Do Inside Ownership and Leverage Share Common Determinants?

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Papers by Jensen and Meckling (1976), Jensen (1986), and Stulz (1988) suggest that a firm's leverage ratio and its level of inside ownership share common determinants. This paper examines whether inside equity and leverage are explained by a common set of variables that proxy for a firm's exposure to various market imperfections. These imperfections include the agency costs of equity, leverage-related costs, the tax advantage of debt, the costs of issuing securities, and the demand for risk-sharing by insiders. In contrast to Crutchley and Hansen (1989), but consistent with Jensen, Solberg, and Zorn (1992) and Holthausen and Larcker (1991), little evidence is found that leverage and inside equity are explained by the same variables. These results hold even after controlling for industry effects, an issue not examined by previous literature. In addition, leverage is related strongly and negatively to free cash flow, a result that is inconsistent with Jensen (1986), but consistent with the pecking order hypothesis of Myers (1984).

INTRODUCTION

Jensen and Meckling (1976) posit that inside equity and leverage are determined jointly by the firm's attempt to minimize total agency costs.[1] More recent papers also suggest that inside equity and leverage share a common set of determinants. For example, Jensen (1986) suggests that leverage and inside equity can help mitigate the agency costs of free cash flow. Thus, the free cash flow hypothesis suggests that in an efficiently organized firm both inside equity and leverage are related directly to the potential agency costs of free cash flow, *ceteris paribus*. Recent papers by Stulz (1988), Harris and Raviv (1988), and Israel (1992) argue that for corporate control reasons, the levels of inside ownership and leverage are chosen jointly. For example, in Stulz (1988), the use of leverage can allow insiders that are wealth-constrained to obtain their optimal ownership percentage. Stulz's framework therefore implies that firms trade the costs of additional debt against the benefits of higher inside ownership. Stated more generally, the optimal values of leverage and inside ownership are influenced by the same set of factors.

Several recent papers empirically examine the joint determinants of inside ownership and leverage and find conflicting results.[2] Crutchley and Hansen (1989) test whether

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[1] Jensen and Meckling (1976, p. 69) state "the crucial variables to be determined are not just the relative amounts of debt and equity but also the fraction of equity held by the manager."

[2] Most empirical studies focus on inside equity and leverage separately. For example, many papers examine whether imperfections such as taxes, bankruptcy costs, agency costs, and liquidation costs affect a firm's leverage decision (e.g., Ferri and Jones, 1979; Flath and Knoeber, 1980; Bradley *et al.* 1984;

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leverage and inside equity are explained by a common set of variables that proxy for agency costs. Their finding that leverage and inside equity are related significantly to the same set of variables leads them to conclude that ownership and leverage are "chosen in tandem by managers to control agency costs." Jensen *et al.* (1992) and Holthausen and Larcker (1991) test whether inside ownership and leverage share a common set of determinants using structural equation models. They find little evidence that inside ownership and leverage share common determinants.[3]

This research also examines whether inside equity and leverage are explained by a common set of variables that proxy for a firm's exposure to various market imperfections. These imperfections include the agency costs of equity, leverage-related costs, the tax advantage of debt, the costs of issuing securities, and the demand for risk sharing by insiders. In addition, this study controls for industry effects. In contrast to Crutchley and Hansen (1989), but consistent with Jensen *et al.* (1992) and Holthausen and Larcker (1991), limited evidence is found that leverage and inside equity are explained by the same variables. The only variable that is associated significantly with both inside equity and leverage is firm size. The results are robust to the measures of inside equity, to the use of book versus market values of equity in the leverage measure, and to the presence or absence of industry dummy variables in the estimated equations.

A strong negative relation between leverage and free cash flow also is found, but no significant relation between inside equity and free cash flow is discovered. These findings are inconsistent with Jensen's (1986) prediction that the agency costs of free cash flow can be mitigated by greater use of debt and higher inside ownership. The strong negative relation between leverage and cash flow, however, is consistent with Myers' (1984) pecking order hypothesis. Firms with high levels of internally generated funds issue securities less often and consequently have lower leverage ratios.

