A Test of the Substitution between Debt and Leases Using Sale-and-Leaseback Transactions

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ABSTRACT

Most theoretical models predict that debt and leases should act as substitutes. While the preponderance of evidence supports this claim, there remain significant cases where debt and leases appear to be complements. One of the problems with prior research is that it is difficult to properly control for the changing asset base associated with leasing in cross-sectional tests. To overcome this problem, we examine a sample of sale-and-leaseback (SLB) transactions where the assets of the firm are not changed due to the lease. We find evidence of a substitution effect between leases and long-term debt in our overall sample. We also find, however, that 40 percent of the firms exhibit evidence of a complementary relation by increasing their debt after the SLB transaction. To further explore this relation we divide the sample into two groups, those that show an increase in debt and those that show a decrease in debt after the SLB transaction. Within the substitute subgroup, leasing is associated with more capital expenditures and financial constraints. Within the complement subgroup, we find a significant relation between leasing and the firm's marginal tax rate.

The "leasing puzzle" first defined by Ang and Peterson (1984) remains unsolved. This puzzle involves the theoretical conjecture that debt and leases should act as substitutes (in the sense that more leases should lead to less debt), but Ang and Peterson found that firms that used more leases tended to have, in fact, more debt. A body of literature has developed since Ang and Peterson posed this puzzle, but no definitive answer has resulted.[1] While the preponderance of evidence in the literature supports debt and leases as substitutes, there remain significant cases in which debt and leases simultaneously increase. One of the problems with the previous literature that examines this issue is the familiar ceteris paribus condition. The assumption that all else remains equal is problematic because a typical lease involves the acquisition of the use of a new asset for the firm. In order to overcome this problem, we have chosen a sample of sale-and-leaseback (SLB) transactions in which the assets of the firm do not (immediately) change due to the leasing transaction. Therefore, we can examine in detail the substitution or complement issue without the potential contamination of a change in the asset base or investments of the firm.

The theoretical models in the leasing area have usually assumed that leases substitute for debt. The question posed in the model by Myers, Dill, and Bautista (1976) was how much debt is displaced by leasing. However, the leasing models presented by Lewis and Schallheim (1992) and Eisfeldt and Rampini (2007) predict the possibility that debt and leases can be complements with theories based on taxes or bankruptcy costs, respectively. Therefore, the true nature of the relation between debt and leases remains an empirical issue.

Bayliss and Diltz (1986), Marston and Harris (1988), Beattie, Goodacre, and Thomson (2000), and Yan (2006) all find that debt and leases are substitutes, with varying degree of substitutability. However, all of these studies suffer from the impact that new leases have on the

[1] Other literature addressing the leasing puzzle includes Bayliss and Diltz (1986), Marston and Harris (1988), Beattie, Goodacre, and Thomson (2000), and Yan (2006).

asset and investment opportunities of the firm. Our study will control for this problem by only examining SLB transactions.

Our results shed the following light on the leasing puzzle. First, in the overall sample of SLBs, we do not find any significant relation between the increase in leases and the change in total debt. However, when we examine just the changes in long-term debt and SLBs and when we add control variable to the estimation, we do find support of a substitution effect between the leases and debt.

We then divide the sample of SLBs into two groups, those who show an increase in total debt in the year after the transaction, a little over 40 percent of the sample, and those that show a decrease in total debt. The first subgroup is labeled the complement sub-sample and the second group is the substitute sub-sample. For the substitute sub-sample, a dollar of SLBs appears to substitute for approximately $0.37 of total debt. Examining just the long-term debt in the substitute sub-sample, a dollar of leases appears to substitute for approximately $0.78 of long-term debt. These findings are in line with the other studies of lease and debt substitution. We also examine the substitute sub-sample for the impact of asset changes, taxes, and financial constraints. We show that SLBs in the substitute sub-sample are associated with more capital expenditures and financial constrained firms. Marginal tax rates, however, do not appear to be statistically correlated within this subgroup.

To our knowledge, our study is the first to separate and examine a subgroup of leases that display the complement effect. Here we examine the impact of taxes and financial constraints as suggested by the Lewis and Schallheim (1992) and Eisfeldt and Rampini (2007) theories. According to our analysis of the complement sub-sample, the tax variable is significantly associated with the SLBs, but we do not find much support for an association with financial constraints for this subgroup.

This paper is organized as follows. Section I describes the theoretical and empirical literature related to leasing and SLBs. Section II discusses our testable hypotheses. Section III describes our sample of SLB transactions and Section IV presents our results. We state our conclusions in Section V.

I. Literature Related to Leasing and Sale-and-Leasebacks

A. Leasing Theory

Under the assumption of perfect capital markets, Modigliani and Miller show that the method of financing is irrelevant to the total value of the firm given the investment opportunity set. The notion that debt and leases are substitutes can be traced to the theoretical model of Myers, Dill and Bautista (MDB, 1976) who present a model of lease or buy (borrow). Even in the presence of corporate taxes, the choice between debt and leases can be irrelevant given common tax rates and no other market imperfections. In the MDB model, leasing can be advantageous to both parties of a transaction if the tax rates between lessor and lessee differ.[2] The MDB model has a parameter, λ, which represents the substitution between debt and leases. The values for λ range between 0 and 1. In other words, the substitution between debt and leases may be dollar for dollar, or a dollar of leases may substitute for less than a dollar of debt. But MDB never consider the possibility that λ could be less than 0, i.e., that a lease could actually allow the firm to take on more debt. In other words, can leases and debt be complements?

