IMPACT OF MANAGEMENT AND NON-MANAGERIAL PRINCIPAL STOCKHOLDERS ON CAPITAL STRUCTURE OF CLOSELY-HELD AND PUBLICLY-HELD CORPORATIONS?

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IMPACT OF MANAGEMENT AND NON-MANAGERIAL PRINCIPAL STOCKHOLDERS ON CAPITAL STRUCTURE OF CLOSELY-HELD AND PUBLICLY-HELD CORPORATIONS

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I. Introduction and Summary

A recent paper by Friend and Hasbrouck (F-H) (1987) used data on holdings of their own stock by managerial insiders (officers and directors) to test the hypothesis that the corporate capital structure is determined at least in part by optimization of management interests even when these conflict with stockholders' interests. The value of their stock held by corporate insiders (MV) and the ratio of their holdings to the total value of their stock outstanding (FR) were used in that study as measures of the greater incentive to management than to other stockholders for maintaining a low debt ratio to avoid bankruptcy possibility. The regression results were supportive of the hypothesized inverse relationship between unscaled MV and debt, but a less satisfactory result is obtained when MV was scaled by Logarithm or FR was used as a second measure of the relevant risk. The less satisfactory result than expected seems to question the ability of management in adjusting debt ratio by its own interests especially when these conflict with stockholders' interests.

To effectively test the managerial optimization hypothesis raised by F-H, this paper intends to address the effect of various constraints on management's ability or desire to reduce the specific risks to them implicit in a higher debt ratio which might otherwise be desired by public investors in view of tax shield on interest paid on corporate debt or for other reasons. A simple example is presented in Appendix A which illustrates that if management

which is less than optimum (which maximizes firm's value) to reduce its bankruptcy risks implicit in a higher debt level. However, a higher debt than management desired is used to resolve conflicts from the zero ownership of the firm by management. As an implication of this example, the higher the ownership of managerial insiders the less the conflicts (which may serve as a favorable signal, Jensen and Meckling (1976), John (1987)), the greater the ability (less constraints) and desire (higher unique risk) of them to adjust debt ratio by their own interests.

To analyze the effect of differences in management's ability and desire to reduce the level of debt, this paper classifies New York Stock Exchange firms into two equal groups -- designated as "closely-held" (CHC) and "publicly-held" (PHC) corporations depending on the fraction of stock owned by management (officers and/or directors). Other things equal, management in closely-held corporations would have higher unique risks than in publicly-held firms, would have less constraints on its behavior so that a more negatively significant impact of its investment on debt ratio should be obtained.

The non-managerial principal stockholders are assumed to have sufficient investment in the firm to warrant the effort required for monitoring function and to influence management appropriately. Their existence might reassure or signal the market that management was effectively being monitored by an investor whose interests would more closely coincide with those of dispersed investors in view of the difference in human wealth exposure (Shleifer and Vishny (1986) and Easterbrook (1984)). As a result where corporations have large non-managerial investors, management may not be able to adjust debt ratio by its own interests, the debt ratio would be expected to be higher than where such investors do not exist and may be closer to the optimal level from the viewpoint of diversified investors. Since in addition to the data on the

level of holdings of their own stock by managerial insiders, we had information on whether corporations had non-managerial stockholders with holdings of 10% or more of their outstanding stock, we were able for this paper to subdivide the closely-held and public-held corporations into subgroups depending on the existence of such major stockholders to test whether there is any evidence of their effective monitoring on management. (Hereafter, CHC1 and CHC0 are CHC with and without non-managerial principal stockholders respectively. PHC1 and PHC0 are PHC with and without non-managerial principal stockholders respectively).

To summarize this paper's results, we find that corporations in CHC1 are characterized by a higher average debt ratio than for CHC0, and the level of debt decreases as the level of management investment (shareholding) in the firm increases in both CHC0 and CHC1 regardless of the existence of a non-managerial principal stockholder. Corporations in PHC1 are still characterized by a higher average debt ratio than for PHC0, but the negative impact of management's shareholdings on debt ratio is found only in PHC1. For corporations in PHC0, the debt ratio increases with its fraction of stock owned by insider.