MOTIVATION AND METHODOLOGY

It is assumed that the financial structure of a firm is chosen to maximize firm value. Analogous to the microeconomic theory of production where a firm chooses inputs given input prices, a firm's financial structure is viewed as the choice of funds given the relative prices of these funds. Therefore, a firm chooses inside equity and leverage given prices that are determined by market imperfections (e.g., taxes and agency costs). Thus, inside ownership and leverage are considered endogenous variables and market imperfections are exogenous variables. The issue addressed is whether inside equity and leverage are viewed best as being determined by the same market imperfections or as being determined by different factors.

Under the common determinant perspective, the equilibrium levels of inside equity and leverage depend on the same market imperfections. Two arguments support this view.

Titman and Wessels, 1988; Kale *et al.* 1992). Consequently, these studies focus on the choice between debt and equity financing without distinguishing inside from outside equity. Other studies directed at understanding the determinants of inside ownership, such as Demsetz and Lehn (1985) and Bergstrom and Rydqvist (1989), do so without consideration of debt financing.

[3] Jensen *et al.* (1992) and Holthausen and Larcker (1991) also test whether the level of inside ownership directly affects leverage and vice versa. They find that firms with higher inside ownership have lower leverage.

First, both inside equity and leverage are influenced directly by the same market imperfections. For example, agency costs of equity influence both inside equity and leverage because as the potential agency costs of outside equity increase, firms are predicted to reduce the use of outside equity and increase the use of inside equity and leverage (Jensen and Meckling, 1976).

The second argument supporting the common determinants view is that inside equity and leverage interact so that an imperfection that affects one also affects the other. Stulz's (1988) hypothesis concerning the costs and benefits of inside ownership provides an example. Corporate leverage allows an insider to obtain a higher ownership percentage without forcing the owner to invest additional wealth in the firm. In this sense, inside equity and leverage are complementary. For example, a firm that has a lower tax benefit from debt (perhaps because it has other tax shields) may have a lower level of both leverage and inside equity. Similarly, if the benefits of inside equity increase (perhaps because the potential agency costs of equity increase), then firms may use more leverage to allow insiders to obtain their optimal ownership percentage.

The hypothesis that inside equity and leverage share common determinants is tested by estimating reduced form equations where the dependent variables are inside equity (IE) and leverage (LEV) and the independent variables are proxies for a firm's exposure to market imperfections. Thus, the following linear equations are estimated using ordinary least squares:

$$IE_i = \alpha_0 + \sum_j \alpha_j \text{ (Exposure to Imperfection j)}_i + u_i,$$

$$LEV_i = \beta_0 + \sum_j \beta_j \text{ (Exposure to Imperfection j)}_i + v_i.$$

The disturbances (u_i and v_i) are assumed to have zero mean and constant covariances. The common determinants perspective predicts that both α_j and β_j are significantly different from zero for some j. The coefficient estimates from the reduced form model capture the total effect of a market imperfection on the dependent variable.

An alternative methodology is to specify structural equations for inside equity and leverage. This approach is not inconsistent with the reduced form approach, as any structural model can be written in a reduced form. The structural equation approach potentially can test not only whether inside equity and leverage share common determinants, but also whether one choice variable influences the other (Jensen *et al.*, 1992; Holthausen and Larcker, 1991). The disadvantage of the structural equation approach, however, is that one must specify *a priori* which variables influence inside equity, but not leverage (and vice versa). If these restrictions are not correct, biased coefficients result. Other papers using the reduced form approach to examine similar issues include Crutchley and Hansen (1989) and Smith and Watts (1992).

DATA

MEASURING FINANCIAL STRUCTURE

Inside ownership ideally should measure the holdings of those with decision-making authority or control. Because it is not possible to observe directly which parties control the firm, the sensitivity of the results are examined using three different measures of inside ownership. Ownership data are obtained from the Fortune 500 *Corporate Data Exchange (CDE) Ownership Directory* for 1980 and the *Value Line Investment Survey* for 1980. The CDE database reports the percentage of common shares owned by any party that holds more than 0.2 percent of the outstanding shares of a Fortune 500 firm that was publicly traded in 1980.

