

A Reexamination of the Relationships Between Ownership Structure, Firm Diversification, and Tobin's Q

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Ownership structure and firm diversification have been separately advanced to be determinants of firm valuation. The finance literature using agency theory has argued that ownership structure influences firm value. Economics, strategic management, and finance have each contributed to the claim that firm diversification impacts firm valuation. Previous results separately document the significance of each effect; however, it is not clear whether both effects are important when included in the same empirical model of Tobin's Q. The results generated in this paper show that ownership structure and the level of firm diversification are both statistically significant variables in the model of Tobin's Q. Moreover, 1.91 percent of the variance in Q is explained by firm diversification effects, 1.63 percent is explained by officer and director ownership effects, 0.90 percent is explained by institutional ownership effects, and 2.17 percent is explained by the level of ownership by blockholders.

INTRODUCTION

What is the source of firm value? The firm is a portfolio of real assets purchased by the issuance of debt and equity. The market valuation of the firm depends upon the asset and financing choices. The finance literature concentrates its study on the financial instruments that are created to purchase real assets. One research theme focuses on the consequences for the firm of having different types of equity holders. This analysis is based on agency theory and the objective of the firm.

The theoretical paper of Jensen and Meckling (1976) uses agency costs to explain how managerial ownership influences firm value. They argue that at higher levels of management ownership an alignment of interests is created between managers and outside owners. An additional model developed by Stulz (1988) also relates firm value and managerial ownership. An important contribution of Stulz's model is to argue that at high levels of managerial ownership the probability of a takeover may be diminished and, therefore, the value of the firm falls. This is sometimes referred to as the *entrenchment effect*. Empirical research has attempted to identify the existence of the alignment effect and the entrenchment effect. Morck, Shleifer, and Vishny (1988) investigate the relationship between Tobin's Q and ownership by the board of directors. Their piece-wise linear regression supports both the alignment and the entrenchment effect. A closely related empirical study by McConnell and Servaes (1990) models Tobin's Q as a function of insider ownership. Their results are generally consistent with the Morck, Shleifer, and Vishny conclusions. They find a significant nonlinear relationship between Tobin's Q and the level of insider ownership.

The finance literature has additionally argued that equity positions by institutions and blockholders impact firm valuation. Shleifer and Vishny (1986) develop a model where large shareholders help to facilitate takeovers and thus serve as a monitoring force result-

ing in a positive relationship between their equity participation and the firm's value. Consistent with this argument, McConnell and Servaes find a significant positive relationship between institutional ownership and Tobin's Q. The monitoring value of institutional investors also has been studied by Brickley, Lease, and Smith (1988) who report that institutions that are less subject to management influence are most likely to vote against antitakeover charter amendments. Pound (1988), however, reports that large investors are passive in their voting and either vote with management or sell their shares (the *Wall Street rule*).

The impact of blockholder ownership on Tobin's Q has been investigated empirically by McConnell and Servaes who find an insignificant negative relationship. Additionally, Holderness and Sheehan (1988) compare a sample of firms with majority holders to a matching sample of firms that are diffusely held and find no significant difference in the mean level of Tobin's Q. These inconsistencies in the Shleifer and Vishny argument may be due to the influence of managerial blockholders. For example, Fama and Jensen (1983) identify instances where managers whose equity position is large enough to dominate the board could expropriate wealth.¹

A separate literature development with contributions from economics, strategic management, and finance has focused on the composition of the firm's assets. The corporate strategy of whether to operate a focused or diversified firm usually is founded upon the creation of synergies from, for example, shared costs. Furthermore, it is argued that excessive diversification (thought to be a function of managerial interests) retards market values. Rumelt (1982) categorizes firms four ways depending on the relatedness of their operating segments. He finds that firms remaining in a single or related business perform better in terms of both ROI and ROE than firms diversifying into unrelated businesses. Wernerfelt and Montgomery (1988) model Tobin's Q as a function of industry effects, market share effects, and focus effects. The market share effects represent the firm's market share in a given industry. The focus effects come in the form of a diversification index. In a variance decomposition 19.48 percent of the variation in Q is captured by industry effects, 2.61 percent is captured by focus effects, and 0.94 percent is captured by share effects.²