Two theories directly address the issue that leases and debt can be complements. Lewis and Schallheim (1992) present a tax-based model that demonstrates that debt and leases can be

[2] Interestingly, the common notion that a low tax rate firm benefits from leasing to a high tax rate firm is not unconditionally true. It is true under normal contracting terms, but it is possible to devise situations in which the opposite holds. However, the conditions for a high tax rate lessee benefiting from a low tax rate lessee are quite unusual and not likely to arise very often in practice.

complements. The Lewis and Schallheim model allows for low tax paying firms to sell excess tax shields to firms that place a much higher value on these tax deductions. By removing redundant tax shields, the lessee firm can be motivated to increase its proportion of debt relative to an otherwise identical firm that does not use leasing.

Eisfeldt and Rampini (2007) provide another model for increased debt capacity due to leasing. The Eisfeldt and Rampini model is based on the repossession advantage of leasing to lessors who are willing to lease to more financially constrained firms. Counter-balancing this effect, however, is the agency costs of leasing due to the separation of ownership and control of the leased assets. The net advantage allows lessors to offer leases to more credit constrained firms who will then choose to lease more of their capital than less constrained firms. Thus debt and leases can be complements.

There are other theories that relate to leasing, but do not directly address the substitute vs. complement issue. With regard to contracting theory, there is the issue of asset specificity. Klein, Crawford, and Alchian (1978) argue that assets with more firm specific uses are more likely to be owned (vertical integration) and more general-purpose assets are more likely to be leased.

With regard to agency theory, there are the problems of over-investment (or asset substitution) and under-investment. Because leases are tied to a specific asset, leasing can help reduce the over-investment problem. There is also the issue of the separation of ownership and control with attendant agency issues as discussed in Smith and Wakeman (1985). Finally, the general implications of information costs are quite pervasive. However, much of the information-costs theories are related to the financial distress costs as incorporated by the Eisfeldt and Rampini (2007) theory. There is one unique leasing feature related to information in that operating leases are a form of off-balance sheet financing by definition. From an economic

point of view, it is unclear why off-balance sheet financing may be valuable, but firms certainly appear to be willing to undertake such transactions, even paying significant transaction costs to facilitate these leases (for example, synthetic leases).

Two theory papers directly model the sale-and-leaseback contract. Kim, Lewellen, and McConnell (1978) show that SLB transactions can cause a wealth transfer from senior debtholders to stockholders. The reason for the wealth appropriation is the violation of me-first rules. In other words, senior debtholders would have had claim to the assets prior to their sale. After the SLB transaction, the senior debtholders' position is less secure and the loss in value to the debtholders is gained by stockholders. Handa (1991) derives a signaling, separating equilibrium with good firms purchasing and poor firms leasing. In a symmetric information environment, all firms would prefer a SLB rather than own. This is because the transfer of tax shields to the lessor allows the lessee to obtain the value of the depreciation tax shield rather than risk not being able to use the tax shield in the future due to low earnings. With asymmetric information, firms facing lower earnings prospects will favor the SLB transaction in order to gain the depreciation tax shield. But the SLB transaction signals to the market the lower earnings forecast and thus the market value will fall (but by less than the gain from the tax shield). Firms with good earnings prospects will therefore prefer to own the asset in order to separate from the SLB firms and not lose market value. At the same time, these firms will have a higher probability of fully utilizing the tax shield from depreciation.

B. Empirical Literature about Leasing

Ang and Peterson (1984) demonstrate a positive correlation between leasing and debt that led them to conclude that debt and leases appear to be complements. Earlier evidence by Bowman (1980) also demonstrates a positive association between relative levels of debt and leases. A drawback to these studies is that only a cross-sectional relation was examined. Thus

the findings are consistent with the result that firms with high external financing requirements use debt and leasing interchangeably and thus cannot reject the hypothesis that debt and leases are substitutes.

In another approach to the question, Bayliss and Diltz (1986) conduct a survey of bank loan officers presenting them with firms who use varying lease obligations and measure their willingness to make loans to these firms. Bayliss and Diltz determine a debt displacement for lease obligations of approximately $1 of leases displacing $0.85 of debt. Marston and Harris (1988), examining the changes in debt and lease obligations, find that $1 of leasing displaces about $0.60 of non-leasing debt. Using UK data, Beattie, Goodacre, and Thomson (2000) find that £1 of leasing displaces £0.23 of non-lease debt.

Yan (2006) considers the problem that the use of debt and leases are simultaneously chosen. This endogenous choice of debt and leases is modeled as a simultaneous equation system. Another complication is that the potential instrumental variables used to predict debt choice are almost all the same variables that are used to determine lease choice. Yan deals with this problem by using lagged dependent variables as instruments. Using a GMM model to estimate parameters, Yan rejects the hypothesis that debt and leases are complements, but cannot reject the hypothesis that they are substitutes. Yan goes on to find that the degree of substitutability is greater for firms that pay no dividends (more asymmetric information), firms that have more investment opportunities (higher agency costs from underinvestment), or firms with higher marginal tax rates (transferring tax shields is less valuable).

