Do Managerial Motives Influence Firm Risk Reduction Strategies?

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ABSTRACT

This article finds evidence consistent with the hypothesis that managers consider personal risk when making decisions that affect firm risk. I find that Chief Executive Officers (CEOs) with more personal wealth vested in firm equity tend to diversify. CEOs who are specialists at the existing technology tend to buy similar technologies. When specialists have many years vested, they tend to diversify, however. Poor performance in the existing lines of business is associated with movements into new lines of business.

AGENCY THEORY IS RICH in models that explain how differences in risk aversion between managers and shareholders can impose costs on shareholders. However, to date there is little evidence that managers' personal risk preferences are associated with firm decisions. This study presents such evidence. I do this by examining how CEO and firm characteristics are associated with firm risk attributes. First, I examine how the diversification level sought in a given acquisition is related to the CEO's human capital vested in the firm, equity wealth vested in the firm, asset specialization, and past performance. I then examine whether these same CEO characteristics are associated with other firm risk attributes such as debt ratios and equity variances.

Such an examination is important in light of recent evidence that diversification strategies do not necessarily add value for shareholders. For example, Comment and Jarrell (1995) find that firm performance is increasing in firm focus level. Lang and Stulz (1994) conclude that firms diversify when they have exhausted growth opportunities in their primary industry, but that such diversification strategies do not necessarily benefit shareholders. Berger and Ofek (1995) compare the stand-alone value of diversified firm segments to specialized firms and find a 13 percent to 15 percent value loss from diversification.

One explanation for why firms pursue risk reducing strategies such as diversification is presented in Amihud and Lev (1981). They argue that im-

perfect monitoring and contracting allow managers to take actions that are in their own best interests and not necessarily those of shareholders. One such action is firm-level diversification. The problem arises because shareholders can easily control the risk of their individual portfolios in the capital market. However, managers can only reduce their human capital risk at the firm level. Thus, for managers, diversification may have a positive net present value (NPV), while for shareholders it may have negative value. Consistent with their theory, Amihud and Lev find that conglomerate mergers are more numerous when shareholdings are widely dispersed, because in such cases managers are better able to pursue policies that serve their own interests.

This article extends the work of Amihud and Lev, who examine differences in management's *opportunity* to pursue risk reduction. Here I examine cross-sectional differences in CEO *motive* to pursue risk reduction. My proxies for CEO motive are years with the firm, proportion of personal wealth vested in firm equity, asset specific expertise, and the firm's recent performance. I find that CEOs tend to pursue equity variance, reducing acquisitions when they have higher levels of personal wealth vested in firm equity. CEOs with backgrounds specific to their firm's existing technology tend to acquire similar technologies. However, when specialists have many years vested with the firm, they tend to diversify. This is consistent with the view that, as human capital becomes more firm specific, the personal gains to diversification outweigh the gains to specialization. (Shleifer and Vishny (1989)). I also find, similarly to Lang and Stulz (1994), that firms tend to move into new lines of business when they are performing poorly in their existing business. Also consistent with the human capital diversification hypothesis, I find a negative relation between CEO years vested and firm debt ratios as well as equity return variances.

The evidence presented in this paper offers empirical support for the view that firm-level risk reduction decisions are affected by managerial objectives. This could explain why strategies such as diversification occur even when they do not increase shareholder value. By pointing out the characteristics that influence management's desire to reduce risk, these findings may also be helpful in designing contracts and control mechanisms that reduce such agency conflicts. That is, they may indicate when such mechanisms may be most appropriate.

The remainder of this article is organized as follows. In Section I, I describe and motivate the dependent and independent variable proxies. I describe the sample and present the findings in Section II. I conclude with a summary and implications in Section III.

I. Independent and Dependent Variable Proxies

A. The Independent Variable Proxies—CEO and Firm Characteristics

A.1. CEO Human Capital Vested in the Firm

Relative to shareholders, managers have a higher demand for firm-specific risk reduction because a manager's portfolio of human capital wealth is mostly tied to firm performance while shareholders are well diversified. Demand for

risk reduction may not be equal across managers, however. If risk reducing actions such as diversification also reduce overall performance, then such strategies involve a tradeoff. Under this scenario, managers who have more human capital vested in the firm have a higher demand for risk reduction.

One proxy for CEO human capital vested in the firm is CEO years with the firm. This is because CEO managerial skills become more firm-specific as time spent with the firm increases. A testable implication for the human capital diversification hypothesis is thus stated as follows: Given that diversification reduces human capital risk, firms whose CEOs have more years vested are more likely to pursue diversification strategies. Also, given that other actions can be taken to reduce firm-specific risk CEO years with the firm should be negatively associated with firm risk attributes such as debt ratios and equity variances.

CEO years with the firm also proxies for other factors that may affect diversification. For example, it may capture managerial entrenchment, and more entrenched managers may make diversifying acquisitions for empire building motives unrelated to human capital risk. To some extent I attempt to control for this by including other factors that may proxy for CEO entrenchment (discussed below). However, these controls will not allow us to distinguish fully between these hypotheses.