Lang and Stulz (1995) use three alternative measures of diversification—the number of firm segments, the Herfindahl index constructed from sales, and the Herfindahl index constructed from assets—and find that diversified firms had significantly lower market values than specialized firms throughout the 1980s. This relationship holds after they control for size, access to capital markets, and research and development. Comment and Jarrell (1995) report that firms increased their operational focus during the 1980s. They find that 55.7 percent of sample firms had a single business segment in 1988 while 38.1 percent had a single business segment in 1979. They further show that shareholder wealth

¹ One referee has pointed out that, assuming managerial blockholders are important, the Holderness and Sheehan results are not necessarily inconsistent with previous empirical work by Morck, Shleifer, and Vishny and McConnell and Servaes. These studies identify Tobin's Q to be low for both high and low levels of ownership, which is what Holderness and Sheehan find.

² Other related research in strategic management has been completed by Michael and Shaked (1984), De (1992), and Schmalensee (1985).

increases with more focus. Finally, Berger and Ofek (1995) estimate the value of individual segments within diversified firms. They use these estimates to show that diversified firms sustained a valuation loss of 13 percent to 15 percent due to diversification during the years 1986 to 1991. They report the valuation loss is reduced when the firm segments have more similar SIC codes.

In summary, the market value of the firm has been found to depend both upon the composition of the firm's equityholders and the composition of the firm's real assets. This study attempts:

- To reexamine the relationship between firm value, as measured by Tobin's Q, and ownership structure and the relationship between Tobin's Q and firm diversification using recent 1992 data;
- To determine if both ownership and diversification effects are significant in the same empirical model of Tobin's Q. It is possible these variables only serve as proxies for one another in previously documented results; and
- To identify the relative contributions of ownership and firm diversification to explain the variation in Tobin's Q.

The relationship between Tobin's Q and officer and director ownership is found to be nonlinear and significant. The relationship between institutional ownership and Tobin's Q is positive and significant. The relationship between blockholder ownership and Tobin's Q is negative and significant. The relationship between Q and firm diversification is negative and significant. Second, when the ownership variables and the diversification index are included in the same model, they are each statistically significant. The parameter estimates and their significance are stable over a variety of models attempted. Third, the diversification effects explain about 1.91 percent of the variation in Q, while the officer and director ownership effects explain 1.63 percent, institutional ownership effects explain 0.90 percent, and blockholder ownership effects explain 2.17 percent.

DATA

An initial sample is generated representing all NYSE firms on the 1992 Compustat tapes for which Tobin's Q could be calculated. The calculation of Tobin's Q is based on an outline provided by the McConnell and Servaes working paper for calculating Tobin's Q using Compustat data. The formulas presented in Lindberg and Ross (1981) are used to calculate the market value of debt. The firms must have complete ownership data available. Officer and director ownership is taken from the firm's proxy statements. Institutional ownership and 5 percent blockholder ownership are taken from spectrum 3 and 5, respectively. The firms are required to have complete financial information on both the Compustat and the Business Information Compustat data tapes. A variable to measure firm diversification is computed using data from the Business Information Compustat tape. After all filters, the final sample of firms numbers 481.

The measure of firm diversification is the concentric index employed by Wernerfelt and Montgomery (1988) and by Caves, Porter, and Spence (1980); it is defined as follows:

$$CI_i = \sum_j w_{i,j} \sum_l w_{i,l} d_{j,l}$$

where:

- i = The firm;
- j and l = Industries within the firm;
- $w_{i,j}$ = The fraction of firm i 's assets that are in industry j ; and
- $d_{j,l}$ = A weight whose value depends on the relations between j and l in the standard industrial classification (SIC) system. $d = 0$ if j and l have the same three digit SIC code; $d = 1$, if j and l have different three digit codes but identical two digit codes; and $d = 2$, if j and l have different two digit codes.

