

Changes in Corporate Debt Policy: Information Asymmetry and Agency Factors

by Claire E. Crutchley, Auburn University and Marlin R.H. Jensen, Auburn University

Abstract

This paper tests how changes in information asymmetry and agency variables affect changes in debt policy. Unlike previous studies that examine levels of variables to explain what may determine debt policy, we calculate yearly changes in variables to provide a stronger test of causal relations. By examining changes in agency and information variables, we are able to identify factors that cause firms to change their optimal capital structure. We find institutional ownership has become a substitute for debt financing due to increased shareholder activism. In addition, we find support for Jensen's free cash flow theory, mixed support for informational asymmetry, and no support for Jensen and Meckling's agency model.

I. Introduction

Traditional finance theory suggests that firms choose debt policy based on the tax advantage of debt financing and potential bankruptcy costs of using too much debt. In recent years, other theories have been introduced to explain the firm's choice of debt. Agency theory says the use of debt can reduce agency problems (see Jensen and Meckling (1976) and Jensen (1986)). Informational asymmetry implies a pecking order, that firms choose first internal equity, then debt, then external equity (see Myers and Majluf (1984) and Myers (1984)). Harris and Raviv (1991) summarize much of the current theoretical and empirical literature on the firm's capital structure; they gather many testable hypotheses of agency theory and information asymmetry. These two theories have differing predictions regarding the firm's debt policy that allow us to empirically test between the two theories.

Agency theory suggests that the lower the managerial ownership of the firm, the greater the need for monitoring activities since management has an incentive to consume excess perquisites or invest in large projects for ego rather than profitability. Debt is a possible avenue for monitoring this problem. Jensen and Meckling (1976) show that debt could be used to lower the need for external equity capital which would increase managerial percentage ownership in the firm. Jensen and Meckling also hypothesize that manager/owners of the firm will bear the full costs of agency problems so they will have an incentive to reduce agency costs in any way possible. Because debt allows managers to own a greater portion of the firm, there is a predicted positive relationship between the change in leverage and the change in managerial ownership.

Jensen (1986) says managers may use excess or free cash flow to invest in negative NPV projects because they would rather be managers of larger firms. This problem is especially bad in firms who are mature and have few growth opportunities, as they have few profitable investments. However, by increasing debt with its required interest pay-

ments, managers are "bonding their promise to pay out future cash flows". Jensen indicates that firms with excess cash flows and low growth opportunities will use more debt financing for monitoring purposes. Thus, there is a predicted positive relationship between the change in debt usage and the change in the free cash flow of the firm, and a predicted negative relationship between the change in growth opportunities and the change in leverage.

While managerial owners reduce agency costs, outside monitors such as institutional owners can also monitor the firm. With a large proportion of stock held by institutions, there is less need for debt as a monitoring device. Grier and Zychowicz (1994) suggest that institutional investors are more likely to have advantages in monitoring management through their research capabilities than individual investors. Therefore, institutional investors may help in reducing the firm's agency costs and become a substitute for debt if institutions can monitor managerial activities at a low cost.¹ Therefore, we expect a negative relationship between the change in institutional ownership and the change in debt based on the joint hypothesis that both debt and institutional ownership are bonding mechanisms.

Harris and Raviv (1990) present an information asymmetry theory which suggests that debt issuance also has informational consequences. First, simply being able to meet interest obligations sends information to the marketplace. Second, debt is a monitoring device that has the capability of forcing a firm into default, allowing creditors to force change. Therefore, firms with less information can use debt to reduce these agency problems. A negative relationship is predicted between the change in leverage and the change in level of information available about the firm. Both Jensen (1986) and Harris and Raviv hypothesize a monitoring role for debt; these models predict debt reduces agency costs and, therefore, that debt is a substitute for managerial ownership rather than the complement assumed by the Jensen & Meckling (1976) model. In addition, these models would predict that the change in debt would be positively related to changes in variables proxying for agency costs.

Other information asymmetry models assume managers or insiders of a firm possess more information regarding the future investment opportunities than outside investors. Ross (1977) suggests that higher quality firms would signal their quality to the marketplace through the issuance of debt. Therefore, increases in debt signal the firm is of high quality because low quality firms could not afford to imitate this action due to high bankruptcy costs. There is a predicted negative relationship between the change in leverage and the change in profitability of the firm. Myers and Majluf (1984) introduced an asymmetric information model which results in a pecking order regarding how a firm finances its future projects. Firms will first use cash and risk free debt (referred to as financial slack) to finance their projects before turning to external funding. In their model, financing is determined by the mispricing of securities in the market. The less that is known about a firm, the greater the potential for mispricing. They argue that because of the asymmetric information problem, firms will first finance projects internally, then with low risk debt, and finally with equity.