A.2. CEO Wealth Vested in Firm Equity

Jensen and Meckling (1976) argue that agency investment conflicts may result when managers hold an undiversified portfolio that consists primarily of firm equity. The problem occurs because managers cannot easily diversify their wealth invested in firm equity. In such a case, managers may choose negative NPV projects if they reduce firm specific return variance, while owners who have perfectly hedged away firm-specific risk through diversification are concerned only with the NPV of the project. Under this hypothesis we would expect that CEOs with higher levels of personal wealth vested in firm equity would have a higher demand for firm-specific risk reduction. This would have implications for diversifying acquisitions as well as other firm-specific risk attributes.

The problem with testing this theory is that while we can measure CEO wealth vested in firm equity, we know very little about the other elements of the CEO's personal portfolio. Some researchers (e.g., Agrawal and Mandelker (1987)) have used a ratio of CEO equity wealth to current cash compensation to proxy for wealth vested in firm equity. While this ratio is easy to measure, it will overstate CEO wealth vested in firm equity because it captures the accumulation of equity wealth but not the accumulation of potentially well-diversified cash compensation. My measure of the ratio of personal wealth vested in firm equity attempts to capture both equity wealth accumulation and nonequity wealth accumulation over the CEO's career path. I do this by examining both the value of current equity holdings and by constructing a proxy for the accumulation of cash compensation earned throughout the CEO's

career path. Thus the proxy used to measure CEO wealth vested in firm equity to total wealth (EQ/WEALTH) is computed as:

EQ = the market value of CEO equity holdings as of the proxy statement date nearest to but prior to the acquisition announcement;

$$\text{WEALTH} = \text{EQ} + \left[(\alpha \cdot (\text{SB})) + \left(\beta \cdot \left(\frac{\text{SB}}{1.14} \right) \right) + \left(\gamma \cdot \left(\frac{\text{SB}}{(1.14) \cdot (1.20)} \right) \right) \right.$$
$$\left. + \left(\delta \cdot \left(\frac{\text{SB}}{(1.14) \cdot (1.20) \cdot (1.33)} \right) \right) \right];$$

SB = CEO salary plus bonus as of the nearest proxy statement date prior to the acquisition announcement;

α = the number of years that the CEO has held the position of CEO of the bidding or any other firm (until the year of the acquisition announcement);

β = the number of years that the CEO has held the position of president of the bidding or any other firm;

γ = the number of years that the CEO has held the position of vice president of the bidding or any other firm; and

δ = the number of years since age 30 until the CEO has attained the position of vice president of the bidding or any other firm.

The second group of variables to the right of EQ are meant to proxy for lifetime cash compensation accumulated by the CEO and are based on the following assumptions. Executive salary grows at an annual rate of 3.5 percent and can be invested to yield the same annual return. CEOs receive a raise equal to 14 percent of their previous compensation upon being promoted from president to CEO, 20 percent upon being promoted from vice president to president, and 33 percent upon becoming vice president.[1]

If CEO risk-taking decisions are a function of personal wealth vested in firm equity, then we expect to observe a negative relation between firm risk taking and the ratio of personal wealth vested in firm equity.

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[1] The salary growth rate assumption of 3.5% is based on the findings of Murphy (1985) and the long-run growth rate of real GNP in the USA. Such an assumption eliminates the need to discount past compensation, since it is assumed that the CEO earned 3.5 percent less last year but at the same time invested it to return 3.5 percent by the end of the year. The discount rates used to proxy for changes in compensation as a function of changes in position are also based on the findings of Murphy (1985). The results are robust to alternative assumptions on wage raises. Specifically, alternative specifications examined include no discounting of salary plus bonus; discounting at 20 percent, 20 percent, and 20 percent; as well as discounting at 30 percent, 30 percent, and 30 percent. For this sample, the median CEO salary plus bonus (SB) is $524,500. The median market value of CEO equity holdings (EQ) is $2,917,587, and the median CEO lifetime wealth level (WEALTH) is $17,026,234.

A.3. CEO Background

The CEO's specialty or background is another factor that may influence the firm's acquisition choice. If a CEO has a background specific to the firm's existing technology, he may be more valuable to a firm that specializes in that technology (see, for example, Shleifer and Vishny (1989)). Thus, for CEOs who are specialists in the firm's existing technology, the rewards to growth in the existing line of business may be greater than for generalist CEOs. However, a specialist at the existing technology is also more dependent on the success of that particular industry because his skills may be less transferable into other unrelated industries. Since both the rewards and risks associated with specialization are higher for the specialist CEO, I view the incentive to diversify for such a specialist as an empirical issue.

To examine how CEO backgrounds influence acquisition choice, I examine the backgrounds of the bidding firm CEOs and categorize them as specialists at the existing technology or alternatively general managers. Data on CEO backgrounds is obtained from corporate proxy statements and *Marquis Who's Who in Finance and Industry*. I construct a binary variable set to 1 if the CEO is categorized as a specialist at the existing technology and zero if categorized as a non-specialist. More specifically:

Specialist
- = 1   if the CEO is a specialist at the firm's existing technology defined as:
  - (1) The original firm founder,
  - (2) A background that is technical (e.g., engineering) in a firm whose primary line of business is technical (e.g., GE),
  - (3) Has worked in this or other firms in areas specifically related to the firm's primary line of business.
- = 0   for general manager or nonspecialist CEO:
  - (1) General managerial background (accounting, administrative, operations),
  - (2) Background unrelated to the firm's primary line of business (e.g., could have a technical background in a firm whose primary business is nontechnical, such as an engineer who is CEO of a retailer).