Slovin, Sushka, and Polonchek (1990) conduct an event-study analysis of SLB transactions. They find a positive stock price reaction for the lessee firms who sell and leaseback structures (59 observations) and aircraft (14 observations). They were able to examine 8 lessor announcement returns for aircraft transactions but find no announcement effect for these firms.

They also examine 10 Safe Harbor leases of aircraft and find significant positive returns. Safe Harbor leases were introduced by the 1981 Economic Recovery Tax Act (and phased out by the 1982 tax act) to allow the simple transfer of tax shields via leasing. Slovin, Sushka, and Polonchek conclude that SLB transaction generates positive wealth for lessee firms but not for the lessors, and that the positive gain is attributable to present value of tax reductions. Handa (1991) examines a sample of 64 SLB and finds a negative stock price reaction to the announcement of these transactions. He also finds that the SLB firms had lower operating earnings subsequent to the transaction. These findings support Handa's model of lower quality firms taking part in SLB transactions.

II. Testable Hypotheses

The SLB transaction provides a "pure" financing event where the substitution and complement hypothesis for debt and leases can be tested. To begin, consider the traditional financial balance sheet for the firm. The value of assets equals the sum of the values of debt, lease, and equity financing:

$$\text{Assets} = \text{Debt} + \text{Leases} + \text{Equity}$$

$$A = D + L + E$$

If we state these amounts in terms of changes:

$$\Delta A = \Delta D + \Delta L + \Delta E$$

In the instance of the SLB, assets do not change ($\Delta A = 0$) and equity does not change ($\Delta E=0$), so

$$\Delta L = -\lambda \Delta D,$$

where λ is the Myers, Dill, and Bautista (1976, p. 806) parameter that represents "the lease payments and the various tax shields support at most λ of debt per dollar of assets leased." If debt and leases are perfect substitutes, $\lambda=1$. Otherwise, according to the Myers, Dill, and

Bautista theory, debt and leases are imperfect substitutes such that $0 < \lambda < 1$. As mentioned earlier, Ang and Peterson (1984) surprisingly find the empirical result that debt and leases appear to be complements ($\lambda < 0$) and label this "the leasing puzzle."

We can now state our first testable hypothesis.

H1: *Debt and leases are substitutes ($0 < \lambda \leq 1$).*

This is the main hypothesis that we want to test in this paper. The estimation equation is

$$\Delta L_i = b_0 + b_1 \Delta D_i + \varepsilon_i .$$

The coefficient b_1 is our estimate of **negative** λ. We want to test if b_1 is equal to negative one (perfect substitutes), between 0 and −1 (substitutes), or greater than zero (complements).

Corollary 1: *Leases substitute for long-term debt financing.*

Leases are long-term contracts averaging five years in maturity.[3] Therefore, leases should be equivalent to similar-term debt contracts. The estimation equation to test the corollary is:

$$\Delta L_i = b_0 + b_1 \Delta LTD_i + \varepsilon_i .$$

One important caveat concerning Hypothesis H1 and the Corollary is that we cannot measure the balance sheet impact of the SLB immediately. Realistically, there will be a delay in the accounting statements and our *ceteris paribus* conditions will not hold in practice. In order to help account for this delay, we will be adding a set of control variables that include balance sheet items, tax effects, and financial distress controls. Furthermore, the research question that we address – are debt and leases substitutes or complements? – appears to have an answer: Yes. That is, a subsample of firms decrease debt after the SLB transaction (around 60 percent of our

[3] There is a lot of evidence that the average lease is about 5 years in length. Schallheim, Johnson, Lease, and McConnell (1987) show an average maturity of 60 months for their sample of 363 lease contracts. The Equipment Leasing and Finance Association show in their annual Survey of Industry Activity that the average maturity is 5 years.

sample) and the remaining firms increase debt post SLB transaction (the remaining 40 percent of our sample). Therefore, we are going to examine the two subsets of SLB firms in order to test various theories about the motivation for leasing and the decision to use funds generated by the SLB transaction.

For the subset of SLB transactions that reduce debt, we examine both the degree of debt reduction as well as the use of funds for asset acquisition.[4]

H2: *If leases and debt are substitutes, but not perfect substitutes, then changes in assets will be related to the SLB transaction.*

If leases are not perfect substitutes for debt ($0 < \lambda < 1$) and assuming no change in equity, then

$$\Delta L = - \lambda \Delta D + (1- \lambda) \Delta A \ .$$

An increase in a dollar of lease payments leads to a λ dollar reduction in debt and a $1-\lambda$ dollar increase in assets. In our estimation of this relation, we will be using capital expenditures to proxy for asset changes.

For the subset that exhibits debt increasing after the SLB transaction, we have various hypotheses to potentially explain the result. There is the tax hypothesis and/or the bankruptcy cost hypothesis, including the possibility that the additional funds are used to increase assets.

H3: *Conditional on debt and leases being complements:*

H3.a: *SLB firms are in lower tax-paying positions;*

H3.b: *SLB firms are more financially constrained;*

H3.c: *SLB firms increase their capital expenditures.*

In our test of H3 as well as the other hypotheses, we will be using a regression equation that, in addition to changes in debt, contains independent variables for capital expenditures, a real estate dummy variable for the SLB that are structures only, the marginal tax rate to test the tax based

[4] It is also possible that the funds from the SLB transaction could be used to buyback equity.

theories of leasing, size of firm as log of total assets, and the interest coverage ratio. The last two variables are our proxies for financially constrained firms. In addition, the regressions for the total sample as well as the complement and substitute subgroups contain all of these explanatory variables (size, capital expenditures, tax rate, interest coverage, and the real estate dummy) in order to empirically explore the impact of SLBs on asset and debt substitutions, transaction and information costs, and the marginal tax rate.