Informational asymmetry models imply the less that is known regarding the firm, the more monitoring is needed. Therefore, we predict a negative relationship between the

change in debt financing and the change in the degree of information known by the market regarding the firm. If the presence of institutional owners leads to more information being known about the firm, the asymmetric information model would predict a negative relationship between the change in leverage and the change in institutional ownership. If insiders are providing a monitoring service leading to more information regarding the firm, we would also expect a negative relationship between the change in leverage and the change in insider ownership. Ross' signalling theory implies that firms which have high potential profits will have higher leverage. An implication of the Myers and Majluf informational asymmetry model concerns the firm's use of excess cash. Unlike Jensen's (1986) free cash flow model which implies increased debt usage, the informational asymmetry model would imply firms use excess cash for financing internally or to build up financial slack. Therefore, a negative relationship between the change in debt financing and the change in free cash flow is predicted.

Informational asymmetry and agency theory lead to differing conclusions as to how much debt a firm should utilize. Agency theory predicts increases in leverage when free cash flow increases while informational asymmetry says that managers should hold excess cash, slack, as a substitute for outside debt or equity so predicts the opposite sign. Jensen and Meckling's (1976) agency theory predicts increasing leverage when more is known about a firm, as managerial ownership will be increased, while informational asymmetry would indicate the less information, the more debt will be utilized. In addition, the Jensen and Meckling agency monitoring would predict a positive relationship between the firm's debt level and managerial or institutional ownership of the firm while both information asymmetry and the debt monitoring theories of Jensen (1986) and Harris and Raviv (1990) predict a negative relationship.

II. Previous Empirical Research

Previous studies determining the firms' debt policy have focused on levels of exogenous and endogenous variables to explain the level of debt the firm utilizes. Overall, studies have found evidence of both agency and informational asymmetry factors.

Recent studies have shown that institutional ownership and managerial ownership can reduce agency problems (see Morck, Shleifer, and Vishny (1988), McConnell and Servaes (1988), and Grier and Zychowicz (1994)). The evidence on the relationship between leverage and managerial ownership is mixed. Kim and Sorensen (1986) find a positive relationship between managerial holdings and leverage when controlling for the industry; Friend and Lang (1988) and Jensen, Solberg, and Zorn (1992) find a negative relationship between managerial ownership and leverage. Grier and Zychowicz find that institutional ownership is negatively related to debt financing. This negative relationship supports the idea that leverage and institutional ownership are substitutes in controlling agency costs. If institutional ownership proxies for information, it supports the idea that firms with less information asymmetry have lower debt financing.

Evidence about the relationship between the level of debt and free cash flow supports information asymmetry rather than Jensen's free cash flow hypothesis. Chaplinsky and Niehaus (1993) find a significant negative relationship between the free cash flow and leverage. Examining whether information regarding the firm affects the debt policy of the

firm has not been directly tested. Indirect testing has been done by examining the amount of research and development the firm does and the potential growth opportunities. The more research and development expenditures and the greater the potential growth of the firm, the less information known about the firm. Bradley, Jarrell, and Kim (1984), Long and Malitz (1985), Kim and Sorensen (1986), Crutchley and Hansen (1989), and Grier and Zychowicz (1994) find evidence consistent with informational asymmetry because research and development expenditures are negatively related to debt levels. However, Kester (1986) finds a positive relationship between debt levels and potential growth opportunities, consistent with agency theory.

Consistent with traditional theory, studies by Friend and Lang (1988), Titman and Wessels (1988), Bathala, Moon, and Rao (1994), and Grier and Zychowicz (1994) have shown levels of debt to be negatively related to profitability. However, Long and Malitz (1985) find no relationship between debt and profitability.

Our study goes beyond the earlier studies to examine year to year changes in independent variables to explain year to year changes in debt policy. When examining levels of debt ratios and exogenous and endogenous variables, much of the level of the firm's debt ratio could be due to past factors or industry norms. In contrast, this study focuses on how changes in exogenous and endogenous variables cause managers to adjust debt ratios. As debt ratios change slightly over time this should provide a stronger test as to which variables lead to certain capital structure choices. Another advantage to using changes is that it reduces the collinearity between independent variables (see O'Brien and Bhushan (1990)).

III. Sample and Methodology

A. Sample Selection

The sample is a cross section of three data bases. The firms were required to be NYSE or AMEX listed industrial firms on Compustat, CRSP, and Disclosure for the time period 1987-1991. Financial data is taken from the Compustat data file, and ownership information is taken from the Disclosure data file. The CRSP database is used to calculate betas for each firm for each year.