The classification of CEOs is based both on their training and work positions subsequent to training. For example if an engineer received an MBA and worked in accounting and administration at GE, she would not be considered a specialist. However, if she worked only in engineering related tasks prior to assuming an executive position, she would be considered a specialist at the existing technology. These classifications are made for bidding firm CEOs prior to the acquisition announcement.[2]

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[2] This classification method will be subject to noise, and thus sensitivity analysis is warranted. Since there are three ways a CEO can be classified as a specialist, I test whether any of the findings below change if I use only one of the three classification methods (while excluding firms from the other two classifications). I find that none of the findings for specialist are statistically

It is also interesting to note how diversification motives change as specialists acquire experience with the firm. There may be diminishing returns to specialization. However, the specialist's human capital becomes more firm specific as he builds years with the firm. Thus, there may be stronger incentives to diversify as the specialist acquires more years with the firm. To investigate this, I include in the analysis an interactive term, CEO years with the firm multiplied by the binary variable used to classify CEOs as specialists at the existing technology.

A.4. Past Performance

Shleifer and Vishny (1989) argue that when poor performance of the firm threatens a manager's job, he may have incentive to enter a new business. If this is the case, then the human capital diversification hypothesis would imply that CEOs whose firms have performed poorly in their primary industries would be more likely to move into new industries. Thus, one testable implication is that diversification is more likely when firms have performed poorly in the past.[3] I measure the bidding firm's past performance by including each firm's equity return (net of the market return) over a three-year period prior to the acquisition announcement. Returns are computed beginning one month prior to the acquisition announcement month.[4]

B. Dependent Variable Proxies

B.1. The Diversification Level Sought

I first examine firm risk strategies as they relate to the diversification level sought in a given acquisition. Diversification will reduce risk because combining industry cash flows that are not perfectly correlated will, in general, reduce the overall variance of the combined firm cash flows. Another way to see how diversification reduces equity risk is that if a firm is in a declining industry it

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different in each of these three tests. However, the results are strongest when I categorize only founders as specialists at the existing technology.

[3] There are two alternative hypotheses that relate prior performance to acquisition choice. First, based on Roll (1986), managers may be infected with hubris, and thus they are more likely to assume that there are positive synergies associated with their abilities to run unrelated businesses. This would imply a positive relation between past performance and diversification. Second, based on Morck, Shleifer, and Vishny (1990), some managers may simply be less competent. Thus, bad decisions in general carry forward to acquisition choices. This would imply a negative relation between past performance and diversification. The findings presented here are not able to distinguish between this latter hypothesis and the human capital diversification hypothesis discussed above.

[4] Alternative measures of performance such as net income and sales growth yielded statistically similar results. One advantage of using equity growth over these measures is that equity growth will capture the market's perception of the firm's future growth opportunities. This is important because the free cash flow theory (Jensen (1986)) argues that firms with good past cash flow performance but poor internal investment opportunities are more likely to diversify.

will reduce the chance of shrinking with that particular industry by moving into a new industry.

Although there is some evidence that diversification reduces equity variance,[5] studies such as Berger and Ofek (1995) and Morck, Shleifer, and Vishny (1990) show that diversification also reduces firm value. Thus, it is not clear that CEO human capital risk is reduced through diversification. The key issue is how sensitive CEO performance evaluation is to firm-performance. If the executives are disciplined only when performance is extremely poor, then a diversifying acquisition would reduce human capital risk because even though average performance decreases the risk of extremely poor performance (variance) also decreases. Morck, Shleifer, and Vishny (1989) and Kaplan (1994) find that CEO replacement is a function of performance. However, one may conclude from their findings that it is severely poor performance (i.e., low industry relative Tobin's Q's and negative earnings) that determines replacement. This evidence offers some support for the view that diversification will reduce human capital risk. However, Morck, Shleifer, and Vishny (1990) show that diversifying acquisitions are viewed negatively by the market. Mitchell and Lehn (1990) show that firms that make bad acquisitions tend to be targets themselves, which leads to higher management turnover (Martin and McConnell (1991)). Thus, even though the risk of replacement from internal sources may be reduced through diversification, there may be a higher risk of disciplining through the market for corporate control. I thus view the effect of diversification on human capital risk as an assumption which requires more empirical investigation.[6]

To measure the diversification level sought in a given acquisition, I construct three alternative measures. The first is the covariance of equity returns between the bidding and target firms. Using monthly equity returns available from the Center for Research in Security Prices (CRSP), I calculate the 60-month covariance between the bidding and target firm monthly equity returns prior to the acquisition announcement. Acquisition announcement dates are obtained from the *Wall Street Journal Index*. The second proxy tries to capture the amount of *firm-specific* risk reduction attained through a given acquisition. To do this, I calculate the covariance of the market model residuals between

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[5] In this sample I find evidence consistent with diversification reducing the variance of firm equity returns. Specifically, there is a negative and significant relation between the variance of firm equity returns and that firm's level of diversification—as measured by the number of firm SIC industry codes.