These results provide support for the proposition that for CHC0 and CHC1, the debt ratio in the period covered is negatively related to management's shareholdings, reflecting the greater non-diversifiable risk of debt to management than to public investors for maintaining a low debt ratio. This finding is independent of the existence of non-managerial principal stockholder. In PHC1, the debt ratio is still negatively related to management's shareholdings, but less significant than in CHC, reflecting a lesser desire and ability of management in PHC than in CHC in adjusting debt ratio by its own interests. The existence of non-managerial principal

stockholders seems to provide little evidence in affecting management's conservative behavior. In PHCO, the debt ratio increases as the fraction of management's shareholdings in the firm increases. As a result of this puzzled evidence, one plausible explanation may suggest that in the absence of both signals, possible monitoring from principal stockholders and sufficient ownership by managerial insiders, the need for other signal is more necessary. But it is by no means clear to us theoretically as why the positive impact of insider ownership on debt may serve as a signal or resolve conflicts.

Interestingly, the realized or average debt ratio after the possible signalling in PHCO is the same as in CHCO, it may be suggestive that management in PHCO only signals to reach the level of debt in CHCO. Unless there is a non-managerial principal stockholder, no significant increase of debt can be realized as we can see from the significant higher average debt ratio in CHC1 as opposed to in CHCO, versus in PHC1 as opposed to in PHCO. There is some evidence to conclude that the existence of large non-managerial stockholders might make the interests of managers and public stockholders coincide. An alternative explanation may simply suggest that non-managerial stockholders have higher ability than dispersed stockholders to demand a higher debt to motivate management's quality totally apart from the tax shield consideration (see Grossman and Hart (1982), Lang (1987)).

The following section of this paper (Part II) describes the data sources while the concluding section (Part III) presents the results of an econometric analysis of these data.

II. DATA SOURCES AND VARIABLES USED IN ANALYSIS

The symbols, data sources and computational procedures used in the econometric analysis are described below:

DRT - Debt/asset ratio which is defined on a book value basis and excludes trade credit and short-term accruals from debt.

RPPEAB - Ratio of net property, plant and equipment to book assets.

ROAM - Mean of earnings (before interest payments and taxes)/ asset ratio defined on a book value basis. It is used as proxy for profitability of a firm.

ROAS - Standard deviation of earnings (before interest payments and taxes)/asset ratio used as a proxy for risk. It is a better measure of management's non-diversifiable risk than the more customary beta coefficient.[1.2]

LA - Log of total assets.

MV - Market value (MV) of equity in his firm held by dominant managerial insider (officer and/or director) (millions of $).

FR - Fraction of equity held by dominant managerial insider.

FRO - Fraction of equity held by dominant non-managerial stockholder who is not officer and director but holds more than 10% of shares outstanding.

All the above variables except ROAM and ROAS are on a five-year average basis (1979-1983), ROAM and ROAS are on a ten-year basis (1974-1983). If there are any missing values of these variables for a firm within this period, this firm is excluded. We compute DRT, ROAM, ROAS, LA and RPPEAB from the Compustat data base by excluding financial organizations and public utilities. In accordance with the Security Act of 1934, officers, directors and principal stockholders (holds over 10% of shares outstanding) are required to report their holdings and transactions of securities of the corporations in which they are insiders and have had transactions during the month. We thus are able to extract holdings of managerial versus nonmanagerial insiders to construct MV, FR and FRO from insider holdings records filed with the U.S. SEC (National Archives and Record Service, General Services Administration, Washington, D.C.). Only those firms which match the Compustat data set are extracted from the SEC tape. The detailed descriptions of MV, FR and FRO are provided in Appendix B. In the results presented in the tables, MV, FR and

FRO are computed only for the largest single insider, which might be expected to proxy the degree to which the insider's holding is an undiversified position (Similar results to these presented were also obtained when holdings for all insiders in each firm were combined). Since other information about the insider's portfolio is not available, we examine the market value of the holding (MV) on the reasonable assumption that the larger MV the larger the undiversified concentration of holdings in a single asset. As an alternative measure, we also examine the fraction (FR) of total equity in the firm constituted by the largest insider's holdings. While neither MV nor FR is a complete measure of the relevant risk to management (which also depends on the other marketable and non-marketable wealth of management), it is shown in Appendix C, MV is a better measure of management's non-diversifiable risk, though FR is clearly a better measure of control.