III. Sample

Our empirical sample comes from several sources and spans three decades. The oldest data comes from sale-and-leaseback (SLB) data collected and presented in Ezzell and Vora (2001). This data set consists of SLB transaction collected from Dow Jones Interactive service for the period 1984-1991. The earliest recorded announcement date, lessee name and identification number is provided as well as type of asset leased and selling price when available.

We also benefited from a similar dataset collected and presented in Ben-David (2005) and Elayan, Li, and Meyer (2005). Both datasets were collected independently searching key words using *Moody's Bank & Finance Manual*, *Reuters' Business Briefing*, *Dow Jones Interactive*, *Factiva* and the *Wall Street Journal Index*. The Ben-David data consists of SLB transactions collected from January 1994 through December 2002. The Elayan, Li, and Meyer data consists of announcement dates collected from January 1987 through December 1999.

In addition, we performed searches that focused on the periods where time gaps exist in the data. Although collected for different purposes, all of the datasets include variables similar to the Ezzell and Vora event study. We eliminate observations without an announcement date or lessee identity, and we limit the data to public firms that appear on COMUPSTAT for at least one year prior to the announcement date. Only non-financial and non-regulated firms are included in the final sample of 425 observations.

The year reported in the tables represents the fiscal year end and may not be equal to the year the transaction was announced. For instance, if the SLB transaction occurred in December of 1996 but the firm reports fiscal year end results in June, the SLB transaction year is changed to 1997. We did this to ensure that the SLB occurred during the change in debt period from year t-1 to year t

In Table 1 we present the summary statistics for the SLB sample. Most announcements in our sample provide some information about the type and value of the assets being sold and leased back. Only 61 of the observations do not include some qualitative description of the type of asset leased. Of the remaining, 310 report real estate as part of the transaction. Any transaction that is wholly real estate, or mostly real estate, but combined with plant and equipment is labeled as a real estate transaction. Only 54 of the SLBs do not have estate assets as part of their transactions. Of the 425 observations, 346 of the announcements provide the sale price of the asset. We report standard statistics for the amount of the sale when reported. We also collect data on each firm from COMPUSTAT and report select debt and market value ratios in Table 1.

[Insert Table 1 Here]

IV. Results

Table 2 presents the main result for the total sample of SLB transactions. In the full sample of 302 firms, the SLB does not lead to any significant change in total debt (column 1). Based on this result, we cannot reject the null hypothesis and do not find support for H1: leases and debt are neither substitutes nor complements for total debt. Column 2 of Table 2, however, tests the Corollary to H1 that long-term debt and leases are substitutes and provides strong statistically significant support for the hypothesis. For this case, it appears that a dollar of leases

substitutes for around $0.30 of long-term debt. In column 3, we again examine the total debt and lease substitution coefficient while adding the control variables for size, real estate assets, capital expenditures, the marginal tax rate, and the interest coverage ratio. In the presence of these control variables, total debt now has a significant coefficient of around $0.30 of total debt substituting for $1 of leases, which is very close to the result using just the long-term debt. This equation also shows that SLB transactions decrease with size while capital expenditures increase with SLB transactions. The size effect is consistent with the Eisfeldt and Rampini (2007) theory. The capital expenditures result is consistent with leases and debt not being perfect substitutes with the excess cash being employed in new assets (Hypothesis H2).

[Insert Table 2 Here]

Table 2 also examines the lease and debt substitution question in the presence of the control variables by examining the changes in long-term debt alone (column 4), short-term debt alone (column 5), and both LT and ST debt (column 6). The results are fairly consistent across the last three regressions. Interestingly, both the LT and ST debt coefficients display significant substitution effects, even when both are included in the regression.

The next part of our analysis splits the sample into two groups based on the whether or not the SLB leads to a decrease in total debt (substitutes) or an increase in total debt (complements). Table 3 presents the pair-wise correlations among the variables for our substitute subsample. Table 4 presents similar regressions to those in Table 2 for the entire sample, but for the substitute subsample. Our estimates of the substitution parameter, λ, is significantly higher for this subsample, naturally. For the long-term debt, we find nearly $0.78 of debt is substituted for each $1 of leases. The regression equations that include the control variables are very similar to the results for the total sample where SLBs are related to size and

capital expenditures. In addition, the substitute regressions show a relation to the interest coverage ratio (columns 3, 4, and 6). The results for size and interest coverage are consistent again with the model of Eisfeldt and Rampini (2007). Finally, the results in Table 4 provide strong support for Hypothesis H2 that changes in assets (capital expenditures) are related to SLB transactions.

[Insert Table 3 Here]

[Insert Table 4 Here]

Tables 5 and 6 repeat the same analysis for the complement subsample as was just discussed for the substitute subsample. Examining the regression results in Table 6, the first two regressions (columns 1 and 2) confirm that both total debt and long-term debt increase for this subsample. However, the significance of the debt coefficients disappears after the inclusion of the control variables. Regarding the control variables, only capital expenditures and the marginal tax rate exhibit significance. The conclusion we can tentatively draw from this analysis is that if debt and leases are complements, tax effects appear to be the driving force. Overall, the results are consistent with Hypotheses H3.a (taxes) and H3.c (capital expenditures), but are not supportive of Hypothesis H3.b (financial constraints) for the complement subsample.