[6] For the sample described below I find an average drop in cumulative abnormal return equal to 3.45 percent on the day that firms announce diversifying acquisitions (as defined by SIC line of business codes). This drop is significantly different form zero (*t*-statistic is −2.775) beyond the 5 percent level and significantly below the stock response for firms that announce related acquisitions (difference is 3.1 percent with a *t*-statistic of 1.871). This would imply that CEO human capital is more vulnerable to external discipline when firms diversify. However, when I split the sample based on the median CEO years with the firm (22), I find that there is no significant market reaction to diversification for the sample of 107 firms whose CEO is in the upper 50 percent of tenure. Thus, it appears as though, in this sample, diversification is perceived as harmful on average but not when contemplated by CEOs who have been in their job for a long time.

the bidder and target over the same 60-month period prior to the acquisition announcement.[7]

The above two proxies measure the relatedness between the target and the bidder, and thus are designed to capture diversification across industry. This however, may be different than diversification in the portfolio sense. Movement into an unrelated industry may still not reduce portfolio return variance because in a portfolio of very few assets the variance of the marginal asset's returns will also impact the variance of the combined portfolio. In addition, the relative size of the additional asset will impact the return of the combined portfolio. To incorporate both of these factors, I construct a measure of the implied change in equity variance resulting from the acquisition. This implied change in equity variance is the variance of the two-asset (bidder and target) portfolio (weighted by the equity value of each firm) less the variance of the bidder prior to the acquisition. It is computed as follows:

$$[(W_1)^2(\text{Var}(\text{Ret}_{\text{bidder}})) + (W_2)^2(\text{Var}(\text{Ret}_{\text{target}}))$$
$$+ 2W_1W_2(\text{Cov}(\text{Ret}_{\text{bidder}}, \text{Ret}_{\text{target}}))] - \text{Var}(\text{Ret}_{\text{bidder}}) \quad (1)$$

where:

$$\text{Var}(\text{Ret}_{\text{bidder}}) = \text{the variance of the bidder monthly equity returns computed 60 months prior to the acquisition announcement;}$$

$$\text{Var}(\text{Ret}_{\text{target}}) = \text{the variance of the target monthly equity returns computed 60 months prior to the acquisition announcement;}$$

$$\text{Cov}(\text{Ret}_{\text{bidder}}, \text{Ret}_{\text{target}}) = \text{the covariance of equity returns between the bidder and the target computed 60 months prior to the acquisition announcement;}$$

$$W_1 = \text{MVEB/(MVEB + MVET)};$$
$$W_2 = \text{MVET/(MVEB + MVET)};$$
$$\text{MVEB} = \text{the market value of equity of the bidder 1 day prior to the acquisition announcement; and}$$
$$\text{MVET} = \text{the market value of equity of the target 1 day prior to the acquisition announcement.}$$

For each of these three diversification proxies, the lower the value, the more diversifying the acquisition.

B.2. Firm Risk Attributes

If CEO characteristics are associated with the level of diversification sought in a given acquisition, then it is possible that the same characteristics are

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[7] The correlation of returns and residual returns are also examined with results that are not statistically different from those described below. However, I use the covariance because residual and model diagnostics reveal that it is more suitable to the linear assumptions of the regression model.

associated with other firm policies that affect firm specific risk. For example, high levels of debt will increase the risk of bankruptcy and leverage the variance of equity returns. Other policies that affect firm risk (e.g., operating leverage, riskiness of investment projects) will be reflected ultimately in the variance of firm equity returns. To test for CEO risk reduction motives, I examine how the sample firm's debt policies and variances of equity returns are associated with the same CEO characteristics described above.

To proxy for cross-sectional differences in debt policy, I examine the net of industry debt to value ratio of the bidding firm in the year ending prior to the acquisition announcement year.[8] Debt is calculated as book value of debt. Value is book value of debt plus book value of preferred stock plus market value of common stock. The median debt-to-value ratio for each firm's primary two-digit Standard Industrial Classification (SIC) industry is subtracted from that firm's debt-to-value ratio to compute the net of industry debt ratio.[9] To measure the overall variance of firm equity returns, I use two alternative measures. The first is the variance of monthly equity returns of the bidding firm over a 60-month interval ending one month prior to the acquisition announcement. The second measure of return variances attempts to capture firm-specific variance (i.e., variance net of market effects). To do this I regress bidding firm returns on market returns each month for the same 60-month period. The residuals for each month i are computed as: $\varepsilon_{bi} = R_{bi} - (K_{bi} + \beta_{bi}R_{mi})$ where R_{bi} is the bidding firm equity returns in the given month i, R_{mi} is the value-weighted market return in the given month i, and $i = 1$ to 60 months prior to the acquisition announcement month. The variance of these residuals over the 60-month period is thus used to proxy for cross-sectional differences in firm-specific risk.[10]

Table I presents data descriptions for all the variables used, along with summary statistics and data sources.

II. Construction of the Sample and Results

A. Construction of the Sample

The sample consists of firms that have made acquisitions between 1979 and 1990. There are five criteria that must be met for an acquisition to be included in this sample: 1) the acquisition must have been completed before 1991, 2) the target's equity value must be at least 5 percent of the bidder, 3) CRSP data

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[8] If the CEO has not been with the firm for more than two years, I exclude these observations from the sample. The results are not affected by the exclusion of these three observations.

[9] Industry adjustment is performed in order to control for asset-specific factors that may influence capital structure (Smith and Watts (1992)). None of the results that follow change statistically when using the unadjusted firm debt to value ratio.