The first inside ownership variable, IE.OC, is the fraction of equity held by the shareholders with the five largest claims in 1980 according to the CDE database.[4] This measure assumes that the parties with the largest ownership claims are most likely to control the firm, independent of whether the party is an individual or an institution and independent of whether the party is an officer or director. IE.OC is, in effect, a measure of ownership concentration. The second measure, IE.BD, is the fraction of equity held by the board members with the five largest claims as indicated by the CDE database. The board of directors includes some, but not all, top managers. Therefore, a third inside ownership variable, IE.OD, is examined that includes the ownership of corporate officers who are not on the board of directors. This measure is the inside ownership value reported by the *Value Line Investment Survey*. *Value Line* defines insiders as individuals and firms that are involved actively in the decision making of the firm. The three ownership variables yield similar results; therefore, only the regression results for IE.BD are reported.

Financial data are taken from the annual Compustat and CRSP data files. The leverage ratio is defined as long-term debt divided by firm value. Firm value is measured one of two ways: book value of long-term debt plus book value of equity or book value of long-term debt plus market value of equity. Myers (1977) argues that leverage ratios measured at book value better reflect the debt capacity associated with the assets. Other theoretical models, however, often are based on market values.[5] The current conclusions are insensitive to whether the market value or book value of equity is used in the leverage ratio; therefore, only results using market values are reported.[6]

An alternative measure of leverage, utilized by Crutchley and Hansen (1989), is long-term debt divided by outside financing. That is, the denominator in the leverage ratio is the book value of debt plus the market value of equity held by outsiders (as opposed to total equity). More precisely, the denominator equals:

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[4] For a small number of firms, fewer than five shareholders own a sufficient number of shares to be included in the data set. For these observations, the inside ownership variable represents the ownership of less than five shareholders. The empirical results are not materially different if only the shareholders with the three largest claims are used to calculate inside equity.

[5] Mulford (1985) provides evidence that market values are more appropriate when explaining equity betas.

[6] Similar to Bradley *et al.* (1984), leverage ratios are calculated as averages from 1976 to 1980. Leverage ratios also were calculated using 1980 data only, with no material change in the results.

(book value of long-term debt) + (market value of equity) (1 - IE.BD),

where:

IE.BD = Ownership of the board members with the five largest claims.

This outside leverage measure combines information about the amount of debt used by the firm and the level of inside ownership. Because the regression results using this leverage measure are essentially the same as when the more traditional leverage ratio is used, regressions using this variable are not reported.

The sample consists of 286 firms with complete financial data. Panel A of Table 1 presents descriptive statistics for the ownership and leverage variables. The data indicate that there is considerable cross-sectional variation in ownership concentration even among the largest U.S. industrial firms. Inside ownership, as measured by ownership concentration (IE.OC), has a mean of 27 percent and ranges from 7 percent to 91 percent of equity value. The board members with the five largest claims (IE.BD) own on average 9 percent. The inside ownership measure taken from *Value Line* indicates that insiders own 12 percent on average. All three ownership variables are skewed, as the median values are substantially lower than the mean values. Financial leverage varies considerably as well. Using book values of equity, the leverage ratio has a mean value of 18 percent and ranges from 0 percent to 46 percent. For leverage measured using market values of equity, the mean is 27 percent and the range is from 0 percent to 85 percent. Panel B of Table 1 provides correlation coefficients between the ownership variables and the leverage variables. As might be expected, the three ownership variables are correlated highly with each other, as are the three leverage measures.[7]

DETERMINANTS OF INSIDE EQUITY AND LEVERAGE

The proxies for market imperfections are taken from existing studies of inside ownership and leverage. Panel A of Table 2 gives the precise definitions for the independent variables and examples of other studies utilizing each variable. Panel B outlines the relation between the variable and the market imperfection for which the variable proxies. Additional discussion of the independent variables follows.