[Insert Table 5 Here]

[Insert Table 6 Here]

The real estate dummy variable which is equal to one for SLB transactions that only include structures was not significant in any of our regression specifications. We include the real estate variable because Handa (1991) finds a significant difference between real estate SLBs and

equipment leases. Slovin, Sushka, and Polonchek (1990) also separate the sample into the two groups but find a positive stock market reaction for both groups, while Handa finds a negative stock price reaction for all SLB transactions. Finally, Eisfeldt and Rampini (2007) also separate their sample into subgroups of structures and equipment. They suggest that the effect of financial constraints may be harder to detect in the equipment group, perhaps due to greater moral hazard problems for equipment. Nevertheless, for our sample, real estate transactions do not appear to differ from the other.

Our result concerning the tax effect for the complement subsample is consistent with the Lewis and Schallheim (1992) model of debt and leases as complements. However, further examination of the correlation matrices in Tables 3 and 5 for both the complement and substitute subsamples indicates significant correlation between the marginal tax rate and the interest coverage ratio. Such correlation may indicate a complication regarding our inference between the theories of tax effects versus financial distress effects. To further explore the tax versus financial distress hypothesis for leases and debt as complements, we present cross-tabulations of the marginal tax rate quartiles and earnings quartiles for the SLB transactions. This is shown in table 7 with mean and median SLB-to-asset ratios reported. Across earnings quartiles, the SLB-to-asset ratios decrease as marginal tax rates increase suggesting that firms with lower marginal tax rates may have greater incentives to lease as suggested in Lewis and Schallheim (1992).

[Insert Table 7 Here]

V. Conclusions

Most theoretical models predict that debt and leases should act as substitutes. While the preponderance of evidence supports this claim, there remain significant cases where debt and leases appear to be complements. One of the problems with prior research is that it is difficult to

properly control for the changing asset base associated with leasing in cross-sectional tests. To overcome this problem, we examine a sample of sale-and-leaseback (SLB) transactions where the assets of the firm do not change due to the lease.

We find evidence of a substitution effect between leases and long-term debt in our overall sample. However, we also find that 40 percent of the firms exhibit evidence of a complementary relation by increasing their debt after the SLB transaction. To further explore this relation we divide the sample into two groups, those that show an increase in debt and those that show a decrease in debt after the SLB transaction. Within the substitute subgroup, leasing is associated with more capital expenditures and financial constraints. Within the complement subgroup, we find a significant relation between leasing and the firm's marginal tax rate.

In the total sample, we do not find any significant relation between the increase in leases and the change in total debt, but do find a negative relation when our set of control variables is included. We do find, however, a significant negative relation between leases and long-term debt in a simple regression. This negative relation is evidence that, on average, firms treat debt and leases as substitutes. Nevertheless, we also find that 40 percent of the firm's in our sample increase their debt after the SLB transaction, which is evidence that at least some firms see debt and leases as complements. To further investigate the difference between firms that treat leases and debt as substitutes versus complements, we divide the sample of SLBs into two groups, those who show an increase in total debt (complement), and those that show a decrease in total debt (substitute). For the substitute sub-sample, a dollar of SLBs appears to substitute for approximately $0.37 of total debt. Examining just the long-term debt in the substitute sub-sample, a dollar of leases appears to substitute for approximately $0.78 of long-term debt. These findings are in line with the other studies of lease and debt substitution (see Bayliss and Diltz (1986), Marston and Harris (1988), and Yan (2006)). We also examine the substitute sub-sample

for the impact of asset changes, taxes, and financial constraints. We show that SLBs are associated with more capital expenditures and financial constrained firms. Marginal tax rates do not appear to be statistically correlated with this subgroup.

For the complement sub-sample, we find a significant relation between leasing and the marginal tax rate. Additionally, across earnings quartiles, the SLB to asset ratios decrease as the marginal tax rates increase. Together, we interpret these findings as support for the argument made by Lewis and Schallheim (1992) that differential tax rates could lead to a complementary relation between leases and debt. Our results show little support for the argument that financial constraints could lead to a complementary relation, but we do find evidence that financial constraints play a role in the substitute relation.

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Table 1 – Descriptive Statistics

This table reports summary statistics from data collected from press releases announcing sale and leaseback transactions from 1981 through 2002. The sample of firms with non-missing data used to calculate summary statistics has 302 observations. Company identification, asset type, sale price, and lease terms were collected when available. *Change in Total Debt* is the Total Debt in year t minus the total debt in year t-1. *Long-term Debt* is long-term debt issuances less long-term debt reductions. *Change in LT Debt* is the long-term debt in year t minus the long-term debt in year t-1. *Change ST Debt* is the change in current liabilities. *Market value of equity* is the number of shares outstanding multiplied by the stock price at the time of the SLB. Market to Book is market value of equity divided by the book value of equity (data 60). *Total assets* is data 6 in Compustat. *Real Estate Dummy* is given the value of 1 if the sale and leaseback transaction included the sale of real estate and 0 if otherwise. *Interest Coverage* is the ratio of operating earnings or EBITDA divided by interest expense. *Capex* is the ratio of capital expenditures in year t divided by total assets as measured in year t-1. *Marginal Tax Rate* is calculated by John Graham according to Graham (1996a). Annual earnings is Compustat data item number 18. The *amount of the SLB*, *market value of equity*, *total assets*, and *annual earnings* are reported in millions.