III. ECONOMETRIC ANALYSIS:

To examine the effect of differences in management's ability and desire to reduce the level of debt, the whole sample is classified into two equal size groups -- designated as "closely-held (CHC)" and "publicly-held (PHC)" corporations depending upon the fraction of stock owned by managerial insiders.[3] As we mentioned in the introduction that the existence of large non-managerial investors may impose effective monitoring on the behavior of management, we further subdivide CHC and PHC into 2 subgroups depending upon the existence of such major stockholders to test their monitoring ability. Hereafter, CHC1 and CHC0 are CHC with and without non-managerial principal investors respectively. PHC1 and PHC0 are PHC with and without non-managerial principal stockholders respectively.

The summary statistics of the above four groups are presented in Table

with very high managerial and non-managerial insiders' holdings, but the fraction of holding of non-managerial investors (i.e. FRO) in either PHC1 and CHC1 are lower than those of managerial insiders (i.e. FR) in the same groups.[4] If the monitoring from non-managerial investors is effective, then a lower shareholding plus the difference in human capital exposure, the debt ratio would be expected to be higher to make the interests of managerial insiders and public investors coincide. This hypothesis is evident by a higher debt ratio 26% in CHC1 as opposed to 22% in CHC0, and 25% in PHC1 as opposed to 22% in PHC0.[5] An alternative explanation may simply suggest that the non-managerial principal stockholders have higher ability than dispersed shareholders to demand a higher debt ratio to motivate management's quality.

A large number of multivariate relationships for the debt ratio are estimated using ordinary least squares, and representative samples of the results are reported in Tables II & III.[6] To reduce the heteroscedastic possibility, MV is scaled by logarithm (LMV). In the regression analysis, ROAM (profitability) and RPPEAB (fixed assets ratio) suggest relations consistent with the findings of earlier studies. Profitability measures for the firm (such as return on assets) are employed in several of the earlier cross-sectional studies.[7] These measures have invariably been found to be strongly negatively related to leverage. The mechanism at work here is presumably retention; more profitable firms borrow less. The positive impact of RPPEAB on debt ratio bears on the collateral value of assets with an obvious link to debt capacity.[8] Risk measure ROAS may suggest a negative impact on leverage: risky firm borrows less. The consistent evidence is found in this paper.[9] Firm size is hypothesized to be positively related to leverage

PHC. It is suggested that when firm grows bigger, it tends to rely more on debt financing in CHC, but this effect is ambiguous in PHC.[10]

In Table II (regressions for CHC), LMV and FR possess significant negative impact on debt ratio in both CHC1 and CHC0.[11] This evidence suggests that management in CHC would have higher ability and desire to adjust debt ratio according to its own interest (personal investment in the firm) despite the existence of non-managerial investor.

In Table III (regressions for PHC), LMV is less negatively significant in PHC1 than in CHC, and FR is insignificant, reflecting a lesser desire and ability of management in PHC than in CHC in adjusting debt by its own interests. In PHC0, LMV is insignificant while debt ratio increases with its fraction of stock owned by managerial insiders (FR). One plausible reason may suggest a greater need of low ownership management to signal dispersed investors about its quality. Interestingly, the average debt ratio in PHC0 is equivalent to that in CHC0, it may suggest that management in PHC0 only signals to reach the level of debt in CHC0. Unless there exists non-managerial principal stockholders, no substantial increase of debt can be realized (debt ratio is 26% in CHC1 as opposed to 22% in CHC0, and 25% in PHC1 as opposed to 22% in PHC0).

