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Organizational Risk and Capital Investments: A Longitudinal Examination of Performance Effects and Moderating Contexts

Mousumi Bhattacharya
Assistant Professor of Management
Fairfield University

Kathleen K. Wheatley
Assistant Professor of Management
University of Tennessee at Chattanooga

Capital investments are among the most critical determinants of competitive advantage (Porter, 1992), in that they have long-term implications for firms in their generation of earnings through current and future returns. Because capital investments entail large outflows of cash, they arguably are related to firm returns and its fluctuation. However, the strategic management and financial perspectives often offer different explanations of the relationship between variations in firm returns and capital investments. From a strategic management perspective, variations in cash flow and stock returns should affect the capital investments behavior of firms (Bromiley, 1986a, 1986b), and the integration of behavioral and contingency theories suggest that firms that vary capital investments in response to organizational risk will outperform those that do not. In con-

trast, the financial perspective indicates that variability in capital investments in response to variability in cash flow is detrimental to the firm's value and should be eliminated, through hedging, to stabilize capital investments patterns (Froot *et al.*, 1993, 1994). Therefore, in this study, our main purpose is to examine the relationships among organizational risk, variation in capital investments, and firm performance.

We also analyze whether the organizational context matters in the relationship between organizational risk and variability in capital investments. Researchers have contended that organizational context strongly influences business investment decisions (Cyert and March, 1963; Thompson, 1967; Noda and Bower, 1996; Steensma and Corley, 2001). Our review of the literature indicates that firms that are more capital intensive,

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possess more slack resources, and have greater employment variability will behave differently in relation to capital investments than will those with lower capital intensity, slack, and/or variability in employment (Noda and Bower, 1996; Steensma and Corley, 2001). We discuss how these contextual variables may moderate the relationship between organizational risk and variation in capital investments and empirically test the interaction effects. By linking capital intensity, slack, and variation in employment with the risk-variability in capital investments relationship, we highlight the role of organizational contexts for capital investments decisions of the firm.

The major contribution of this study lies in analyzing the organizational risk-variability in capital investments relationship over time using a large sample of pooled time-series data along the following two dimensions. First, we assess whether it is of benefit to the firm to vary its capital investments in response to risk—whether the interaction effect of risk and flexibility of investments on the long-term returns of the firm is positive. This finding has significant implications for researchers, who might further explore the various conditions in which flexible investments improve firm performance, and for managers, who make decisions about capital investments. It also provides insights into when flexibility in investments is undesirable and when managers should act to stabilize investments. Second, we empirically show that the risk-variability in investment relationship is contingent on the organizational context, in that capital intensity accentuates the relationship, whereas slack and variability in employment buffer it. Therefore,

managers must be cognizant of the relevant organizational factors that may assist them in making their investment flexibility decisions. In the following sections we discuss the theoretical background, develop hypotheses, explain methodology, and discuss results. We also provide future research directions and managerial implications.

THEORY AND HYPOTHESES

Risk and Variation in Capital Investments

Palmer and Wiseman (1999) refer to organizational risk as the uncertainty of a firm's income stream or returns. This form of risk is distinct from managerial risk-taking or shareholder risk (Palmer and Wiseman, 1999). Researchers note that variation in firm returns is critical for analyzing firm-level or within-firm decisions (Miller and Bromiley, 1990; Palmer and Wiseman, 1999). Firm returns provide the enabling conditions for resource commitments because, in addition to serving as indicators of the cash available from operations to fund investments, they influence the firm's ability to borrow. They also indicate (albeit noisily) the returns from prior investments, which may in turn be correlated with the quality of the firm's current investment opportunities, provided they exist within the same area of expertise. Therefore, reductions in a firm's returns generally result in lower levels of investments in resources, whereas increases in returns lead to increased investments.

Variation in capital investments indicates how much firms have changed, or varied, their capital investments over time in relation to

their average investment levels. Greater variability indicates greater fluctuations around the mean, whereas lower variability represents more stable investment patterns. Therefore, a firm with greater variation in capital investments is either more flexible in its capital investments pattern, or has been making more changes in its capital investments, than is a firm with lower variation in capital investments, which indicates either investment stability or inability or unwillingness to invest.