Demsetz and Lehn (1985) and Jensen and Meckling (1976) argue that inside ownership is determined by a balancing of insiders' demand for risk sharing and the agency costs of outside equity. Two variables are used to proxy for insiders' demand for risk sharing: LOGASSETS equals the natural logarithm of total assets, and STDCF equals the standard deviation of the first differences in operating cash flows. The larger the firm, the more an insider must contribute to maintain a given ownership percentage. Holding an insider's wealth constant, it is riskier for an insider to hold a given ownership percentage in a

[7] Panel B of Table 1 indicates that the outside leverage ratio used by Crutchley and Hansen is correlated positively with inside equity. This can be attributed, at least in part, to the definition of the outside leverage ratio. As inside equity increases, *ceteris paribus*, outside equity decreases, and so the outside leverage ratio necessarily increases.

Table 1

Panel A
Descriptive Statistics for Inside Equity and Leverage, (N=286)

Variable[a]	Mean	Median	Standard Deviation	Minimum	Maximum
IE.OC	0.27	0.22	0.16	0.07	0.91
IE.BD	0.09	0.03	0.13	0.01	0.78
IE.VL	0.12	0.04	0.16	0.10	0.75
$\frac{LTDEBT}{LTDEBT+EQ_B}$	0.18	0.18	0.09	0.00	0.46
$\frac{LTDEBT}{LTDEBT+EQ_M}$	0.27	0.25	0.18	0.00	0.85
$\frac{LTDEBT}{LTDEBT+EQ_M(1-IE.BD)}$	0.29	0.26	0.19	0.00	0.85

Panel B
Pearson Correlation Coefficients, (p-values)

	IE.OC	IE.BD	IE.VL	$\frac{LTDEBT}{LTDEBT+EQ_B}$	$\frac{LTDEBT}{LTDEBT+EQ_M}$
IE.BD	0.68 (0.01)				
IE.VL	0.68 (0.01)	0.72 (0.01)			
$\frac{LTDEBT}{LTDEBT+EQ_B}$	-0.03 (0.60)	0.05 (0.37)	-0.04 (0.52)		
$\frac{LTDEBT}{LTDEBT+EQ_M}$	0.09 (0.11)	-0.06 (0.33)	-0.04 (0.53)	0.82 (0.01)	
$\frac{LTDEBT}{LTDEBT+EQ_M(1-IE.BD)}$	0.21 (0.01)	0.11 (0.05)	0.08 (0.16)	0.81 (0.01)	0.98 (0.01)

[a]IE.OC is the fraction of equity held by the shareholders with the five largest claims. IE.BD is the fraction of equity held by the board members with the five largest claims. IE.VL equals inside ownership as reported by *Value Line*. LTDEBT equals long-term debt, EQ_B equals the book value of equity, EQ_M equals the market value of debt

larger firm, *ceteris paribus*. In addition, the risk of an insider's position increases, *ceteris paribus*, as the variability of the firm's cash flows increase.[8]

Demsetz and Lehn (1985) suggest that the agency costs of outside equity increase as the nonpecuniary benefits of control increase. Certain industries such as publishing and

[8] Crutchley and Hansen's (1989) proxy for the demand for risk sharing is the variable DIVERSE, which equals the expected return on equity minus the risk free rate of return divided by the standard deviation of equity returns. Intuitively, the greater is the risk (standard deviation) of equity, the greater is the demand for risk sharing, *ceteris paribus*. If the firm is expected to generate sufficient returns to compensate for greater risk, however, then the demand for risk sharing decreases. The DIVERSE variable suffers from the problem that both the risk and return of equity depend on the firm's leverage ratio, one of the variables that this paper tries to explain.

Table 2—Summary of Proxy Variables

Panel A
Definitions of Proxies, (Compustat variable number in parentheses; examples of other studies using similar variables)

LOGASSETS	Natural logarithm of the average value of total assets (V6) from 1976 through 1980 (in millions). (Demsetz and Lehn, 1985)
STDCF	Standard deviation of the first difference of operating cash flow (V13) divided by assets (V6) calculated using data from 1971 through 1980. (Bradley et al. 1984)
FCF	Ratio of pretax operating income before depreciation (V13) minus taxes (V15) minus interest (V16) minus capital expenditures (V128) divided by total assets (V6) averaged from 1976 to 1980. (Lehn and Poulsen, 1989)
RD	The ratio of research and development costs (V46) divided by total assets (V6) averaged from 1976 to 1980. (Long and Malitz, 1985)
NDTS	The ratio of depreciation expense (V14) plus investment tax credits (V51) to total assets (V6) averaged from 1976 to 1980; if investment tax credit information is missing, it is assumed to be zero. (Bradley et al. 1984)