Further evidence on the relationship among these variables is given in Table IV, which presents sample means for quartile subgroups ranked in order of descending values of DRT. The pattern of MV means in CHC (both CHC0 and CHC1) are suggestive of a monotonic relationship, while it is still quite but less suggestive of such a relationship for FR. The patterns of MV in PHC1 is suggestive of a jump relationship from small (groups 1 and 2) to large (group 3 and 4), an ambiguous relationship is found for FR. In the case of PHC0, both MV and FR suggest concave relationship, but firms in the highest debt

ratio group (group 1) are characterized by a highest FR. These further evidence are quite consistent with our previous linear regression results, which may enhance our previous findings.

These results are generally consistent with our hypothesized relationship between insider holdings and capital structure policy, but it remains to be considered as to whether these findings might have risen as a consequence of some methodological shortcomings. The dependent variable DRT is the ratio of debt D to book asset A. In fact, a more relevant measure might be D/V_u, where V_u is the unlevered market value of the firm. If D/V_u is the true dependent variable in our specification, use of D/A will lead to a measurement error correlated with market value of the firm, and therefore the market value of insider holdings, leading to estimates of LMV biased upward.[12] Even we recognize the upward bias of LMV in CHC and PHC, the differential effect of LMV in CHC from PHC may still holds because we can conceive no plausible reason why this bias should be different in CHC and PHC. To correct the biases of LMV, FR may serve as an alternative measure even though it is less important than LMV in terms of non-diversified risk measure. Having analyzed from FR only, our previous conclusion still holds.

The second problem involves causality. In our specification, we are implicitly assuming that causality runs from the insider holding measures to the debt ratio. In this view, managers set their insider holdings based upon exogenous considerations, and then address the capital structure problem. It is possible that other mechanisms may lead to a reversed causality. A higher level of debt, for example, increases (ceteris paribus) the risk of a stock, motivating the reduction of undiversified holdings. The possiblity of reversed causality remains as an open question, although such a mechanism would not be inconsistent with our hypothesized relationship between

managerial holdings and capital structure.

FOOTNOTES:

1. The risk bearing costs of an undiversified portfolio depend not just on the weight of own firm shareholdings but also on characteristics of the return to shareholders. That is, these costs will be greater the more of the risk in shareholder returns that can be diversified away by small outside shareholders but must be borne by managers who hold undiversified portfolios. An additional variable, the unsystematic risk, may be included in regressions. A similar result for insider holdings is still obtained after we include the unsystematic risk measure.

2. If beta is incorporated into our model, a positive impact of equity beta on DRT is obtained. As a result that a higher leverage implies a higher equity beta, a similar result for insider holdings is still obtained.

3. We experimented with cut-off points ranging from 2.5% to 7.5% for largest managerial insider or ranging from 5% to 15% for all managerial insiders combined and obtained similar results. We thus only report the one with the cut-off point 13.825% of total insiders combined which separate samples into two equal size groups.

4. FRO in PHC1 is only about 3.5% which is less than 10% the cut-off point for investors to be the principal stockholders. The obvious reason is elaborated in the Appendix C that once an investor holds more than 10% of shares outstanding at one time, then he has to report his holdings and transactions in the subseqent periods if he has had transactions no matter his fraction of holdings.

5. The higher debt ratio in CHC1 and PHC1 as opposed to that in CHCO and PHCO respectively may be a statistical artifact. For corporations with high debt ratio, the shares outstanding would be relative low, therefore, it would be easiser to have shareholders who hold more than 10% of shares outstanding.

6. Similar results are still obtained if 2-digit or 3-digit industry dummy are incorporated into our regressions.

7. See Carlton and Silberman, Toy et.al.

8. The positive impact of RPPEAB on DRT was found by Long and Malitz (1983), Gonedes, Lang and Chicaonda (1987).

9. The studies by Baxter (1967), Ferri and Jones (1979) and Long and Malitz (1983) all suggest the expected negative relationship. Scott (1980) finds this relationship ambiguous, Flath and Knoeber (1980) suggest there is no relationship between the variations in a firm's earnings, measured in several ways, and its debt. Gonedes, Lang and Chikaonda (1987) finds insignificant impact of equity beta on debt.

11. LMV and FR are used as the proxies for the true non-diversified risk measure MV/W where W is the insider's wealth. A multicollinearity problem is introduced once LMV and FR are introduced in one regression, which may lead the coefficient of FR to be positive.