B. Methodology

1. Model

We examine the relationship between changes in independent variables and changes in firm debt ratios. $DEBT_{i,t}$ is the change in the debt ratio for each firm from year to year.² Each firm has a maximum of four observations, the debt change from 1987 to 1988, from 1988 to 1989, from 1989 to 1990, and from 1990 to 1991. The yearly change in debt of the firms is regressed on nine proxy variables:

$$\Delta DEBT_{i,t} = \alpha_{i,t} + \beta_{1,i} \Delta DEPR_{i,t} + \beta_{2,i} \Delta DBETA_{i,t} + \beta_{3,i} \Delta SIZE_{i,t} + \beta_{4,i} \Delta CASHFLOW_{i,t} + \beta_{5,i} \Delta ROA_{i,t} + \beta_{6,i} \Delta INSIDER_{i,t} + \beta_{7,i} \Delta INST_{i,t} + \beta_{8,i} \Delta \#INST_{i,t} + \beta_{9,i} \Delta R\&D_{i,t} + \varepsilon_{i,t} \quad (1)$$

where the change (Δ) in the variable X of firm i at year t is defined as:

$$\Delta X_{i,t} = \ln(X_{i,t}) - \ln(X_{i,t-1})$$

for all variables.

The specific variable definitions are as follows:

- $\Delta DEBT_{i,t}$ = Δ ratio of long term debt divided by long term debt plus the market value of equity of firm i for year t.
- $\Delta DEPR_{i,t}$ = Δ ratio of depreciation divided by earnings before depreciation, interest, and taxes of firm i for year t.
- $\Delta DBETA_{i,t}$ = Δ daily equity beta times one minus the debt ratio of firm i for year t.
- $\Delta SIZE_{i,t}$ = Δ total assets of firm i for year t.
- $\Delta CASHFLOW_{i,t}$ = Δ ratio of earnings before interest, taxes and depreciation less interest, taxes and dividends divided by market value of equity of firm i for year t.
- $\Delta ROA_{i,t}$ = Δ ratio of earnings before interest taxes and depreciation divided by total assets of firm i for year t.
- $\Delta INSIDER_{i,t}$ = Δ percentage of stock held by the officers and directors of firm i for year t.
- $\Delta INST_{i,t}$ = Δ percentage of stock held by institutions of firm i for year t.
- $\Delta \#INST_{i,t}$ = Δ number of institutions holding the stock of firm i for year t.
- $\Delta R\&D_{i,t}$ = Δ ratio of research and development of the firm divided by sales of firm i for year t.

2. Independent Variables Employed

The first three factors analyzed are control variables which have been found to be important in previous studies of levels of leverage (see Bradley, Jarrell, and Kim (1984), Titman and Wessels (1988), Bathala, Moon, and Rao (1994), or Grier and Zychowicz (1994)). We include changes in these control variables in the analysis to determine whether

they have the same relationship with changes in leverage as the earlier studies found using variable levels. $\Delta DEPR_{i,t}$ represents the change in the firm's depreciation tax shield. DeAngelo and Masulis (1980) argue that the greater the depreciation tax shield, the lower the firm's debt level as there is less need for interest tax shields. Therefore, a negative relationship is expected between $\Delta DEBT_{i,t}$ and $\Delta DEPR_{i,t}$. Our second traditional variable ($\Delta DBETA_{i,t}$) represents the annual change in business risk of the firm and is measured as the firm's delevered beta. Other studies have shown the greater the business risk of the firm, the less debt financing the firm will have (see Friend and Lang (1988), Crutchley and Hansen (1989) or Grier and Zychowicz (1994)). Therefore, we predict changes in delevered beta will cause indirect changes in leverage: a negative relationship between $\Delta DEBT_{i,t}$ and $\Delta DBETA_{i,t}$ is expected.³ The final traditional variable is the size of the firm, $\Delta SIZE_{i,t}$ (see Friend and Lang (1988), Crutchley and Hansen (1989), or Grier and Zychowicz (1994)). Friend and Lang argue, among others, that the larger the size of the firm, the more debt financing they will be able to use as there is easier access to the credit markets. We predict a positive relationship between $\Delta DEBT_{i,t}$ and $\Delta SIZE_{i,t}$ as when a firm increases in size the cost of debt falls allowing the firm to increase its level of debt.

Jensen's (1986) free cash flow theory predicts that firms with excess cash will use more debt financing, whereas the pecking order theory implies that excess cash would be used to fund projects or be held for future needs. $\Delta CASHFLOW_{i,t}$ is our proxy for the firm's change in free cash flow. Our measure is the same cash flow variable Lehn and Poulsen (1989) use in their study, and is similar to that used by Chaplinsky and Niehaus (1993). If Jensen's theory is correct, there should be a positive relationship between changes in leverage and changes in free cash flow; and if the pecking order theory is correct, there would be a negative relationship between changes in debt and changes in free cash flow.