The index captures the relatedness between industries in a firm. It will equal 0 for a perfectly focused firm. It will equal 0.5 if the firm has 50 percent of its assets in one industry and 50 percent of its assets in a second industry with different three digit SIC codes but identical two digit SIC codes. It will equal 1 if the firm has 50 percent of its assets in one industry and 50 percent of its assets in a second industry that have unique two digit SIC codes. Therefore, the more divisions and the more those divisions differ, the larger the index.³

EMPIRICAL RESULTS

The following notation is used for reporting the empirical results:

- Q = Tobin's Q ;
- OD = The percentage equity held by officers and directors;
- $(OD)^2$ = The percentage equity held by officers and directors squared;
- $INST$ = The percentage equity held by institutional investors;
- FV = The percentage equity held by 5 percent blockholders;
- CI = The concentric diversification index;
- TA = Total assets;
- DA = The percentage of the firm's assets financed by long-term debt;
- $ADEXP$ = The level of advertising expense as a percentage of total assets;
- $RDEXP$ = The level of research and development expense as a percentage of total assets.

³ An alternative measure of firm diversification is the Herfindahl index (HI) which is used by Lang and Stulz (1995). It is defined as:

$$HI = \sum_j (w_j)^2$$

where j indexes the industries or segments within the firm and w_j represents the percentage of the firm's total assets devoted to segment j . If a firm has only one segment, then HI equals 1. If a firm has two segments with 50 percent of the assets in each segment, then the HI equals 0.5. If a firm has ten segments with 10 percent of the assets in each segment, then HI equals 0.1. Therefore, HI increases with the level of firm focus.

Table 1—Summary Statistics (Means, medians, and standard deviations for dependent and independent variables used in the empirical models of Tobin's Q. Q is Tobin's Q; TA is total assets; DA is long-term debt divided by total assets; RDEXP is research and development expenditures divided by total assets; ADEXP is advertising expense divided by total assets; OD is the percentage of officer and director ownership; INST is the percentage of institutional ownership; FV is the percentage of blockholder ownership; and CI is the diversification index)

Variable	Mean	Median	Standard Deviation
Q	1.53	1.23	0.86
TA	3,030	711	10,409
DA	20.75	19.49	15.68
RDEXP	1.83	0.0	3.39
ADEXP	2.09	0.0	5.64
OD	13.03	5.63	16.75
INST	48.09	50.91	20.91
FV	1.75	1.17	1.90
CI	0.41	0.0	0.48

Sample statistics are presented in Table 1. Tables 2 reports the results of the empirical models of Tobin's Q. Three models are attempted:

$$\text{Model 1: } Q = \alpha + \beta(CI) + \delta(TA) + \phi(DA) + \gamma(RDEXP) + \lambda(ADEXP) + \text{industry dums} + \mu;$$

$$\text{Model 2: } Q = \alpha + \omega(OD) + \zeta(OD)^2 + \varepsilon(INST) + \phi(FV) + \delta(TA) + \phi(DA) + \gamma(RDEXP) + \lambda(ADEXP) + \text{industry dums} + \mu;$$

$$\text{Model 3: } Q = \alpha + \omega(OD) + \zeta(OD)^2 + \varepsilon(INST) + \phi(FV) + \beta(CI) + \delta(TA) + \phi(DA) + \gamma(RDEXP) + \lambda(ADEXP) + \text{industry dums} + \mu.$$

Table 3 reports the estimated variance decomposition following the presentation in Wernerfelt and Montgomery.