12. Suppose that the true relationship between leverage and the insider holding variable is $D/V_u = MV$, and the relationship actually estimated is $D/A = aMV + u$, where $u = (D/A - D/V_u)$. If $Cov(MV, V_u) > 0$, $Cov(MV, u) > 0$, leading to estimates of 'a' biased upwards.

APPENDIX A:

Consider a corporation in which the manager collects funds H from risk neutral investors by issuing stocks E and bonds B to implement investment project at date 0. It is assumed that this firm will be dissolved after date 1. The firm's pre-tax cash flow X is normally distributed with mean g and variance s^2. g is assumed to be a concave function on investment I with $g'>0$, $g''<0$.

To simplify the model, the manager is assumed to invest I out of H and to consume H-I. The equilibrium condition requires that H must be equal to the firm's value V(I,B); the risk neutral investors expect to earn at date 1 if interest rate is 0. The firm's value in the sense of Lang (1987) is defined as follows:

$$(A.1).\ V(I,B)=\int_{-\infty}^{B}[X-K]f(X)dX+\int_{B}^{\infty}[B+(1-t)(X-B)]f(X)dX$$
$$=\int_{-\infty}^{S}[sz+g(I)-K]f(z)dz+\int_{S}^{\infty}[B+(1-t)(sz+g(I)-B)f(z)dz$$

where S=(B-g)/s, B is the principal and interest payments of debt, K is lump-sum bankruptcy cost, t is the income tax rate, and z is the standardized cash flow.

Let the manager have a concave von Neumann-Morgenstern utility function U(V-I) in which $U'>0$, $U''<0$. It is assumed that this utility is only realized if the firm does not go bankrupt. The manager maximizes his expected utility function as follows before X is known:

$$(A.2.)\ \ U = E[U(I,B)] = U(V-I)(1-F(S))$$

Management may intend to increase its stake by investing less if the investment level is unobservable to the market. Under this circumstance of the potential conflict, no funds could be collected from investors unless

observable actions taken by management.

Debt creation enables management to effectively bond its promise to pay out future cash flows. If the manager commits to a certain amount of debt but can not repay interest and principal, he also loses his stake at bankruptcy as represented by (A.2). To ensure enough cash flow to pay back debt obligation, a certain amount of investment has to be carried out. The market may thus observe the debt level to infer the investment level: the potential conflict can be resolved by the use of debt.

In this case, it is shown in Lang (1987) that the equilibrium conditions are as follows:

(A.3). $g' > 1$

(A.4). $V_B = T + G \gtrless 0$

where $T=rU/sU' > 0$, $G =(1-g')/(B'-g') < 0$. $g'>1$ determines a less than optimum amount of investment I_1 ($g' = 1$ determines an optimum investment).

To better explain the managerial behavior toward the use of debt, (A.4) can be decomposed as

(A.5). $V_B = T > 0$

(A.6). $V_B = T + G \gtrless 0$

(A.5) suggests that, given underinvestment I_1, management intends to use a less than optimum amount of debt to reduce bankruptcy risk implicit in a higher debt level, but it has to use more debt as determined by (A.6) to signal the market about its intention of investment. The equilibrium debt determined by (A.6) may or may not exceed the optimum which maximizes the firm's value.

APPENDIX B:

The insider holding measures used in this paper were derived from records filed with the U.S. SEC. (National Archives and Record Service, General Services Administration, Washington, D.C. 20408). In accordance with the Securities Act of 1934, officers, directors, trustees and principal stockholders (i.e. those holding over 10%) are required to report holdings, acquisitions and dispositions of securities of corporations in which they are insiders and have had transactions during the month. Principal stockholders who now holds more than 5% of the shares outstanding are required to report their holdings and transactions, 10% instead of 5% is the cut-off point in the SEC insider holdings tape which is available to us. Specifically, the managerial insiders included in this paper are: chairman of board, other officers, directors, controlling person (but with only few entries) and principal stockholders who are either officers and/or directors. The non-managerial insiders are those principal stockholders who are not officers and directors. The excluded categories include investment advisors and trustees. We just consider the direct holdings of common stock by the aforementioned insiders. The indirect holdings reflecting holdings in trusts and other similar vehicles are ignored. The SEC places on the transaction records an inconsistency code when holdings can not be reconciled with acquisition and disposition data. Records so marked were dropped.