Ross's (1977) leverage signalling would predict that increases in profitability would be followed by increases in leverage as the firm signals it is of high quality. The pecking order hypothesis predicts a negative relationship between leverage and profitability as more profitable firms will retain more earnings and therefore will have less of a need for outside debt. We use return on assets, $\Delta ROA_{i,t}$, for the firm to measure profitability. A positive relationship between the change in debt levels and the change in the return on assets is expected according to Ross, but a negative relationship is expected by pecking order theory.

The change in the percent of stock held by insiders, $\Delta INSIDER_{i,t}$, is utilized to examine whether inside ownership and debt are substitutes or complements. In the Jensen and Meckling (1976) agency framework, increasing debt allows insiders to own more of the stock of a company, therefore a positive relationship is expected between leverage and insider ownership. However, the debt monitoring hypothesis of Jensen (1986) and Harris and Raviv (1990) and information asymmetry models would predict a negative relationship between debt and insider ownership.

When institutions increase their stock holdings this may provide a monitoring function allowing firms to hold less debt. If the main factor in determining debt levels and institutional ownership is agency problems, a negative relationship is expected as debt levels and institutional ownership are substitutes in controlling agency costs. $\Delta INST_i$ is

measured as the annual change in the percentage of the stock held by institutional owners as reported in Disclosure. In addition, the changes in the actual number of institutions, $\Delta\#INST_{i,t}$, that buy into each firm is examined as an information variable. Institutions are legally required to become knowledgeable about any company they invest in so that they can make informed proxy votes since 1988.⁴ Therefore, we expect that when more institutions buy the stock of a company, more information will be available in the market. Those firms which have large increases in the numbers of institutions holding the stock are expected to have decreases in informational asymmetry so a negative relationship between changes in number of institutions and leverage is expected.

We employ the annual change in the firm's research and development ($\Delta R\&D_{i,t}$) divided by the sales, to represent the firm's investment opportunities. Myers (1984) argues the greater the growth potential of the firm, the lower the firm's debt level because management will preserve borrowing capacity to finance potential growth. Therefore, a negative relationship is expected between $\Delta DEBT_{i,t}$ and $\Delta R\&D_{i,t}$ according to informational asymmetry. Jensen and Meckling's (1976) model also predicts a negative relationship between debt and growth. However, firms with high R&D are difficult to monitor. If leverage is providing a monitoring device, agency theory would predict a positive relationship between leverage and R&D.

Table 1 lists descriptive statistics for the level of the variables by year even though the regression analysis will use changes in the variables. Notice that the average of most variables is consistent over our time period. However, it is of interest that both the percentage of stock held by institutional investors as well as the average number of institutions investing in the firms is growing over the time period. This evidence is consistent with the monitoring role of institutional investors growing in importance over time.

IV. Empirical Results

The first set of ordinary least squares regression results are reported in Table 2. Equations 1 through 4 include only one year of changes over time while equation 5 pools the annual changes for each of the four years.⁵ We estimate a regression for each yearly change as we believe the role of institutions has changed over the four year time period. For most variables the yearly results in equations 1 through 4 are very consistent with the pooled changes reported in equation 5. Overall we find changes in size and free cash flow to be consistently positively related to leverage; we find changes in delevered beta and number of institutional holders to be consistently negatively related to leverage. Changes in institutional ownership are negatively related to leverage in the pooled regression, but the result is driven by institutional ownership changes in 1989-1990 and 1990-1991 regressions. There is no significant relationship between either depreciation tax shields or insider ownership and leverage.⁶

Table 3 adds the change in research and development expenditures ($\Delta R\&D_{i,t}$) into the regression analysis, which reduces the number of observations. We find a significant positive relationship between changes in R&D and changes in leverage in the two later years and in the pooled regression. Including research and development decreases the sample size by more than a third because many firms do not report R&D. However, neither

TABLE 1. Means and standard deviations of the levels of the variables analyzed by year. (Standard deviations in parentheses.)

Variable ^a	1987 N = 859	1988 N = 923	1989 N = 940	1990 N = 901	1991 N = 968
DEBT	0.246 (0.204)	0.251 (0.207)	0.251 ^d (0.216)	0.292 ^{d,e} (0.239)	0.256 ^e (0.227)
DEPR	0.467 (1.127)	0.460 (1.093)	0.476 (0.912)	0.684 (4.693)	0.874 (4.593)
DBETA	0.597 (0.285)	0.617 ^b (0.405)	0.566 ^b (0.424)	0.564 (0.420)	0.543 (0.408)
SIZE (in millions)	2147.67 (6397.79)	2097.35 (6719.87)	2159.53 (6988.03)	2177.36 (6270.49)	2425.88 (8256.76)
CASHFLOW	0.175 (0.185)	0.154 (0.286)	0.147 ^d (0.198)	0.217 ^{d,e} (0.273)	0.162 ^e (0.216)
ROA	0.153 (0.080)	0.153 (0.087)	0.148 (0.076)	0.146 ^f (0.073)	0.138 ^f (0.073)
INSIDER	0.173 (0.208)	0.196 (0.355)	0.179 (0.208)	0.185 (0.230)	0.176 (0.234)
INST	0.382 (0.245)	0.376 ^e (0.257)	0.401 ^e (0.282)	0.405 ^f (0.245)	0.435 ^f (0.266)
#INST	98	95	100	103	112
R&D	N = 534 0.029 (0.035)	N = 565 0.029 (0.036)	N = 567 0.031 (0.044)	N = 547 0.032 (0.044)	N = 604 0.034 (0.046)