Table 1 shows that the average Tobin's Q for the sample is 1.53, that the average size measured in millions of dollars is \$3,030 or approximately \$3.0 billion, that 20.75 percent of the assets for the average firm are financed by long-term debt, that RDEXP and ADEXP are 1.83 percent and 2.09 percent of total assets, respectively, and that the level of officer and director ownership is 13.03 percent (a percentage similar to that reported in McConnell and Servaes). Institutions own 48.09 percent of the equity for the average firm, while blockholders have 1.75 percent.⁴

⁴ This study combines diversification indices and ownership variables into the same model of firm valuation. One issue is whether these variables are related and the consequence of the relationships for modeling Tobin's Q. The correlation coefficient between officer and director ownership and diversification is -0.0824 with a p value of 0.07. The correlation coefficient between institutional ownership and diversification is 0.0822 with a p value of 0.07. The correlation coefficient between 5 percent blockholder ownership and firm diversification is -0.0879 with a p value 0.06. These correlation coefficients do show some relationships between the explanatory variables; however, the empirical models of Tobin's Q generate results that are stable and robust across the many variations attempted. The results are reported in Table 2.

In Table 2 model (1) supports the results of Wernerfelt and Montgomery, as the diversification index enters significantly with a p value on the estimated coefficient of zero. The parameter estimate on the diversification index is significant. The R^2 is 31.26 percent, and the F statistic is a significant 4.397. The negative sign on the diversification index is consistent with previous work and suggests that the market rewards firms with higher values for more focused operations. Model (2) reexamines the conclusions of McConnell and Servaes (1992). The nonlinear regression model has an inflection point at 36.67 percent. The parameter estimates on all of the ownership variables are significant. The R^2 is 32.77 percent, and the F statistic is a significant 4.387. The shape of the nonlinear relationship between officer and director ownership and Tobin's Q is consistent with previous research. These results support the existence of both an alignment effect and an entrenchment effect. The significant positive relationship between institutional ownership and Tobin's Q supports a monitoring function possibly of the type discussed by Shleifer and Vishny. The significant negative relationship between blockholder owner-

Table 2—Empirical Models of Tobin's Q (Results of OLS regressions using Tobin's Q as the dependent variable and using officer and director ownership (OD), institutional ownership (INST), blockholder ownership (FV), firm diversification (CI), total assets (TA), long-term debt (DA), research and development expense (RDEXP), and advertising expense (ADEXP) as independent variables. The significance of the industry dummies are jointly tested using an F test)

Variables	(1)	Models (2)	(3)
Intercept	1.455* (0.06)	1.205 (0.11)	1.388* (0.07)
OD		0.022*** (.00)	0.019*** (0.00)
(OD)2		-0.0003*** (.01)	-0.000219** (0.04)
INST		0.004** (0.02)	0.005** (0.02)
FV		-0.076*** (0.00)	-0.077*** (0.00)
CI	-0.283*** (0.00)		-0.283*** (0.00)
TA	-0.0000008 (0.81)	-0.0000026 (0.45)	-0.00000062 (0.86)
DA	-0.010*** (0.00)	-0.009*** (0.00)	-0.009*** (0.00)
RDEXP	0.030** (0.02)	0.035*** (0.01)	0.027** (0.04)
ADEXP	0.014** (0.04)	0.014** (0.04)	0.014** (0.03)
Industry Dums	yes***	yes***	yes***
R^2	31.26%	32.77%	34.68%
F	4.397*** (0.00)	4.387*** (0.00)	4.670*** (0.00)

R^2 = The coefficient of determination

F = F statistic

p values are reported in parentheses below each estimated coefficient

*** Significant at 1 percent

** Significant at 5 percent

* Significant at 10 percent

ship and Tobin's Q may support the expropriation arguments advanced by Fama and Jensen.⁵