The records in the tape were sorted by CUSIP number, insider identification and time. An end-of-month holding for a particular insider was taken to constitute a balance that persisted until the date of the next filing, or until December 1983 (the last date considered in this study) if no later filings were encountered. For each firm, we pick the holdings of the dominant managerial and non-managerial insider at the end of each year. We multiply the holdings by the closing stock price of the year to get MV. We

divide these shares of the dominant insider by the total shares outstanding to get FR or FRO. One limitation of the data concerns managerial insiders who leave the insider population by virtue of retirement or other separation. Since the investor loses insider status, the disposition will not be reported. This may lead to a systematic upward bais in our insider holding counts, but we can conceive of no plausible reasons why this error might be related to capital structure. Another limitation of the data concerns non-managerial stockholders (principal stockholders who are not directors and officers) who lose their status to be the principal stockholders. According to the SEC regulation, if the holding of shareholder is more than 10% at one time, then this shareholder is classified as principal stockholder; he has to report holdings, acquisitions and dispositions of shares even though he holds much less fraction in the subsequent period because of his own disposition, the issuing of more shares by his firm, etc. This leads to a systematic upward bias in our count of non-managerial firms with principal stockholders. To test the impact of this upward bias, we only extract firms with non-managerial principal stockholders who hold more than 5% and 10% of shares outstanding, similar results as shown in the subsequent tables are obtained.

APPENDIX C

As indicated in the text of this paper, the market value of insider holdings (LMV) is the primary measure used to represent the risk of undiversified concentrations of holdings in a single asset. However, the fraction (FR) of total equity constituted by insider holdings is also used and, though we state that it is not likely to be as satisfactory a measure as LMV of the risk associated with an insider's position, it is necessary to

It is clear that LMV is much more closely related than FR to the absolute risk entailed in an insider's holdings. However, since investors' behavior seems to be much better characterized by constant relative risk aversion than by absolute risk aversion (Friend and Blume, 1975), the relevant question to raise is whether LMV or FR is a better proxy for MV/W, where W is the insider's wealth. In other words, is LMV or FR more highly correlated with MV/W? It will be recalled that FR=MV/M, where M is the market value of outstanding shares of the stock including shares owned by the public as well as by insiders. For the sake of convenience, we shall deal with the logs of the relevant variables, i.e. $v = \log MV$, $w = \log W$ and $m = \log M$, so that $\log (MV/W) = v-w$ and $\log (MV/M) = v-m$. Then $r(v,v-w)=(s_v^2-s_{vw})/(s_v s_{v-w})$

$r(v-m,v-w)=(s_v^2-s_{vw}-s_{vm}+s_{mw})/(s_{v-m}s_{v-w})$ where r is the correlation coefficient and s is the standard deviation. The circumstances under which LMV is a better proxy than FR for MV/W can be written as $r(v,v-m) > r(v-m,v-w)$ or

$$\frac{s_v^2 - s_{vw}}{s_v} > \frac{s_v^2 - s_{vw} - s_{vm} + s_{mw}}{s_{v-m}}$$

All of these statistics, with the exception of those involving w, can be estimated from our sample. Then $s_v=1.7526$, $s_m=1.7200$, $s_{v-m}=1.4913$, $s_{vm}=1.5153$, $r_{vm} = 0.5027$. To determine whether this inequality holds, it is necessary to estimate $s_{vw} = s_v s_w r_{vw}$ and $s_{mw} = s_m s_w r_{mw}$.