^a DEBT is the ratio of long term debt divided by long term debt plus the market value of equity; DEPR is the ratio of depreciation divided by the earnings before depreciation, interest, and taxes; DBETA is the delevered beta of the firm; SIZE is the firm's total assets; CASHFLOW is the ratio of the cashflow of the firm divided by the market value of equity; ROA is the ratio of earnings before interest taxes and depreciation divided by total assets; INSIDER is the percentage of stock held by insiders; INST is the percentage of stock held by institutions; #INST is the number of institutions that have purchased stock; and R&D is the ratio of research and development expenditures divided by sales.

^b The mean variable in 1988 is significantly different from the mean variable in 1989 at the 0.01 level.

^c The mean variable in 1988 is significantly different from the mean variable in 1989 at the 0.05 level.

^d The mean variable in 1989 is significantly different from the mean variable in 1990 at the 0.01 level.

^e The mean variable in 1990 is significantly different from the mean variable in 1991 at the 0.01 level.

^f The mean variable in 1990 is significantly different from the mean variable in 1991 at the 0.05 level.

TABLE 2. Cross-sectional regression estimates of the yearly change in the debt level on yearly changes in the independent variables. (T-statistics are in parentheses.)

Variable ^a	(1) Change from 1987 to 1988	(2) Change from 1988 to 1989	(3) Change from 1989 to 1990	(4) Change from 1990 to 1991	(5) Pooled Yearly Changes
Intercept	0.004 (1.362)	-0.011*** (-3.881)	0.024*** (8.290)	-0.026*** (-8.686)	-0.002 (-1.101)
Δ DEPR	0.007 (0.698)	0.011 (0.917)	-0.005 (-0.480)	0.002 (0.296)	0.004 (0.878)
Δ BETA	-0.049*** (-6.634)	-0.041*** (-5.004)	-0.023*** (-3.135)	-0.055*** (-6.220)	-0.040*** (-9.796)
Δ SIZE	0.048*** (9.764)	0.105*** (11.324)	0.036*** (3.020)	0.060*** (4.224)	0.061*** (14.178)
Δ CASHFLOW	0.147*** (5.051)	0.136*** (5.580)	0.142*** (6.943)	0.052*** (2.875)	0.135*** (12.769)
Δ ROA	-0.426*** (-6.197)	-0.287*** (-3.814)	-0.470*** (-6.207)	-0.402*** (-4.946)	-0.406*** (-10.619)
Δ INSIDER	0.008 (0.391)	-0.008 (-0.237)	0.015 (0.738)	-0.009 (-0.338)	0.005 (0.357)
Δ INST	-0.028 (-0.836)	0.042 (1.132)	-0.070** (-2.135)	-0.100*** (-2.885)	-0.065*** (-3.648)
Δ #INST	-0.085*** (-7.088)	-0.119*** (-9.778)	-0.066*** (-5.111)	-0.079*** (-6.435)	-0.084*** (-13.571)
N	772	849	857	938	3416
Adjusted R ²	0.300	0.344	0.189	0.197	0.253
F-statistic	42.305	56.593	25.960	29.675	145.318

^a Δ DEPR is the annual change of depreciation divided by the earnings before depreciation, interest, and taxes; Δ BETA is the annual change in the delevered beta of the firm; Δ SIZE is the annual change of the total assets; Δ CASHFLOW is the annual change of the cashflow of the firm divided by the market value of equity; Δ ROA is the annual change in earnings before interest, taxes and depreciation divided by total assets; Δ INSIDER is the annual change in the percentage of stock held by insiders; Δ INST is the annual change in the percentage of stock held by institutions; and, Δ #INST is the annual change in the number of institutions that have purchased stock.

* The coefficient is significantly different from zero at the 0.10 level.

** The coefficient is significantly different from zero at the 0.05 level.

*** The coefficient is significantly different from zero at the 0.01 level.

TABLE 3. Cross-sectional regression estimates of the yearly change in the debt level on yearly changes in the independent variables. (T-statistics are in parentheses.)

