5 Size_{it} + \rho_6 \Pr of_{iy} + \rho_7 Dv_{it} + \rho_8 Dummy1 + \rho_9 Dummy3 + \rho_{10} Dummy3 + \varepsilon_{LRO,it}$$

(*continue*)

The relationship between Operating Leases and Debt				
Variables	STDR	LTDR	SDR	USDR
Intercept	0.1480***	0.1549***	0.1526***	0.1674***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Debt	0.0419***	0.0155***	0.0171***	-0.0247*
	(<.0001)	(0.0013)	(<.0001)	(0.0622)
NDT	0.0234***	0.0233***	0.0256***	0.0258***
	(<.0001)	(0.0003)	(<.0001)	(<.0002)
Z_score	-0.0010***	-0.0023***	-0.0022***	-0.0032***
	(0.0033)	(<.0001)	(<.0001)	(<.0001)
Collateral	0.0049***	0.0041**	0.0046***	0.0070***
	(0.0009)	(0.0118)	(0.0059)	(<.0001)
Size	-0.0010***	-0.0011***	-0.0010***	-0.0011***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Prof	-0.0361***	-0.0465***	-0.0467***	-0.0502***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Dv	0.0022***	0.0019**	0.0019***	0.0015*
	(0.0006)	(0.0110)	(0.0098)	(0.0529)
Dummy1	-0.1337***	-0.1322***	-0.1305***	-0.1408***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Dummy2	-0.1253***	-0.1203***	-0.1194***	-0.1297***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Dummy3	-0.1251***	-0.1201***	-0.1182***	-0.1283
	(<.0001)	(<.0001)	(<.0001)	(0.9443)
lnL	6608	6411	6413	6370

Note: 1. "***" is statistically significant at 1%, and "*" is statistically significant at 10%

2. Parenthetic value is p-value.

Appendix A: Accounting for Leases

Definition of Capital and Operating Leases

Following is a brief list of the accounting rules that define capital and operating leases from the lessee. Statement of Financial Accounting Standards(FASB) NO. 13 provides the detail criteria for a lease contract to be specified as a capital or operating lease. A capital lease is defined as a lease that meets any one or more of four criteria.

(1) Transfer of Ownership. If the lease agreement transfers ownership to the lessee before the lease expires, without payment of additional compensation to the lessor; the lease is considered a purchase financing arrangement, similar to an installment purchase.

(2) Bargain Purchase Option. The lessee can purchase the asset for a bargain price when the lease expires. A bargain purchase option requires comparing the option's purchase price to the leased asset's expected residual value at the maturity of the lease. If the purchase option is well below the expected residual value, the lessee is not expected to pass up the savings, and the probability is high that the lessee will buy the asset at maturity.

(3) 75 Percent of Economic Life. The lease lasts for a least 75 percent of the asset's expected economic life. A bargain renewal option to renew the lease at a rental rate below the expected fair market rental at the time of the exercise of the option, is considered to lengthen the lease life used in this determination.

(4) 90 Percent of Asset's Value. The present value of the minimum lease payments is at least 90 percent of the asset's fair value. The minimum lease payments is defined by SFAS No. 13 to mean "the payments that the lessee is obligated to make or can be required to make in connection with the leased property." Of course, the minimum lease payments consist mainly of the periodic payments. However, minimum lease payments also include such items as the bargain purchase option or bargain renewal option payments. Some leases contain additional provisions that are included as minimum lease payment for failure to renew if it is expected that the renewal option will be rejected by the lessee.

Appendix B: Disclosure for Leases

The following information with respect to leases shall be disclosed in the lessee's financial statements or the footnotes thereto.

A. For capital leases:

(1) The gross amount of assets recorded under capital leases as of the date of each balance sheet presented by major classes according to nature or function. This information may be combined with the comparable information for owned assets.

(2) Future minimum lease payments as of the date of the latest balance sheet presented, in the aggregate and for each of the five succeeding fiscal years, with separate deductions from the total for the amount representing executory costs, including any profit thereon, included in the minimum lease payments and for the amount of the imputed interest necessary to reduce the net minimum lease payments to present value.

(3) The total of minimum sublease rentals to be received in the future under noncancelable subleases as of the date of the latest balance sheet presented.

(4) Total contingent rentals actually incurred for each period for which an income statement is presented.

B. For operating leases having initial or remaining noncancelable lease terms in excess of one year:

(1) Future minimum rental payments required as of the date of the latest balance sheet presented, in the aggregate and for each of the five succeeding fiscal years.

(2) The total of minimum rentals to be received in the future under noncancelable subleases as of the date of the latest balance sheet presented.

C. For all operating leases, rental expense for each period for which an income statement is presented, with separate amounts for minimum rentals, contingent rentals, and sublease rentals. Rental payments under leases with terms of a month or less that were not renewed need not be included.