Panel B
Relation between Proxy and Market Imperfection

Proxy	Relation Between Market Imperfection and Proxy	Market Imperfection	Predicted Sign Inside Equity	Leverage
LOGASSETS	+	Agency Costs of Equity	+	+
	+	Demand for Risk Sharing	-	?
STDCF	+	Agency Costs of Equity	+	+
	+	Expected Bankruptcy Costs	?	-
	+	Demand for Risk Sharing	-	?
FCF	+	Agency Costs of Free Cash Flow	+	+
	-	Need for Outside Funds	?	-
RD	+	Leverage-Related Costs	?	-
NDTS	-	Tax Advantage of Debt	?	-

sports franchising offer insiders more opportunity to use corporate assets for their own benefit. Therefore, industry dummy variables are used as proxies for the nonpecuniary benefits of control. Industry dummies are based on two digit SIC codes.[9]

Demsetz and Lehn (1985) also suggest that the agency costs of outside equity increase as the costs of monitoring managers increase. Larger firms and firms with more variable cash flows are hypothesized to be more costly to monitor. Thus, LOGASSETS and STDCF also may proxy for the costs of monitoring managers.[10]

[9] In a few cases where closely related two digit SIC classes contained small numbers of observations, observations from more than one two digit SIC code were combined into one industry class.

[10] Demsetz and Lehn (1985) use the unsystematic risk of equity as a measure of the costs of monitoring managers (complexity, in their terminology). In the current framework, the variability of equity returns is not an appropriate proxy for complexity because it depends on leverage and leverage is also a choice variable.

Jensen (1986) argues that high levels of free cash flow contribute to greater agency costs of outside equity. Thus, all else equal, higher free cash flow is predicted to be associated with higher levels of inside equity. Jensen (1986) defines free cash flow as the cash flow from operations less the funds needed to finance all positive net present value projects. Because the value of positive net present value projects is unobservable, free cash flow is difficult to measure in practice. Potential agency costs arising from free cash flow are proxied using the average value of the ratio of pretax operating income before depreciation less taxes, interest, and capital expenditures to total assets (FCF). Using this definition, capital expenditures are assumed to represent investment in all positive net present value projects.

Myers and Majluf (1984) and Miller and Rock (1985) show that underpricing of new issues can occur if managers have information about the value of projects that is not conveyed to investors. For these reasons, firms prefer the use of internally generated funds to finance projects. The costs of issuing securities also gives rise to a preference for the use of internal funds. (See Ritter, 1987.) The use of internal funds rather than external funds decreases leverage by increasing the value of existing equity. Thus, the pecking order hypothesis predicts a negative relation between leverage and the availability of internal funds, *ceteris paribus*. FCF is used as a proxy for the availability of internal funds.

The static tradeoff hypothesis (Brealey and Myers, 1991) predicts that a firm's leverage decision results from a balancing of benefits from leverage against the costs of leverage. One benefit of leverage is the tax shield on interest payments. DeAngelo and Masulis (1980) argue that the greater the level of nondebt tax shields, the lower is the tax benefit of additional leverage. Thus, all else equal, firms with higher nondebt tax shields (NDTS) are expected to receive lower tax benefits from issuing debt. Following Bradley *et al.* (1984), NDTS is measured by dividing depreciation expenses plus investment tax credits by total assets.[11]

Many capital structure studies argue that as the probability of bankruptcy increases, debt becomes more costly.[12] STDCF is likely to be related positively to the probability of bankruptcy and therefore is used as a proxy for leverage-related costs (Bradley *et al.*, 1984). Myers (1977) and Stulz and Johnson (1985) argue that leverage-related costs depend on the composition of the firm's assets between tangible and intangible assets. Firms with higher proportions of firm value in intangible assets are expected to have higher leverage related costs. The average ratio of research and development expenses to total assets (RD) is used as the proxy for intangible assets (Long and Malitz, 1984). The earlier defined variable NDTS, however, also is likely to be correlated positively with tangible or fixed assets. To the extent that these assets provide better collateral for debt, NDTS may be related positively to leverage (Bradley *et al.*, 1984).