Variable ^a	(1) Change from 1987 to 1988	(2) Change from 1988 to 1989	(3) Change from 1989 to 1990	(4) Change from 1990 to 1991	(5) Pooled Yearly Changes
Intercept	0.003 (1.009)	-0.011*** (-3.017)	0.024*** (6.171)	-0.026*** (-7.644)	-0.004** (-2.174)
ΔDEPR	-0.023 (-1.433)	-0.006 (-0.356)	-0.015 (-1.132)	-0.008 (-0.838)	-0.008 (-1.321)
ΔDBETA	-0.041*** (-4.725)	-0.038*** (-3.631)	-0.029*** (-2.977)	-0.039*** (-3.849)	-0.033*** (-6.694)
ΔSIZE	0.055*** (4.536)	0.124*** (9.951)	0.048** (2.526)	0.071*** (3.870)	0.087*** (11.483)
ΔCASHFLOW	0.167*** (4.571)	0.105*** (3.199)	0.106*** (3.944)	0.133*** (4.675)	0.161*** (10.900)
ΔROA	-0.623*** (-6.057)	-0.446*** (-4.043)	-0.532*** (-4.661)	-0.501*** (-4.831)	-0.522*** (-9.676)
ΔINSIDER	-0.001 (-0.043)	-0.011 (-0.266)	-0.001 (-0.018)	0.086** (2.229)	0.021 (1.365)
ΔINST	-0.035 (-0.927)	0.003 (0.063)	-0.025 (-0.498)	-0.101** (-2.376)	-0.066*** (-2.866)
Δ#INST	-0.070*** (-4.698)	-0.102*** (-6.334)	-0.078*** (-3.981)	-0.082*** (-5.590)	-0.084*** (-10.394)
ΔR&D	-0.164 (-0.413)	0.390 (0.980)	0.554* (1.703)	1.217*** (4.070)	0.702*** (4.023)
N	471	509	517	577	2074
Adjusted R ²	0.271	0.340	0.162	0.266	0.265
F-statistic	20.439	30.089	12.085	24.230	84.023

^a ΔDEPR is the annual change of depreciation divided by the earnings before depreciation, interest, and taxes; ΔDBETA is the annual change in the delevered beta of the firm; ΔSIZE is the annual change of the total assets; ΔCASHFLOW is the annual change of the cashflow of the firm divided by the market value of equity; ΔROA is the annual change in earnings before interest, taxes and depreciation divided by total assets; ΔINSIDER is the annual change in the percentage of stock held by insiders; ΔINST is the annual change in the percentage of stock held by institutions; Δ#INST is the annual change in the number of institutions that have purchased stock; and, ΔR&D is the annual change of research and development expenditures divided by sales.

* The coefficient is significantly different from zero at the 0.10 level.

** The coefficient is significantly different from zero at the 0.05 level.

*** The coefficient is significantly different from zero at the 0.01 level.

the inclusion of the variable or the decrease in sample size affects the relationships found in Table 2.

The results regarding control variables in both tables are similar to previous studies that examined levels of variables. Traditional finance theory suggests that firms cannot borrow too much because of bankruptcy costs leading to the prediction that the higher the risk of the firm, the lower the amount of debt financing the firm will employ. Consistent with this view, we find a negative relationship between the change in the debt and the change in business risk ($\Delta DBETA_{i,t}$) of the firm. This is consistent with studies by Bradley, Jarrell, and Kim (1984), Friend and Lang (1988), and Jensen, Solberg, and Zorn (1992) who all find a negative relationship between leverage and operating risk. In addition, we find that larger firms are able to handle a larger amount of debt financing. We find a positive relationship between the change in debt and the change in the size ($\Delta SIZE_{i,t}$) of the firm. This is opposite of the finding by Chaplinsky and Niehaus (1993) who find a negative relationship between actual size and level of the debt ratio, but is consistent with Grier and Zychowicz (1994).

Consistent with agency theory and the pecking order hypothesis but inconsistent with the Ross's signalling model, we find that as profitability ($\Delta ROA_{i,t}$) declines, firms increase the amount of debt financing. Many studies find this negative relationship including Bradley, Jarrell, and Kim (1984), Friend and Lang (1988), Jensen, Solberg, and Zorn (1992) and Grier and Zychowicz (1994). If managers do not adjust their debt ratio in response to earnings, an explanation for this relationship is that as profits are retained in the firm, the book value of equity rises so the debt ratio falls. In contrast, as free cash flow ($\Delta CASHFLOW_{i,t}$) increases debt financing increases, consistent with Jensen's free cash flow theory. This result is again opposite to that found in Chaplinsky and Niehaus (1993). The differences between what our paper and Chaplinsky and Niehaus could be due to our study controlling for profitability, using changes rather than levels of variables, and using a later time period. While free cash flow and profitability are similar, the free cash flow measure takes fixed obligations out of the operating profits of the firm; taxes, interest expense and both preferred and common dividends are subtracted from operating profits.⁷ The positive relationship between $\Delta R\&D_{i,t}$ and changes in debt in the last two years show support for the agency theory of debt monitoring rather than information asymmetry or traditional Jensen and Meckling agency theory. If increases in R&D cause decreases in information, the less that is known about the firm the more debt financing the firm utilizes. If changes in R&D proxy for changes in growth, then the positive result in equations 3, 4 and 5 show high growth firms use more debt; this is also inconsistent with information asymmetry.