	Mean	Median	Std. Dev.
Amount of SLB	139.19	28.00	383.61
Change in Total Debt / Total Assets	0.018	0.000	0.244
Change in LT Debt / Total Assets	-0.019	-0.003	0.174
Change in ST Debt / Total Assets	0.031	0.001	0.163
Debt to Asset Ratio	0.272	0.242	0.279
Lease to Asset Ratio	0.194	0.120	0.225
Prior 6-month return	-0.067	0.015	0.480
Market Value of Equity	4,328.62	298.56	19,473.82
Total Assets	1,499.31	72.21	9,070.82
Market to Book	1.888	1.283	1.911
Interest Coverage Ratio	3.382	2.765	18.469
Capital Expenditures / total assets	0.099	0.056	0.161
Marginal Tax Rate	0.305	0.350	0.126
Real Estate Dummy	0.879	1.000	0.327
Annual Earnings	50.13	4.22	2,123.07

Table 2: Change in Lease on Change in Debt Regressions

This table reports results from regressing change in leases on change is debt. The dependent variable is the amount of sale in a sale and leaseback observations scaled by total assets. *Change in Lease* is the *Amount of Sale* as reported in sale and leaseback announcements. With exception of *Marginal Tax Rate*, financial information was calculated by merging company sale and leaseback firm identifiers with COMPUSTAT tapes. *Total Debt* is long and short-term debt plus capitalized lease obligations. *Change in Total Debt* is the Total Debt in year t minus the total debt in year t-1. *Long-term Debt* is long-term debt issuances less long-term debt reductions. *Change in LT Debt* is the long-term debt in year t minus the long-term debt in year t-1. *Change ST Debt* is the change in current liabilities. *Ln(Total Assets)* is the natural log of total assets in year t. *Real Estate Dummy* is given the value of 1 if the sale and leaseback transaction included the sale of real estate and 0 if otherwise. *Interest Coverage* is the ratio of operating earnings or EBITDA divided by interest expense. *Capex* is the ratio of capital expenditures in year t divided by total assets as measured in year t-1. *Marginal Tax Rate* is calculated by John Graham according to Graham (1996a). Year t is the fiscal year in which a sale and leaseback was announced. Where appropriate, variables were scaled by total assets.

	1	2	3	4	5	6
Constant	0.125***	0.121***	0.247***	0.278***	0.274***	0.244***
	(9.960)	(10.146)	(4.070)	(5.040)	(4.330)	(3.950)
Change in Total Debt	-0.002		-0.317***			
	(-0.036)		(-4.050)			
Change in LT Debt		-0.307***		-0.279***		-0.334***
		(-4.490)		(-3.140)		(-3.400)
Change in ST Debt					-0.318**	-0.283*
					(-2.120)	(-1.940)
ln(Total Assets)			-0.032***	-0.032***	-0.038***	-0.032***
			(-4.900)	(-5.250)	(-5.780)	(-4.720)
Real Estate Dummy			0.033	0.013	0.046	0.034
			(0.890)	(0.370)	(1.190)	(0.900)
Capital Expenditures			0.543***	0.218*	0.413**	0.547***
			(3.130)	(1.800)	(2.350)	(3.130)
Marginal Tax Rate			-0.003	0.02	0.07	-0.006
			(-0.025)	(0.190)	(0.610)	(-0.055)
Interest Coverage			0.000	0.000	0.000	0.000
			(0.600)	(0.550)	(0.500)	(0.600)
Observations	302	302	163	180	163	163
R-squared	0.001	0.058	0.297	0.245	0.245	0.297
F-Statistic	0.0013	20.170	10.98	9.378	8.429	9.365
Prob F	0.971	0.000	0.000	0.000	0.000	0.000

t statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Substitute Correlations

This table reports correlations between independent variables used in subsequent regressions. Observations were limited to those exhibiting a substitute effect between debt and leasing. With exception of *Marginal Tax Rate*, financial information was calculated by merging company sale and leaseback firm identifiers with COMPUSTAT tapes. *Long-term Debt* is long-term debt issuances less long-term debt reductions. *Change in LT Debt* is the long-term debt in year t minus the long-term debt in year t-1. *Change ST Debt* is the change in current liabilities. *Ln(Total Assets)* is the natural log of total assets in year t. *Real Estate Dummy* is given the value of 1 if the sale and leaseback transaction included the sale of real estate and 0 if otherwise. *Interest Coverage* is the ratio of operating earnings or EBITDA divided by interest expense. *Capex* is the ratio of capital expenditures in year t divided by total assets as measured in year t-1. *Marginal Tax Rate* is calculated by John Graham according to Graham (1996a). Year t is the fiscal year in which a sale and leaseback was announced. Panel A presents the correlation coefficients and Panel B presents the corresponding probability statistics. Where appropriate, variables were scaled by total assets.