[11] When investment tax credit information is missing, NDTS is equal to the ratio of depreciation to total assets. NDTS also was defined using just depreciation in the numerator with no change in results.

[12] Castanias (1983) and Scott (1976) show that the relation between leverage and business risk is ambiguous. Castanias, however, shows that a negative relation exists if firms have the same bankruptcy costs and marginal tax rates.

Leverage also provides a mechanism for reducing the agency costs of equity created by free cash flow (Jensen, 1986). Increasing interest payments decreases the cash flows over which managers have discretion. This reasoning suggests that leverage will be related positively to FCF.

Descriptive statistics for the independent variables are presented in Table 3. Significant correlation coefficients are reported for several variables. In particular, RD is correlated positively with FCF, indicating firms with high cash flows tend to spend more on research and development. Also, NDTS is correlated positively with both LOGASSETS and STDCF and correlated negatively with FCF. The correlation coefficients are not large in absolute magnitude, however, indicating that pairwise collinearity is not likely to be a problem. Also reported in Panel B are correlation coefficients between the independent variables and the dependent variables. Inside equity is correlated negatively with firm size, and leverage is correlated negatively with cash flows (FCF) and with research and development expenses (RD).

RESULTS ON THE COMMON DETERMINANTS OF LEVERAGE AND INSIDE EQUITY

The regression results are presented in Table 4. As mentioned earlier, the results are insensitive to which of the three inside ownership variables are used and which of the three leverage measures are used. Therefore, only the results for IE.BD and the leverage ratio using market value of equity are reported. For both dependent variables (inside equity and leverage), two equations are presented: one with and one without industry dummy variables. Bradley *et al.* (1984) find that a significant portion of the cross-sectional variation in leverage ratios is explained by industry factors. The dummy variables are based on two digit SIC codes and are included to control for industry factors that may affect inside equity and leverage independent of the firm specific factors already discussed.[13]

Table 4 indicates that LOGASSETS and NDTS are associated significantly with inside equity. Larger firms have lower inside equity, consistent with the hypothesis that the demand for risk sharing increases as firm size increases. Firms with higher NDTS (i.e., higher depreciation expenses) have greater inside equity. If, as suggested by Stulz (1988), debt is complementary with inside equity and if NDTS is proxying for a firm's marginal tax rate, then one would expect firms with higher NDTS to have lower levels of both debt and inside equity. The observed positive relation between NDTS and inside equity therefore suggests that NDTS proxies for some other characteristic of assets that is related positively to management's desire to retain a greater interest in a firm.

Leverage is associated significantly with LOGASSETS, FCF, and RD. A negative relation is found between firm size and leverage. Consistent with Baskin (1989), leverage is related strongly and negatively to cash flow. Finally, the negative relation between leverage and research and development expenses is consistent with the results of previous capital structure studies (e.g., Titman and Wessels, 1988; Bayless and Chaplinsky, 1990; and Long and Malitz, 1985).

[13] Without the industry dummy variables, the regression measures the impact of the determinants of leverage across firms and industries. When industry dummy variables are included, however, the regression tests whether market imperfections distinguish firm leverage ratios within industries.

Table 3

Panel A
Descriptive Statistics for Independent Variables (N=286)

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
LOGASSETS	$6.95	$6.84	$1.05	$4.74	$10.52
STDCF	0.04	0.04	0.02	0.01	0.12
FCF	0.02	0.02	0.04	-0.13	0.12
RD	0.02	0.02	0.02	0.00	0.15
NDTS	0.05	0.04	0.02	0.01	0.12

Panel B
Pearson Correlation Coefficients, (p-values in parentheses)

	LOGASSETS	STDCF	FCF	RD	NDTS
STDCF	-0.07 (0.25)				
FCF	-0.25 (0.01)	-0.02 (0.75)			
RD	0.12 (0.04)	0.09 (0.13)	0.17 (0.01)		
NDTS	0.31 (0.01)	0.18 (0.01)	-0.34 (0.01)	0.06 (0.34)	
IE.BD	-0.20 (0.01)	0.09 (0.14)	0.07 (0.24)	-0.07 (0.22)	0.08 (0.16)
LTDEBT LTDEBT+EQ$_M$	-0.08 (0.19)	-0.05 (0.25)	-0.50 (0.01)	-0.38 (0.01)	-0.01 (0.96)