[10] The 60-month interval is chosen in order to capture the effects of the given CEO's decisions near the time that other CEO characteristics are examined. If the CEO has been CEO of that firm for less than 60 months but more than 30 months, I calculate the variance over the CEOs tenure as CEO. If the CEO has been CEO for less than 30 months, I delete this observation from the sample.

Table I
Data Construction, Summary Statistics, and Data Sources for the Variables Used

Dependent Variables	Mean	Median	Standard Deviation	High	Low	Data Source
Equity Return Covariance	0.423	0.355	0.370	2.548	−1.020	CRSP

Covariance of monthly equity returns between bidder and target computed over a 60-month period beginning one month prior to acquisition announcement month (multiplied by 100).

Residual Equity Return Covariance	0.115	0.087	0.317	2.911	−2.580	CRSP

Covariance of monthly residual returns (from the market model) between the bidder and target computed over 60 months prior to the acquisition announcement month (multiplied by 100). The market model residuals for the bidder and the target are computed as: $\varepsilon_{bi} = R_{bi} - (K_{bi} + \beta_{bi}R_{mi})$ and $\varepsilon_{ti} = R_{ti} - (K_{ti} + \beta_{ti}R_{mi})$ where R_{bi}, R_{ti} are the bidding and target firm equity returns in the given month i, R_{mi} is the value-weighted market return in the given month i and, $i = 1$ to 60 months prior to the acquisition announcement month.

Implied Change in Equity Variance	−0.216	−0.092	0.350	0.376	−1.971	CRSP

Change in equity variance implied by the acquisition (multiplied by 100) computed as:

$$[(W_1)^2(\text{Var}(\text{Ret}_{bidder})) + (W_2)^2(\text{Var}(\text{Ret}_{target})) + 2W_1W_2(\text{Cov}(\text{Ret}_{bidder}, \text{Ret}_{target}))]$$
$$- \text{Var}(\text{Ret}_{bidder}).$$

$\text{Var}(\text{Ret}_{bidder})$ = the variance of the bidder monthly equity returns computed 60 months prior to the acquisition announcement;

$\text{Var}(\text{Ret}_{target})$ = the variance of the target monthly equity returns computed 60 months prior to the acquisition announcement;

$\text{Cov}(\text{Ret}_{bidder}, \text{Ret}_{target})$ = the covariance of equity returns between the bidder and the target computed 60 months prior to the acquisition announcement;

W_1 = MVEB/(MVEB + MVET);

W_2 = MVET/(MVEB + MVET);

MVEB = the market value of equity of the bidder 1 day prior to the acquisition announcement; and

MVET = the market value of equity of the target 1 day prior to the acquisition announcement.

Debt to Value Ratio	0.016	−0.006	0.187	0.661	−0.544	CRSP and COMPUSTAT

The bidding firm's book value of debt to book value of debt plus book value of preferred and market value of common equity in the year ending prior to the acquisition announcement year minus the median debt to value ratio of the bidding firm's two digit SIC primary industry. The data point is deleted if the CEO has been with the firm for less than two years.

Equity Return Variance	1.039	0.824	0.747	3.813	0.223	CRSP

Variance of bidding firm equity returns computed monthly over a 60-month period prior to acquisition announcement month (multiplied by 100). Or over the CEO's tenure as CEO if less than 60 months. If the CEO's tenure is less than 30 months the observation is deleted.

Residual Equity Return Variance	0.805	0.558	0.701	4.150	0.167	CRSP

Variance of bidding firm residual monthly equity returns (from the market model) computed over the same time period as the equity variance (multiplied by 100). The market model residuals for the bidder are computed as: $\varepsilon_{bi} = R_{bi} - (K_{bi} + \beta_{bi}R_{mi})$ where R_{bi} is the bidding firm equity returns in the given month i, R_{mi} is the value-weighted market return in the given month i.

Table I—*Continued*

Dependent Variables	Mean	Median	Standard Deviation	High	Low	Data Source
Human Capital Vested	22.736	22.000	11.615	50.000	0.170	Proxy Statements

CEO years employed with the bidding firm as of the acquisition announcement year.

Dependent Variables	Mean	Median	Standard Deviation	High	Low	Data Source
Ratio of Personal Wealth Vested in Equity	0.327	0.240	0.272	0.978	0.000	Proxy Statements and Marquis *Who's Who in Finance and Industry*

Value of bidding firm CEO equity holdings relative to a proxy of total equity and non-equity wealth computed as EQ/WEALTH:

EQ = the market value of CEO equity holdings as of the proxy statement date nearest to but prior to the acquisition announcement

$$\text{WEALTH} = \text{EQ} + \left[(\alpha \cdot (\text{SB})) + \left(\beta \cdot \left(\frac{SB}{1.14} \right) \right) + \left(\gamma \cdot \left(\frac{SB}{(1.14) \cdot (1.20)} \right) \right) \right. $$
$$\left. + \left(\delta \cdot \left(\frac{SB}{(1.14) \cdot (1.20) \cdot (1.33)} \right) \right) \right]$$

SB = CEO salary plus bonus as of the nearest proxy statement date prior to the acquisition announcement;

α = the number of years that the CEO has held the position of CEO of the bidding or any other firm (until the year of the acquisition announcement);

β = the number of years that the CEO has held the position of president of the bidding or any other firm;

γ = the number of years that the CEO has held the position of vice president of the bidding or any other firm;

δ = the number of years since age 30 until the CEO has attained the position of vice president of the bidding or any other firm.