We know s_v and s_m and we can estimate s_w (i.e. the standard deviation of the log of wealth) or at least put plausible bounds on its value from the data on wealth and related information compiled from the Federal Reserve Board's 1983 Survey of Consumer Finance, covering a sample of 3824 families, 282 of whom indicated that they owned stock of corporations for which they worked.

both corporate insiders and other employees who are stockholders in the corporation for which they work, in an attempt to separate those families who are more likely to be corporate insiders or to resemble corporate insiders in their wealth characteristics, s_w was also computed for the 61 families in this subsample with annual income over $50,000, for the 11 families with income over $100,000, for the 124 families with net worth over $100,000 and for 13 families with net worth over 500,000. For these groups, s_w is 0.86, 0.91, 0.63 and 0.40 respectively. Of the entire sample of 3824 families, for the 26 with wealth in excess of $1 million, s_w = 0.30; for the 90 families with wealth in excess of $500,000, s_w = 0.44. Thus, while to ensure that we do not bias the results in favor of our hypothesis we shall use s_w = 1.35 as our estimates of the standard deviation of the log of wealth for corporate insiders, the evidence suggests this is an overstatement.

Information on r_{vw} and r_{mw} is not available, but so long as $r_{mw} < 0.46 + 0.15\, r_{vw}$, $r(v,v-w) > r(v-m,v-w)$. Since there is no necessary relationship between m and w, though LMV would be expected to be fairly highly correlated with W of which it is a part, r_{mw} would be expected to be lower than r_{vw} and well below the critical value of 0.54 for $r_{mw} = r_{vw}$. For the more realistic assumption $r_{mw} < r_{vw}$, the critical level for r_{mw} would be even higher. It might be noted that if r_{vw} and r_{mw} were both 0.5, $r(v,v-w) > r(v-m,v-w)$ so long as $s_w < 1.45$, which is higher than the upper bound of 1.35 suggested above as the critical level for s_w. With a more plausible relation between r_{vw} and r_{mw}, with correlation of 0.75 and 0.25 respectively, $r(v,v-w) > r(v-m,v-w)$ so long as $s_w < 4.42$.

For closely-held corporations (definition see section III), the evidence in favor of the superiority of LMV over FR as a proxy for MV/W is even more

This result is obtained for closely-held corporations for which s_v=1.4693, s_m=1.6471, s_{v-m}=.8624, s_{vm}=2.0641 and r_{vm}=0.8529. As a result, for the extreme assumption that $r_{mw} = r_{vw}$, LMV is a better proxy than FR for MV/W so long as $r_{mw} < 0.83$. For the more realistic assumption $r_{mw} < r_{vw}$, the critical level for s_{mw} would again be even higher.

For publicly-held corporations (definition see section IV), the results are closer to those obtained for all corporations combined. It is estimated that s_V=1.6357, s_M=1.7396, s_{VM}=1.6355, s_{V-M}=1.5591, r_{VM}=0.5748, so that the condition for the superiority of MV over FR as a proxy for MV/W becomes $r_{mw}<0.65+ 0.043r_{vw}$. If $r_{mw} = r_{vw}$, MV is a better proxy so long as $r_{mv}<0.68$. For $r_{mw} < r_{vw}$, the critical level for r_{mw} would be increased. Similar results as above are obtained for closely-held corporations with and without nonmanagerial principal stockholders respectively, and for publicly-held corporations with and without non-managerial principal stockholders respectively (definitions of these four groups, see section IV).

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Table I: Summary Statistics

	CHCO[1]		CHC1		PHCO		PHC1	
	Mean	Stand. Dev.	Mean	Stand. Dev.	Mean	Stand. Dev.	Mean	Stand.
DRT[2]	0.227[3]	0.148	0.264	0.142	0.220	0.120	0.249	0.1
ROAM	0.125	0.067	0.110	0.058	0.127	0.065	0.125	0.0
ROAS	0.060	0.037	0.054	0.037	0.045	0.029	0.047	0.0
RPPEAB	0.305	0.154	0.348	0.181	0.364	0.168	0.343	0.1
LA	4.437	1.404	4.926	1.481	6.119	1.687	6.330	1.4
MV	38.305	118.480	56.342	140.440	11.386	28.577	46.395	152.2
FR	0.174	0.128	0.199	0.131	0.022	0.023	0.045	0.0
FRO	0.000	0.000	0.115	0.107	0.000	0.000	0.035	0.0

1. CHCO - Closely-held corporations with no non-managerial principal stockholders. Sample size = 210.

   CHC1 - Closely-held corporations with non-managerial principal stockholders. Sample size = 282.