Model (3) tests for the inclusion of both diversification and ownership effects in the model. Both the diversification effect and the ownership effects remain significant. The parameter estimates are stable relative to model (1) and (2). The R^2 reveals that an impressive 34.68 percent of the variability in Tobin's Q is captured by the model. The F statistic is 4.670. This model provides evidence that both previously documented effects are robust when included in the same model of Tobin's Q. The model shows that diversification tends to retard value, that officer and director ownership increases value for low levels of ownership and decreases value for high levels of ownership, that institutional ownership tends to inflate values, and that ownership by blockholders results in lower market values. The inflection point for officer and director ownership in model (3) is 47.5 percent. Figure 1 displays the relationship between officer and director ownership and Tobin's Q while the control variables are evaluated at their mean level. The diagram shows that Tobin's Q is 1.27 when officer and director ownership is zero, Tobin's Q rises to a maximum of approximately 1.67 at 47.5 percent officer and director ownership, then Tobin's Q falls rather substantially for officer and director ownership beyond 47.5 percent. Figure 2 shows the concentric diversification index and Tobin's Q. Control variables are evaluated at their mean values.^{6, 7, 8}

Following the presentation in Wernerfelt and Montgomery, Table 3 reports the relative contribution of the ownership and firm diversification effects in explaining the variation in Tobin's Q. The industry effects explain 14.05 percent of the variability in Q; the concentric diversification index (CI) explains 1.91 percent of the variance, approximately

⁵ The author acknowledges the possibility of reverse causality as pointed out by one referee. Institutions may tend to purchase the stock of high performance, high value firms, while blockholders may be attracted to low performance, low value firms. These are open questions for future research.

⁶ Model 3 was run without the industry dummies. The parameter estimates and p values remained stable. The R^2 equals 20.63 percent. The estimated model is:

$$Q = 1.661 + 0.020 (OD) - 0.0002 (OD)^2 + 0.004 (INST) - 0.106 (FV) - 0.319 (CI) + \text{control variables.}$$

(0.00) (0.00) (0.07) (0.05) (0.00) (0.00)

⁷ The same models are generated using the Herfindahl index as a measure of diversification. The Herfindahl index is employed by Lang and Stulz (1995). Using this index, the result of equation (3) in Table 2 is:

$$Q = 0.887 + 0.019 (OD) - 0.0002 (OD)^2 + 0.005 (INST) - 0.080 (FV) + 0.472 (HI) + \text{control variables.}$$

(0.24) (0.00) (0.04) (0.01) (0.00) (0.00)

⁸ Moreck, Shleifer, and Vishny (1988) employ a piece-wise linear modeling technique. Assuming a turning point at 47.5 percent, the result of equation (3) in Table 2 is:

$$Q = 1.415 + 0.010 (ODx) - 0.008 (ODy) + 0.005 (INST) - 0.072 (FV) - 0.285 (CI) + \text{control variables.}$$

(0.06) (0.00) (0.42) (0.02) (0.00) (0.00)

where:

$$\begin{aligned} ODx &= OD, \text{ if } OD < 47.5 \\ &= 47.5, \text{ if } OD \geq 47.5 \\ ODy &= 0, \text{ if } OD < 47.5 \\ &= 47.5, \text{ if } 47.5 \leq OD \leq 100. \end{aligned}$$

Figure 1—Tobin's Q as a Function of OD Ownership (Graphical presentation of model (3) in Table 2 showing the relationship between Tobin's Q and officer and director ownership holding other explanatory variables constant at their mean level)