Dependent Variables	Mean	Median	Standard Deviation	High	Low	Data Source
CEO Background	0.245	0.000	0.431	1.000	0.000	Proxy Statements and Marquis *Who's Who in Finance and Industry*

Specialist
 = 1 if the CEO is a specialist at the firm's existing technology defined as:
   (1) The original firm founder,
   (2) A background that is technical (e.g., engineering) in a firm that whose primary line of business is technical (e.g., GE),
   (3) Has worked in this or other firms in areas specifically related to the firm's primary line of business.
 = 0 for general manager or nonspecialist CEO:
   (1) General managerial background (accounting, administrative, operations),
   (2) Background unrelated to firms primary line of business (e.g., could have a technical background in a firm whose primary business is non-technical such as an engineer who is CEO of a retailer).

Dependent Variables	Mean	Median	Standard Deviation	High	Low	Data Source
Past Performance	0.124	0.089	0.283	1.861	−0.963	CRSP

The 3 year equity return (adjusted for dividends and stock splits) of the bidding firm beginning one month prior to acquisition announcement month net of the return on the value-weighted market portfolio over the same period.

must be available for the bidder and target, 4) proxy statements and COM-PUSTAT data must be available for the bidding firm, and 5) the bidding firm should not be subject to regulations that affect its acquisition or asset choice (this criterion rules out banks, bank holding companies, and regulated public utilities). These criteria are similar to those used in Morck, Shleifer, and Vishny (1990); thus, my sample construction begins with their sample. Al-though their sample of acquisitions is for the period 1975 to 1987, proxy statements obtained from the University of Chicago library are available only subsequent to 1979. I thus truncate their sample to include only acquisitions made between 1979 and 1987. To update the sample, I examined the top 100 transactions (acquisitions and divestitures) reported yearly from *Mergers and Acquisitions Magazine* between 1988 and 1990. Of these 300 transactions, 87 met the five criteria described above. Acquisition announcement dates were obtained from the Wall Street Journal Index. The final sample begins with of 226 acquisitions made by 200 firms. It is further reduced to a maximum of 184 acquisitions because of lack of data on CEO characteristics.

B. Results

B.1. The Diversification Level Sought

Table II presents results from multivariate regressions of the proxies for the level of diversification sought in a given acquisition on the proxies for CEO and firm characteristics described above. Each column heading in the table de-scribes which one of the three dependent variables is used—the covariance of equity returns, covariance of residual returns from the market model regres-sion, and the implied change in variance resulting from the acquisition—to examine the diversification level sought. In each row the independent vari-ables are described and the predicted sign of the coefficient under the human capital diversification hypothesis is in parentheses. The numbers in the table represent the coefficients of each independent variable along with the *p*-value (in parentheses below each coefficient) based on a two-tailed test of the null hypothesis that the coefficient is equal to zero. Each regression also includes a constant (not shown in the table). Given that I use three methods to test the same underlying phenomenon, I will henceforth term evidence as strong if the coefficient is significant (beyond the 5 percent level) in all three regressions.

Table II shows weak evidence that CEO years with the firm is linked to incentives to diversify. The coefficient on years with the firm is negative and significant beyond the 10 percent level only in the regression using the covari-ance of equity returns as the diversification level sought. There is strong evidence that CEO wealth vested in firm equity is associated with diversifica-tion. The coefficients on CEO wealth vested in firm equity are negative and significant (beyond the 5 percent using all three proxies for diversification level sought). For firms that make acquisitions, holding CEO years with the firm, background, and past performance constant, a one standard deviation increase in personal wealth vested in firm equity is associated with a 7 percent, 13

Table II

Multivariate Regressions of Diversification Level Sought in a Given Acquisition on Proxies For CEO and Firm Characteristics

The sample begins with 226 acquisitions made between 1979 and 1990. The table shows results from three multivariate regressions where the dependent variable is a proxy for the diversification level sought in a given acquisition. The three dependent variable proxies of the diversification level sought are the covariance of monthly equity returns between the bidding and target firms, the covariance of the monthly residual returns (from the market model) between the bidder and target and the change in equity variance implied by the acquisition. All three dependent variables are multiplied by 100. The independent variables are CEO years employed with the bidding firm (a proxy for human capital vested in the firm), a proxy for CEO equity vested in the bidding firm to total wealth, a dummy variable set to one if the CEO is a founder or has a background specific to the bidding firm's existing assets (a proxy for CEO background), the three year net of market equity return of the bidding firm prior to acquisition announcement (a measure of the bidding firm's past performance), and an interactive term that is the CEO's years with the firm multiplied by the CEO specialist dummy variable. The predicted sign under the diversification hypothesis is shown in parentheses by the independent variable descriptions. The coefficient on each independent variable is the number shown in the table. In parentheses below each coefficient is the two-tail *p*-value for the null hypothesis that the coefficient value is equal to zero. A constant is also included (but not shown) in each regression. More detail on the construction of all the variables is contained in Table I.