	Change in Total Debt	Change in LT Debt	Change in ST Debt	ln(Total Assets)	Real Estate Dummy	Interest Coverage	Capex
Panel A: Correlations							
Change in LT Debt	0.868						
Change in ST Debt	0.531	0.040					
ln(Total Assets)	0.078	0.083	0.028				
Real Estate Dummy	-0.052	-0.067	-0.025	0.003			
Interest Coverage	0.056	0.080	-0.004	-0.004	0.037		
Capex	-0.200	-0.097	-0.040	-0.075	-0.026	-0.004	
Marginal Tax Rate	-0.103	-0.097	-0.036	0.040	0.039	0.188	0.043
Panel B: p-values							
Change in LT Debt	0.000						
Change in ST Debt	0.000	0.559					
ln(Total Assets)	0.253	0.207	0.665				
Real Estate Dummy	0.484	0.352	0.730	0.960			
Interest Coverage	0.420	0.231	0.952	0.950	0.609		
Capex	0.003	0.144	0.565	0.256	0.720	0.955	
Marginal Tax Rate	0.203	0.214	0.646	0.596	0.645	0.017	0.582

Table 4: Substitute Regressions

This table reports the results from regressing change in leases on change is debt and various variables used to test leasing hypotheses. The dependent variable is the amount of sale in a sale and leaseback observations scaled by total assets. Observations were limited to those exhibiting a substitute effect between debt and leasing.. *Change in Lease* is the *Amount of Sale* as reported in sale and leaseback announcements. With exception of *Marginal Tax Rate*, financial information was calculated by merging company sale and leaseback firm identifiers with COMPUSTAT tapes. *Total Debt* is long and short-term debt plus capitalized lease obligations. *Change in Total Debt* is the Total Debt in year t minus the total debt in year t-1. *Long-term Debt* is long-term debt issuances less long-term debt reductions. *Change in LT Debt* is the long-term debt in year t minus the long-term debt in year t-1. *Change ST Debt* is the change in current liabilities. *Ln(Total Assets)* is the natural log of total assets in year t. *Real Estate Dummy* is given the value of 1 if the sale and leaseback transaction included the sale of real estate and 0 if otherwise. *Interest Coverage* is the ratio of operating earnings or EBITDA divided by interest expense. *Capex* is the ratio of capital expenditures in year t divided by total assets as measured in year t-1. *Marginal Tax Rate* is calculated by John Graham according to Graham (1996a). Year t is the fiscal year in which a sale and leaseback was announced. Where appropriate, variables were scaled by total assets.

	1	2	3	4	5	6
Constant	0.086***	0.045***	0.264**	0.289***	0.234*	0.247**
	(5.390)	(3.010)	(2.270)	(3.440)	(1.990)	(2.070)
Change in Total Debt	-0.374***		-0.604***			
	(-4.310)		(-7.260)			
Change in LT Debt		-0.776**		-0.655***		-0.755***
		(-9.890)		(-4.330)		(-6.110)
Change in ST Debt					-0.578***	-0.455***
					(-3.420)	(-5.380)
ln(Total Assets)			-0.023***	-0.028***	-0.040***	-0.024***
			(-3.570)	(-3.670)	(-5.490)	(-3.740)
Real Estate Dummy			0.005	0.022	0.05	0.007
			(0.130)	(0.480)	(1.070)	(0.190)
Capital Expenditures			0.729***	0.641***	0.890***	0.775***
			(3.590)	(2.670)	(3.540)	(3.790)
Marginal Tax Rate			0.127	0.222	0.320**	0.13
			(1.070)	(1.610)	(2.280)	(1.100)
Interest Coverage			-0.003*	-0.004*	-0.003	-0.003*
			(-1.970)	(-1.920)	(-1.460)	(-1.880)
Observations	173	173	77	77	77	77
R-squared	0.331	0.285	0.646	0.51	0.467	0.655
F-Statistic	73.73	59.28	21.27	12.14	10.24	18.68
Prob F	0.000	0.000	0.000	0.000	0.000	0.000

t statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Complement Correlations

This table reports correlations between independent variables used in subsequent regressions. Observations were limited to those exhibiting a complement effect between debt and leasing.. With exception of *Marginal Tax Rate*, financial information was calculated by merging company sale and leaseback firm identifiers with COMPUSTAT tapes. *Long-term Debt* is long-term debt issuances less long-term debt reductions. *Change in LT Debt* is the long-term debt in year t minus the long-term debt in year t-1. *Change ST Debt* is the change in current liabilities. *Ln(Total Assets)* is the natural log of total assets in year t. *Real Estate Dummy* is given the value of 1 if the sale and leaseback transaction included the sale of real estate and 0 if otherwise. *Interest Coverage* is the ratio of operating earnings or EBITDA divided by interest expense. *Capex* is the ratio of capital expenditures in year t divided by total assets as measured in year t-1. *Marginal Tax Rate* is calculated by John Graham according to Graham (1996a). Year t is the fiscal year in which a sale and leaseback was announced. Panel A presents the correlation coefficients and Panel B presents the corresponding probability statistics. Where appropriate, variables were scaled by total assets.