There is no evidence that insiders are either substitutes or complements of debt. Changes in insider holdings over the 5 year period seem to have no effect on changes in leverage. This does not support the traditional Jensen and Meckling agency theory. There has been mixed evidence of a significant relationship between insider ownership and leverage by other studies; Jensen, Solberg, and Zorn (1992) find a negative relationship, while Grier and Zychowicz (1994) find a positive relationship. The evidence we find in the last two years of a negative relationship between changes in institutional owners and changes in leverage is consistent with the agency prediction that monitoring by institutions can substitute for debt. The fact that this relationship only happens in the final years of

the sample is consistent with anecdotal evidence that institutions are becoming more active in monitoring the firms in which they hold stock. This negative relationship is also found in Grier and Zychowicz (1994). The evidence on the number of institutions being negatively related to debt provides support for informational asymmetry. The higher the number of institutions, the more that is known about a firm so the firm is able to take on more risky debt.

V. Conclusions and Implications

The role of debt in mitigating agency costs has generated a great deal of attention in the literature. The objective of this study is to further analyze the influence of agency theory and informational asymmetry on debt policy. Unlike previous debt policy studies that examine the level of firm debt, we examine yearly changes in debt financing to determine what factors lead to the firm's choice of capital structure. In addition, we examine the impact of institutional owners using data from 1987 to 1991, a period when institutions became much more active in corporate governance. We find that changes in institutional owners do significantly affect debt policies of companies especially in the early 1990's. This is evidence that institutions, through shareholder activism, are making a difference in how companies are managed.

An important finding of this study is that changes in free cash flow lead to positive changes in leverage which is support for Jensen's free cash flow theory of leverage. When examining levels of free cash and levels of leverage, other authors have not found this relationship. Another important finding is that increases in institutional ownership in the early 1990's have led to decreases in leverage supporting the idea that leverage and institutional ownership have become substitutes in controlling agency costs. In contrast, by examining changes, we find no evidence that insider ownership is either a substitute or a complement of leverage. Finally, we use a new information variable, the number of institutions, and find that firms with low information asymmetry have higher leverage ratios. Putting all of the findings together, we find evidence fully consistent with Jensen's free cash flow theory and mixed results testing informational asymmetry theory. However, we find little support for the traditional Jensen and Meckling agency model or the Ross signalling model.

Footnotes

1. O'Barr and Conley (1992) report that institutional investors have increased their ownership in firms from 38% to 53% in 1990. Over this period, institutions have also increased their influence over corporate decision making as evidenced by the activism of the California Public Employees Retirement System (CALPERS).

2. We calculate the debt ratio the same way as Chaplinsky and Niehaus (1993) who use long term debt to market value of the firm. One reason for using long term debt rather than total debt is to have the debt ratio reflect risky debt rather than the risk free debt referred to as part of slack in Myers and Majluf (1984). We also looked at total debt to market value of the firm, and found results similar to those reported.

3. Previous studies use standard deviation of operating earnings as a measure of business risk which requires several years of data; since we do year to year changes we only have one year of data available. Therefore, we calculate the daily stock beta, but by delevering, we take out any financial risk from the beta measure.

4. In 1988, the US Department of Labor issued a statement commonly known as the Avon Letter which stated that "the decision as to how proxies should be voted... are [sic] fiduciary acts of plan asset management" (O'Barr and Conley (1992), page 183).

5. Since we are examining annual changes rather than levels of variables, there is low correlation between the variables. In addition, we test for multicollinearity using variance inflation factors (VIF) in the regression analysis, and we do not find a problem. The VIFs are all less than 2.

6. Since we do not find the predicted negative relationship, similar to Grier and Zychowicz (1994), we also examined the annual change in gross property, plant, and equipment to see if our sample of firms have a high degree of fixed assets that would enhance borrowing capacity of the firm. Unlike Grier and Zychowicz who find a significant positive relationship, we find an insignificant relationship between the change in debt and the change in property, plant, and equipment.

7. While this free flow measure includes interest which is obviously correlated with the level of debt, the relationship is opposite to what would be expected: increases in interest cause decreases in free cash flow, but the relationship between changes in free cash flow and leverage are positive, so this correlation does not appear to be a problem.