Independent Variables	Dependent Variables		
	Diversification Level Sought		
	Equity Return Covariance	Residual Equity Return Covariance	Implied Change in Equity Variance
	Covariance of returns between bidding and target firms	Covariance of market model residual returns between bidding and target firms	Change in equity variance implied by the acquisition
Human Capital Vested (−)	−0.004 (0.078)*	−0.001 (0.323)	0.065 (0.265)
Ratio of Personal Wealth Vested in Equity (−)	−0.101 (0.032)**	−0.152 (0.011)**	−0.193 (0.018)**
CEO Background (?)	0.390 (0.007)***	0.198 (0.016)**	0.152 (0.093)*
Past Performance (+)	0.373 (0.000)***	0.561 (0.000)***	0.227 (0.257)
Interactive Variable Human Capital Vested* Specialist Background (−)	−0.010 (0.032)**	−0.004 (0.094)*	−0.005 (0.124)
Number of Observations	184	184	182
Adjusted R^2	0.169	0.230	0.141

*, **, *** Significantly different from zero beyond the 10, 5, and 1 percent level of significance (two-tailed tests).

percent, and 15 percent of one standard deviation decrease in monthly equity variance, residual equity variance, and change in variance implied by the acquisition respectively.

CEOs who are experts at the existing technology tend to buy related targets as exhibited by the positive and significant relation between CEO expertise and all three diversification proxies. One interpretation of this finding is that for CEOs who are experts at the existing technology, the gains to specialization dominate the gains to diversification. There is also some evidence that poor market perception of the buying firm prior to the acquisition is associated with movements into new industries. Past performance is positively associated with the covariance of returns between bidding and target firms using both covariance proxies for relatedness. This finding is consistent with the hypothesis that CEOs move into new industries when they are performing poorly in their existing lines-of-business.[11]

The interactive variable is designed to proxy for the incentive effects related to CEO years with the firm for those CEOs who are specialists at the existing technology. This is done by multiplying CEO years with the firm by the specialization binary variable. The coefficient of this variable is negative and significant using both covariance proxies of the diversification level sought. However, it is not significant at conventional levels when using the implied change in equity variance as the diversification proxy.

To summarize, the results in Table II offer strong evidence of a negative association between CEO equity wealth vested in the firm and the diversification level sought. There is weaker evidence that specialists tend to acquire related firms, that poor performance in the existing line of business is associated with movements into different lines of business, and that specialists with many years vested tend to diversify. The findings are also robust to the inclusion of other variables (not shown) that may affect both the diversification level sought and some of the independent variable proxies. These include; bidding firm size, prior level of diversification, CEO age, firm age, and CEO entrenchment power (e.g., board composition, relative shareholdings, and block shareholdings).[12]

B.2. Other Firm Risk Attributes

The arguments for CEO risk reduction motives described above should be related not only to acquisition choices but to other decisions that affect firm-level risk. For example, those CEOs who are more concerned with human capital risk will be more averse to debt financing since higher levels of debt will increase the variance of equity returns and the risk of financial distress. Also, aversion to risk would result in selection of lower variance projects, and thus the overall variance of firm returns would be lower in firms whose managers have a higher demand for risk reduction. I test this by examining the same CEO characteristics described above for the 200 firms that made acquisitions

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[11] It is also contrary to Roll's (1986) hubris hypothesis discussed above.

[12] Unlike Amihud and Lev (1981), I do not find a significant association between the existence of block shareholders and the diversification level sought.

from 1979 to 1990 and relating them to firm debt ratios and equity return variances.[13]

Table III shows results from the three multivariate regressions. The dependent variables are net of industry debt ratio, equity return variance, and the variance of the residuals of equity returns from the market model. The independent variables are: CEO years employed with the firm, wealth vested in firm equity, CEO background, and the interactive term (CEO years with the firm times the specialization binary variable).

The results are highly significant only for the coefficient on CEO years with the firm in all three regressions. Holding all of the above factors constant, a one standard deviation increase in CEO years vested with the firm is associated with a 25 percent, 31 percent, and 35 percent of one standard deviation decrease in debt to value ratio, equity return variance, and residual equity return variance respectively.

There is no significant relation between these other firm risk attributes and CEO wealth vested in firm equity. CEOs who are specialists run relatively higher variance firms. However, the expertise coefficient is significantly positive only when the dependent variable is equity return variance and is marginally significant (beyond the 10 percent level) when the dependent variable is residual equity returns. Finally, there is weak evidence that specialists with many years vested run relatively lower variance firms. The interactive term is negative and marginally significant (beyond the 10 percent level) when the dependent variable is equity return variance.[14]

The findings relating CEO characteristics to firm risk-attributes in Table III support some of the findings on diversification choices shown in Table II. However, they are not consistent across all proxies. For example, the strongest finding for diversification level sought is CEO wealth vested in firm equity. But this is not significantly associated with firm risk attributes such as debt ratio and equity variance. One explanation for this is that acquisition decisions are clearly made by the existing CEO, while the proxies for debt policy and firm variance are a function of decisions made by the existing as well as prior CEOs. This implies that the diversification level sought (the dependent variables in Table II) more accurately proxies for the current CEO's risk-reduction strategies. However, the distinction between the findings may also imply that the diversification proxies used in Table II measure something other than risk reduction. If this is the case, then the findings in Table III question the interpretations of the results observed in Table II.