Variable Definitions: See Tables 1 and 2

Looking across the leverage and inside equity equations, the evidence indicates that only LOGASSETS is related to both choice variables. NDTS is marginally significant in one of the leverage equations. This finding is not robust, however; when leverage is measured using book values of equity, NDTS is not statistically significant (not reported in Table 4).[14] This evidence suggests that, in general, the market imperfections affecting the split between debt and equity do not affect the split between inside equity and outside equity.[15]

[14] Bradley *et al.* (1984) suggest that NDTS may proxy for tangible assets. Consistent with this interpretation, they find a positive relation between leverage and NDTS. In general, an insignificant coefficient is found for NDTS. One possible explanation is that the current research includes a measure of cash flow in the equation. When the cash flow variable is omitted from the equation, however, the coefficient on NDTS continues to be insignificant.

[15] To examine whether these results are due to the relatively large size of the sample firms, the equations were reestimated using a sample that contains smaller firms. In particular, Compustat firms were

Table 4—Regression Results for Inside Equity (IE.BD) and Leverage (LEV) With and Without Industry Dummy Variables

	Dependent Variables (N=286)			
	IE.BD	IE.BD	LEV	LEV
Intercept	0.21 * (3.66)	0.12 (1.19)	0.60 * (9.19)	0.45 * (4.08)
LOGASSETS	-0.03 * (-3.39)	-0.03 * (-3.47)	-0.03 * (-3.03)	-0.02 ** (-2.24)
STDCF	0.30 (0.85)	-0.06 (-0.17)	-0.25 (-0.62)	-0.06 (-0.15)
FCF	0.31 (1.37)	0.36 (1.52)	-2.56 * (-10.02)	-2.57 * (-10.15)
RD	-0.40 (-1.25)	0.20 (0.50)	-1.69 * (-4.59)	-1.67 * (-3.76)
NDTS	1.24 * (2.62)	1.37 * (2.89)	-0.89 (-1.55)	-0.96 *** (-1.75)
adj. R^2	0.05	0.10	0.34	0.44
p-value for joint significance of industry dummy variables		0.01	0.01	

See Tables 1 and 2 for variable definitions
t-statistics in parentheses

* Indicates significance at the 0.01 level
** Indicates significance at the 0.05 level
*** Indicates significance at the 0.10 level

The conclusion that there is little evidence that inside equity and leverage share common determinants is consistent with recent studies by Jensen *et al.* (1992) and Holthausen and Larcker (1991). The current conclusions differ from Crutchley and Hansen (1989), however, who use a similar reduced form methodology. While the different results could be due to sample differences, some other potential explanations are investigated.

As shown in Table 4, cash flow (FCF) is found to be related highly to leverage, but not to inside equity. Because Crutchley and Hansen do not include a cash flow variable in their equations, this is one potential explanation for the different results. Omitting the cash flow variable from the current equations, however, does not change the result that inside equity and leverage do not share common determinants.

The other possible explanations investigated all concern the treatment of leverage. Crutchley and Hansen measure leverage as long-term debt relative to outside funds,

divided from the primary, supplementary, tertiary file into quartiles based on the value of assets. Fifty firms were selected randomly from each quartile. For these firms, inside equity was measured by the percentage of the firm owned by officers and directors as reported in 1981 proxy statements. Due to missing data, the final sample consisted of 76 firms. The average size of the firms in this sample is less than one-third the average size of the firms in the Fortune 500 sample. The regression results for this sample indicate that the only variable that is related to both inside equity and leverage is RD.

whereas other studies use long-term debt relative to total assets. As mentioned earlier, however, the current results are insensitive to this change in the leverage measure.