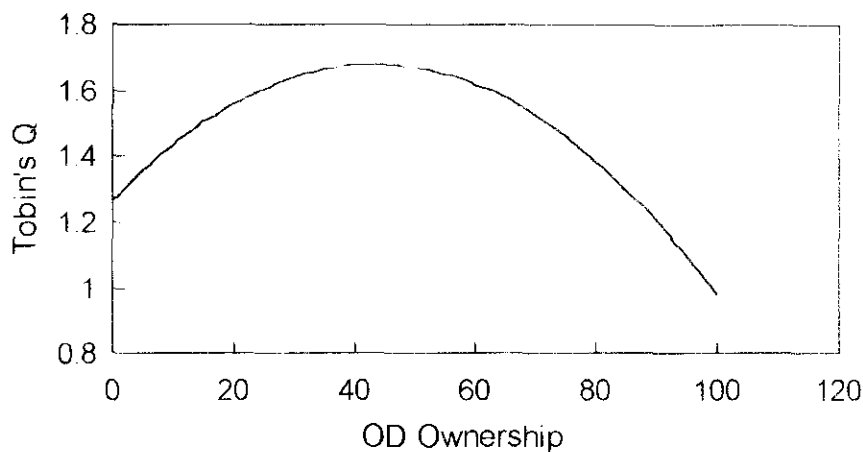


Figure 2—Tobin's Q as a Function of Firm Diversification (Graphical presentation of model (3) in Table 2 showing the relationship between Tobin's Q and firm diversification holding other explanatory variables constant at their mean level)

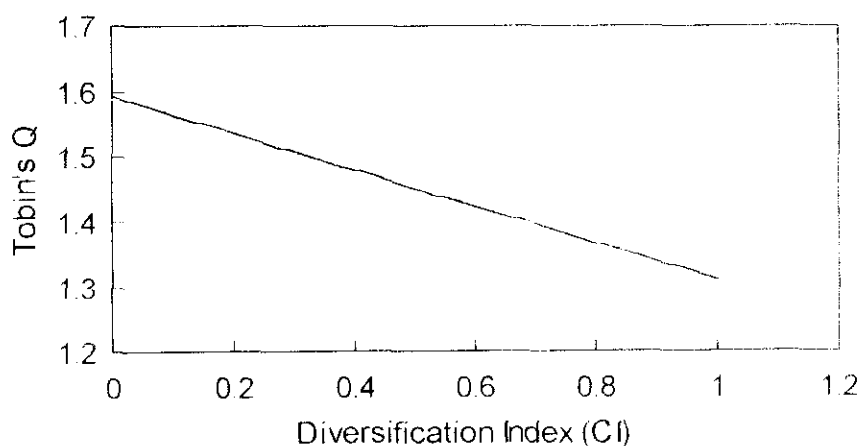


Table 3—Estimated Variance Decomposition (Estimated variance decomposition calculated as the incremental contributions to R^2 relative to the model with all the effects)

Effect	Percentage
Industry	14.05
CI	1.91
OD	1.63
INST	0.90
FV	2.17

the same amount as reported in Wernerfelt and Montgomery; the officer and director ownership effects, that were not modeled by Wernerfelt and Montgomery, explain 1.63 percent of the variance, slightly less than the diversification effects; the institutional ownership and 5 percent blockholder effects explain 0.90 percent and 2.17 percent, respectively.

CONCLUSION

What is the source of firm value? The finance literature using agency theory argues that the ownership structure of the firm influences firm valuation. Alternatively, a separate literature with contributions from economics, strategic management, and finance explains valuation as a function of the composition of the firm's real assets and the resulting level of firm diversification. This study fills the gap between these separate arguments and contributes additional supportive evidence. Three objectives are completed:

- To retest the relationship between ownership structure and Tobin's Q and the relationship between the diversification index and Tobin's Q using recent data from 1992. The results show that ownership structure significantly influences firm value. The results also show that the lower the level of firm diversification, the higher the firm valuation;
- To test whether the empirical models are improved by the incorporation of both ownership and diversification measures. The results show that both the ownership structure and the diversification index are significant in the same model of Tobin's Q;
- To identify the contributions made to value by firm diversification and ownership. The results show that firm diversification explains 1.91 percent of the variation in Tobin's Q, while officer and director ownership explains 1.63 percent, institutional ownership explains 0.90 percent, and 5 percent blockholder ownership explains 2.17 percent.

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