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[13] I use the same sample of acquiring firms for these tests, partly because doing so tests the robustness of the findings on firm diversification motives shown in Table II, and also because of the prohibitively high cost of gathering data on the some of the independent variable proxies. Given that the firms in this sample come from a broad cross-section of industries and sizes, selection bias does not appear evident.

[14] The findings in Table III are robust to the inclusion of the same potentially spurious factors described for the regressions shown in Table II.

Table III

Multivariate Regressions of Firm Debt Ratios and Equity Return Variances on CEO Characteristics

This table examines how firm risk attributes are associated with CEO and firm characteristics. The sample begins with the same 200 acquiring firms examined in Table II. The table shows results from three multivariate regressions where the dependent variables are the firm's debt to value ratio, variance of equity returns and the variance of residual equity returns. Debt to value is the bidding firm's book value of debt to book value of debt plus book value of preferred and market value of common equity in the year ending prior to the acquisition announcement year minus the median debt to value ratio of the bidding firm's two-digit SIC primary industry. Equity return variance is the variance of bidding firm equity returns computed monthly over a 60-month period to acquisition announcement month (multiplied by 100). Or over the CEO's tenure as CEO if less than 60 months. If the CEO's tenure is less than 30 months the observation is deleted. Residual equity variance is the variance of bidding firm residual monthly equity returns (from the market model) computed over the same time period as the equity variance (multiplied by 100). The market model residuals for the bidder are computed as: $\varepsilon_{bi} = R_{bi} - (K_{bi} + \beta_{bi} R_{mi})$ where R_{bi} is the bidding firm equity returns in the given month i, R_{mi} is the value-weighted market return in the given month i. The independent variables are CEO years employed with the bidding firm (a proxy for human capital vested in the firm), a proxy for CEO equity vested in the bidding firm to total wealth, a dummy variable set to one if the CEO is a founder or has a background specific to the bidding firm's existing assets (a proxy for CEO background), and an interactive term that is the CEO's years with the firm multiplied by the expertise dummy variable. The predicted sign under the personal risk reduction hypothesis is shown in parentheses by the independent variable descriptions. The coefficient on each independent variable is the number shown in the table. In parentheses below each coefficient is the two-tail p-value for the null hypothesis that the coefficient value is equal to zero. A constant is also included (but not shown) in each regression. More detail on the construction of all the variables is contained in Table I.

	Dependent Variables		
	Firm Risk Attributes		
Independent Variables	Debt to Value Ratio	Equity Return Variance	Residual Equity Return Variance
	The bidding firm's debt to value ratio	Variance of bidding firm monthly equity returns	Variance of bidding firm residual monthly equity returns
Human Capital Vested (−)	−0.004	−0.020	−0.021
	(0.015)**	(0.000)***	(0.000)***
Ratio of Personal Wealth Vested in Equity (−)	−0.003	0.429	0.286
	(0.643)	(0.212)	(0.177)
Managerial Background (?)	−0.061	0.676	0.404
	(0.492)	(0.014)**	(0.097)*
Interactive Variable Human Capital Vested* Specialist Background (−)	0.001	−0.018	−0.011
	(0.788)	(0.054)*	(0.187)
Number of Observations	172	171	171
Adjusted R^2	0.060	0.205	0.166

*, **, *** Significantly different from zero beyond the 10, 5, and 1 percent of significance (two-tailed tests).

III. Conclusions and Implications

This article examines the relation between CEO characteristics and decisions that affect firm-level risk. Using a sample of 226 acquisitions made between 1979 and 1990, I find a negative and significant relation between CEO wealth vested in firm equity and all three proxies of the diversification level sought in a given acquisition. Intuitively this means that for firms that make acquisitions, the acquisitions tend to be more diversifying in nature when CEOs have more of their wealth vested in firm equity. Such a finding is consistent with the hypothesis that CEOs with more nondiversifiable wealth vested in the firm will have more incentive to reduce personal risk through diversification. There is also some evidence that CEOs who have a background specific to the firm's existing line of business tend to acquire similar firms. I interpret this finding as consistent with Shleifer and Vishny's (1989) model that for specialists at the existing technology the gains to specialization outweigh the gains to diversification. However, when CEOs are specialists *and* have been with the firm for many years, they tend to diversify. One interpretation of this finding is that as human capital becomes more firm specific, the personal gains to diversification outweigh the gains to specialization. Also, consistent with the human capital diversification hypothesis is the finding that firms tend to diversify when they are performing poorly in their existing lines of business.

I also examine how other characteristics that relate to firm-specific risk are associated with the same CEO attributes. I find a negative and significant relation between CEO years vested with the firm and that firm's equity variance and debt to equity ratio. This is consistent with the hypothesis that as human capital vested in the firm increases, there is more incentive to reduce firm specific risk. However, the other factors that I find to be associated with diversification are not found to be as strongly associated with these other firm risk attributes.

The findings of this article are consistent with the model and evidence of Amihud and Lev (1981) who examine managers' opportunities to pursue diversification. The findings present new evidence on cross-sectional differences in managers' motives to reduce risk. Such evidence could be helpful in constructing compensation contracts or control mechanisms that are designed to align risk-taking incentives of managers with those of shareholders. For example, they point to one potential cost associated with equity-based compensation. That is, the accumulation of equity wealth while aligning effort incentives may make the manager more risk averse and thus misalign risk-taking incentives.

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