	Change in Total Debt	Change in LT Debt	Change in ST Debt	ln(Total Assets)	Real Estate Dummy	Interest Coverage	Capex
Panel A: Correlations							
Change in LT Debt	0.480						
Change in ST Debt	0.901	0.051					
ln(Total Assets)	-0.184	-0.129	-0.138				
Real Estate Dummy	-0.019	-0.071	0.020	-0.038			
Interest Coverage	-0.138	-0.119	-0.095	0.012	0.002		
Capex	0.288	0.512	0.052	-0.126	-0.180	-0.058	
Marginal Tax Rate	-0.006	0.014	-0.005	0.053	0.047	0.274	0.093
Panel B: p-values							
Change in LT Debt	0.000						
Change in ST Debt	0.000	0.509					
ln(Total Assets)	0.017	0.082	0.074				
Real Estate Dummy	0.813	0.363	0.809	0.627			
Interest Coverage	0.081	0.123	0.234	0.880	0.976		
Capex	0.000	0.000	0.507	0.094	0.022	0.460	
Marginal Tax Rate	0.951	0.880	0.960	0.552	0.612	0.003	0.310

Table 6: Complement Regressions

This table reports the results from regressing change in leases on change is debt and various variables used to test leasing hypotheses. The dependent variable is the amount of sale in a sale and leaseback observations scaled by total assets. Observations were limited to those exhibiting a complement effect between debt and leasing. *Change in Lease* is the *Amount of Sale* as reported in sale and leaseback announcements. With exception of *Marginal Tax Rate*, financial information was calculated by merging company sale and leaseback firm identifiers with COMPUSTAT tapes. *Total Debt* is long and short-term debt plus capitalized lease obligations. *Change in Total Debt* is the Total Debt in year t minus the total debt in year t-1. *Long-term Debt* is long-term debt issuances less long-term debt reductions. *Change in LT Debt* is the long-term debt in year t minus the long-term debt in year t-1. *Change ST Debt* is the change in current liabilities. *Ln(Total Assets)* is the natural log of total assets in year t. *Real Estate Dummy* is given the value of 1 if the sale and leaseback transaction included the sale of real estate and 0 if otherwise. *Interest Coverage* is the ratio of operating earnings or EBITDA divided by interest expense. *Capex* is the ratio of capital expenditures in year t divided by total assets as measured in year t-1. *Marginal Tax Rate* is calculated by John Graham according to Graham (1996a). Year t is the fiscal year in which a sale and leaseback was announced. Where appropriate, variables were scaled by total assets.

	1	2	3	4	5	6
Constant	0.087***	0.071***	0.09	0.138*	0.06	0.087
	(3.410)	(2.770)	(0.950)	(1.950)	(0.670)	(0.920)
Change in Total Debt	0.210**		0.002			
	(2.550)		(0.008)			
Change in LT Debt		0.424**		0.003		-0.282
		(2.580)		(0.013)		(-0.890)
Change in ST Debt					0.272	0.221
					(0.980)	(0.780)
ln(Total Assets)			0.000	0.000	0.000	0.000
			(-0.310)	(-0.540)	(-0.250)	(-0.300)
Real Estate Dummy			0.080	0.047	0.092	0.081
			(1.340)	(0.960)	(1.580)	(1.370)
Capital Expenditures			0.444*	0.108	0.486*	0.565**
			(1.730)	(0.710)	(1.900)	(2.090)
Marginal Tax Rate			-0.378**	-0.357**	-0.365**	-0.387**
			(-2.330)	(-2.540)	(-2.280)	(-2.390)
Interest Coverage			0.001	0.001	0.001	0.001
			(0.740)	(0.710)	(0.790)	(0.680)
Observations	119	119	83	83	83	83
R-squared	0.049	0.031	0.196	0.172	0.196	0.201
F-Statistic	7.438	5.454	3.09	3.23	3.096	2.698
Prob F	0.007	0.021	0.009	0.006	0.009	0.015

t statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Quartile Cross-tabulation

This table reports cross-tabulation of the marginal tax rate and earnings quartiles for sale and leaseback transactions from the complement sample. The sale and leaseback transactions are scaled by total assets. With exception of *Marginal Tax Rate*, financial information was calculated by merging company sale and leaseback firm identifiers with COMPUSTAT tapes. *Earnings* is the net income before extraordinary items scaled by total assets. *Marginal Tax Rate* is calculated by John Graham according to Graham (1996a). Year t is the fiscal year in which a sale and leaseback was announced.

Marginal Tax Rate Quartiles	Quartile Range	…	Earnings Quartiles 1 -1.23 to -.02	2 -.02 to .02	3 .02 to .05	4 .05 to .33	Row Totals
1	.0000 to	Mean	0.24	0.06	0.05	0.99	0.25
	.3391	Median	0.13	0.05	0.05	0.99	0.12
		N	12	3	4	2	21
2	.3400 to	Mean	0.15	0.06	0.03	0.11	0.09
	.3499	Median	0.13	0.05	0.01	0.05	0.05
		N	3	3	5	9	20
3	.3500 to	Mean	0.02	0.07	0.07	0.06	0.06
	.3532	Median	0.02	0.01	0.05	0.02	0.03
		N	5	5	7	4	21
4	.3532 to	Mean	0.00	0.06	0.04	0.05	0.05
	.4600	Median	0.00	0.01	0.05	0.03	0.03
		N	1	9	5	6	21
	Column	Mean	0.16	0.07	0.05	0.17	0.12
	Totals	Median	0.06	0.03	0.03	0.04	0.03
		N	21	20	21	21	83