Crutchley and Hansen also use two independent variables that are related to leverage. In particular, they include DIVERSE, which is equal to the average excess return on equity divided by the standard deviation of equity, and STDRET, the standard deviation of equity returns. The inclusion of these variables in the current equations indicates that neither variable is related to inside equity, but that both variables are related significantly to leverage. DIVERSE has a negative coefficient and STDRET has a positive coefficient. The relation of these variables with leverage is not surprising, given that equity risk and return are related to financial leverage. Crutchley and Hansen also find that these variables are related to inside equity,[16] which explains in part their conclusion that inside equity and leverage share common determinants. This conclusion, however, is suspect given that equity risk is related algebraically to leverage.

OTHER RESULTS

The large negative coefficient on FCF in the leverage equations indicates that FCF has the potential to explain the large cross-sectional variation in debt ratios. For example, an increase in FCF of approximately one standard deviation (0.04) decreases the leverage ratio by approximately 10 percent [(0.04)(2.56)], all else equal.

Assuming FCF proxies for agency costs of free cash flow, the negative relation between FCF and LEV indicates that firms with greater potential agency costs of free cash flow use less debt. This finding is opposite of that predicted by Jensen (1986). Thus, the results suggest that the agency costs of free cash flow are not the primary determinant of a firm's use of debt. The negative relation between FCF and leverage is also difficult to reconcile with the traditional balancing theory of capital structure. Specifically, increased cash flow should result in lower expected bankruptcy costs and greater demand for tax shields. Both effects should contribute to greater use of debt under the balancing theory.

The strong negative relation between FCF and leverage ratios may result from slow adjustment by firms to their optimal leverage ratio. If firms with high cash flows also experience high equity values, then these firms may find themselves below their optimal leverage ratios. Given transaction costs, firms slowly adjust to their optimum by issuing debt at a later date. This adjustment process is more broadly consistent with the pecking order hypothesis, however, than it is with optimal capital structure theory (Myers, 1984). Thus, the results for FCF suggest that equilibrium capital structures are explained more by the pecking order hypothesis than by other market imperfections (Baskin, 1989).

For the inside equity equations, the coefficients of FCF are insignificant. The lack of relation between FCF and inside equity suggests that managers do not change their holdings as equity value increases due to cash flow retention. If high levels of internal cash flow increase the agency costs of outside equity, then higher inside ownership should be associated with higher levels of cash flow according to the free cash flow hypothesis. The results, however, suggest that firms with high free cash flow do not mitigate the agency problem with high inside ownership.

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[16] Demsetz and Lehn (1985) also find that STDRET is related to inside equity.

Bradley *et al.* (1984) indicate that a significant proportion of the cross-sectional variation in debt ratios is explained by industry factors. This result is cited as evidence that firms choose their capital structures on the basis of underlying costs and benefits that are similar within each industry. Consistent with this idea, an F-test rejects the hypothesis that the coefficients on the industry dummy variables are jointly zero in each of the equations in Table 4. Note, however, that the presence of the industry dummy variables does not affect materially the significance of the coefficient estimates on the other independent variables. This finding suggests that the same imperfections affect leverage ratios across industries as within industries.

With respect to the inside equity equations in Table 4, two industry dummy variables are consistently positive and statistically significant. Similar to Demsetz and Lehn (1985), firms in the publishing industry have higher inside ownership. In addition, firms in the mining business have higher inside ownership.

SUMMARY AND CONCLUSION

This paper examines whether inside equity and leverage are explained by a common set of market imperfections. Both inside equity and leverage are regressed on the same set of firm characteristics proxying for market imperfections. Firm size, research and development expenditures, and the availability of internal funds are found to be associated significantly with leverage. The most important determinant of leverage in terms of economic and statistical significance is a firm's availability of internal funds. The higher is the availability of internal funds, the lower is leverage. This result strongly supports Myers' (1984) pecking order hypothesis and confirms the results of Baskin (1989). Jensen (1986) predicts that the agency costs of free cash flow can be mitigated by greater use of debt and higher inside ownership. The strong negative relation between leverage and free cash flow and the insignificant relation between inside equity and free cash flow is inconsistent with Jensen's hypothesis. The only significant variable in the current research in explaining the cross-sectional variation in both inside equity and leverage is firm size. Thus, the results provide little evidence that inside equity and leverage share common determinants.

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