References

- Aggarwal, R., and R.P. Rao. "Institutional Ownership and Distribution of Equity Returns," *Financial Review*, 25 (May 1990), 211-230.
- Bathala, C.T., K. Moon, and R.P. Rao. "Managerial Ownership, Debt Policy and the Impact of Institutional Holdings: An Agency Perspective," *Financial Management*, 23 (Autumn 1994), 38-50.
- Bradley, M., G.A. Jarrell, and E.H. Kim. "On the Existence of an Optimal Capital Structure: Theory and Evidence," *Journal of Finance*, 39 (July 1984), 857-880.
- Brickley, J.A., R.C. Lease, and C.W. Smith. "Ownership Structure and Voting on Antitakeover Amendments," *Journal of Financial Economics*, 20 (January/March 1988), 267-291.
- Chaplinsky, S., and G. Niehaus. "Do Inside Ownership and Leverage Share Common Determinants?" *Quarterly Journal of Business and Economics*, 32 (Autumn 1993), 51-65.
- Crutchley, C.E., and R.S. Hansen. "A Test of the Agency Theory of Managerial Ownership, Corporate Leverage, and Corporate Dividends," *Financial Management*, 18 (Winter 1989), 36-46.
- DeAngelo, H., and R. Masulis. "Optimal Capital Structure Under Corporate and Personal Taxation," *Journal of Financial Economics*, 8 (March 1980), 3-29.
- Friend, I., and L. Lang. "An Empirical Test of the Impact of Managerial Self-Interest on Corporate Capital Structure," *Journal of Finance*, 43 (June 1988), 271-281.
- Grier, P., and E. J. Zychowicz. "Institutional Investors, Corporate Discipline, and the Role of Debt," *Journal of Economics and Business*, 46 (February 1994), 1-11.
- Harris, M., and A. Raviv. "Capital Structure and the Informational Role of Debt," *Journal of Finance*, 45 (June 1990), 321-349.
- Harris, M., and A. Raviv. "The Theory of Capital Structure," *Journal of Finance*, 46 (March 1991), 297-355.
- Jensen, M.C. "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers," *American Economic Review*, 76 (May 1986), 323-329.
- Jensen, M.C., and W.H. Meckling. "Theory of the Firm: Managerial Behavior, Agency Costs and Capital Structure," *Journal of Financial Economics*, 3 (October 1976), 305-360.
- Jensen, G.R., D.P. Solberg, and T.S. Zorn. "Simultaneous Determination of Insider Ownership, Debt, and Dividend Policies," *Journal of Financial and Quantitative Analysis*, 27 (June 1992), 247-263.

Lehn, K., and A. Poulsen. "Free Cash Flow and Stockholder Gains in Going Private Transactions," *Journal of Finance*, 44 (July 1989), 771-787.

Long, M., and I. Malitz. "The Investment-Financing Nexus: Some Empirical Evidence," *Midland Corporate Finance Journal*, 3 (March 1985), 53-59.

McConnell, J.J., and H. Servaes. "Additional Evidence on Equity Ownership and Corporate Value," *Journal of Financial Economics*, 27 (October 1990), 595-612.

Mitra, D. "The Impact of Firm Size, Institutional Holding and Exchange Listing on Equity Returns Variance During Dividend Initiation Announcements," (October 1993) Financial Management Association Annual Meeting.

Morck, R., A. Shleifer, and R.W. Vishny. "Management Ownership and Market Valuation: An Empirical Analysis," *Journal of Financial Economics*, 20 (January/March 1988), 293-315.

Myers, S.C. "The Capital Structure Puzzle," *Journal of Finance*, 39 (July 1984), 575-592.

Myers, S.C., and N.S. Majluf. "Corporate Financing and Investment Decisions When Firms have Information that Investors Do Not Have," *Journal of Financial Economics*, 13 (June 1984), 187-221.

O'Barr, W.M., and J.M. Conley. *Fortune and Folly: The Wealth and Power of Institutional Investing*. Irwin, Homewood, Illinois (1992).

O'Brien, P., and R. Bhushan. "Analyst Following and Institutional Ownership," *Journal of Accounting Research*, 28 (Supplement 1990), 55-76.

Pound, J. "Proxy Contests and the Efficiency of Shareholder Oversight," *Journal of Financial Economics*, 20 (January/March 1988), 237-265.

Ross, S. "The Determination of Financial Structures: The Incentive Signalling Approach," *Bell Journal of Economics*, 8 (Spring 1977), 23-40.

Titman, S., and R. Wessels. "The Determinants of Capital Structure Choice," *Journal of Finance*, 43 (March 1988), 1-19.

Zeckhauser, R.J., and J. Pound. "Are Large Shareholders Effective Monitors? An Investigation of Share Ownership and Corporate Performance," In *Asymmetric Information, Corporate Finance, and Investment*, edited by R.G. Hubbard, University of Chicago Press, (1990), 149-180.