   PHCO - Publicly-held corporations with no non-managerial principal stockholders. Sample size = 388

   PHC1 - Publicly-held corporations with non-managerial principal stockholders. Sample size = 104.

2. DRT is debit/total asset ratio, ROAM and ROAS are the mean and standard deviations of earnings before interests and taxes respectively, RPPEAB plant/total asset ratio, LA is log of total book asset (million $) MV and FR are the market value (million $) and the fraction of equity held by dominant managerial insider, FRO is the fraction of equity held by dominant non-managerial principal stockholder. The sample periods cover from 1974-1983, see main text.

3. t-statistics of $DRT_{CHC1} - DRT_{CHC0} = 2.61$

t-statistics of $DRT_{PHC1} - DRT_{PHC0} = 2.02$

t-statistics of $DRT_{CHC1} - DRT_{PHC1} = .97$

t-statistics of $DRT_{CHC0} - DRT_{PHC0} = .59$

Table II: Regression of Closely-Held Corporations

	ROAM	ROAS	RPPEAB	LA	LMV	FR	R^2
			Regressions of CHCO				
1.	-.618 (-4.0)	.012 (.048)	.284 (4.88)	.056 (3.90)	-.042 (-3.15)	.047 (.48)	.350
2.	-.645 (-4.50)	-.0005 (-.002)	.283 (4.87)	.052 (4.86)	-.037 (-4.14)		.352
3.	-.899 (-6.97)	-.189 (-.76)	.286 (4.82)	.016 (2.31)		-.180 (-2.66)	.321
			Regressions of CHC1				
1.	-.537 (-3.7)	-.382 (-1.87)	.193 (4.39)	.060 (4.73)	-.062 (-5.27)	.114 (1.52)	.291
2.	-.608 (-4.42)	-.385 (-1.88)	.202 (4.63)	.048 (4.82)	-.050 (-5.71)		.288
3.	-.923 (-7.06)	-.488 (-2.30)	.195 (4.23)	0.00 (0.0)		-.149 (-2.57)	.223

1. The dependent variable is DRT in all specifications.

2. R^2 is adjusted for degress of freedom.

Table III: Regressions of Publicly-Held Corporations

Regressions of PHCO

	ROAM	ROAS	RPPEAB	LA	LMV	FR	R^2
1.	-.854 (-9.16)	-.423 (-2.17)	.172 (5.18)	.0006 (.11)	-.005 (-.86)	.685 (2.02)	.293
2.	-.930 (-10.9)	-.425 (-2.17)	.175 (5.26)	-.006 (-1.57)	.003 (.80)		.287
3.	-.894 (-11.0)	-.418 (-2.14)	.173 (5.20)	-.003 (-.68)		.477 (2.00)	.293

Regressions of PHC1

	ROAM	ROAS	RPPEAB	LA	LMV	FR	R^2
1.	-.844 (-2.81)	-.423 (-1.33)	.058 (.75)	.025 (1.61)	-.034 (-2.24)	.461 (.80)	.305
2.	-.986 (-4.08)	-.463 (-1.48)	.058 (.75)	.016 (1.49)	-.025 (-2.69)		.308
3.	-1.33 (-6.27)	-.552 (-1.73)	.056 (.71)	-.004 (-.41)		-.577 (-1.66)	.277

*Footnotes, see Table II.

Table IV. Quartile Groups in the Descending Order of DRT

	CHCO			CHC1			PHCO			PHC1		
	DRT	MV	FR	DRT	MV	FR	DRT	MV	FR	DRT	MV	FR
1.	.463	15.30	0.140	.454	32.67	0.177	.378	9.889	0.029	.427	12.75	0.039
2.	.270	27.41	0.138	.304	40.33	0.196	.250	8.636	0.019	.272	11.19	0.047
3.	.168	28.30	0.190	.210	59.61	0.206	.178	11.080	0.020	.199	79.05	0.042
4.	.043	82.60	0.230	.087	93.23	0.216	.075	15.930	0.021	.097	82.58	0.053