Both strategic management and finance literature suggest similar rationales for the relationship between organizational risk and capital investments. The behavioral theory of the firm, while discussing the processes of decision making in organizations, indicates that firm returns are major determinants of managerial choices about resource commitments (Cyert and March, 1963). If the returns are unstable, investments are affected as well because problem-driven search continues until a satisfying alternative is found (Greve, 2003). Therefore, if firm returns do not match expectations, investment patterns are changed until a satisfactory solution is found. This suggests that variation in firm returns will positively affect variation in capital investments decisions and that, over time, capital investments will vary along with the variation in firm returns—they will be high when firm returns are high and low when firm returns are low.

Similarly, financial literature has shown that capital investments are sensitive to cash flow (Bond and Meghir, 1994; Fazzari *et al.*, 1988) and liquidity (Cleary, 1999). Froot and his co-authors emphasize that “variability in internal cash flow must result in either: (a) variability in the amount

of money raised externally or (b) variability in the amount of investment” (1993: 1630). Firm returns affect cash flow and the overall liquidity of the firm; consequently, variation in capital investments should be affected by the variation in firm returns. When returns are low, firms must ration capital according to their limited cash flow, and only a few projects (usually those with the highest returns) get funded. Greater returns provide firms with more money to invest and reduce the need for capital rationing. Therefore, higher firm returns lead to more projects getting accepted and funded. In addition, profitability increases the borrowing capacity of the firm. The ability to take on more debt enables additional investments, beyond those that can be funded by profits. The inability to borrow, due to lower profitability, may constrain investment even further than the reduction in investment that is directly due to lower profits.

Therefore we hypothesize that organizational risk will positively affect variation in capital investments.

Hypothesis 1: Organizational risk is positively related with variation in capital investments.

Two caveats are in order. First, reactions to adjusted capital investments may occur with a time lag as the interpretation and reaction process unfolds in managerial decision making. Because variation in capital investments represents the investment profile of the firm over a period of time, decision lags can be captured by the pattern of variability. In other words, the association between variation in firm returns and variation in capital investments is not strictly a point-to-point relationship; rather, it is a relationship between a pattern of variation in firm returns and a pat-

tern of variation in capital investments (Bedeian and Mossholder, 2000). Second, adjustments in capital investments may not be entirely planned; often, managers are forced to cut back or expand on the basis of market demands and other conditions. Therefore, flexibility in investments may occur not only by choice, but by circumstance as well.

Risk, Variation in Capital Investments and Firm Performance

Past studies on risk and firm performance have yielded conflicting results. Although some early financial portfolio studies have shown that greater risk is associated with greater returns (Aaker and Jacobson, 1987; Marsh and Swanson, 1984), others have questioned this positive association and have found negative relations between firm risk and returns (Bowman, 1980, 1982; Bromiley, 1991). The conflicting findings have led researchers to explore and examine factors that potentially impact the risk-returns relationship. Bowman (1982) looked at factors related to specific managerial behavior in "troubled firms" as well as strategic decision-making skill, while Fiengenbaum and Thomas (1986) proposed that environmental forces play a role. The risk-returns relationship, however, continues to be one of the unresolved "black box" issues as no consensus has emerged over time.

In view of the above controversy, a critical question that we examine is whether firms that vary their capital investments in response to organizational risk are more successful than those that do not. Whereas the strategic management and finance perspectives converge in their predictions about the relationship between

organizational risk and capital investments, they part ways in their assessments about performance effects. Strategic researchers, using a behavioral contingency approach, have suggested that to remain competitive, organizations must change their resource commitments in keeping with rapid changes in business environments (Rindova and Kotha, 2001; Teece *et al.*, 1997). In dynamic environments, established paradigms about the sustainability of competitive advantage and stable resource commitments may have limited usefulness, and flexibility and adaptability may contribute more to long-term success. For firms experiencing greater uncertainty in returns, flexibility in investments would enable them to maintain their competitive advantage, because outlay would be adjusted according to income stream. If the enabling conditions for stable capital investments do not exist, firms that adjust their resource commitments in response to shifts in demand may be more successful in maintaining their competitive advantage because the new resource combinations could achieve a better fit with the changed business conditions. Therefore, when variation in firm returns is high, firms that respond by varying their capital investments are expected to achieve a greater level of success than are firms that do not adjust their capital investments behavior pattern.

However, the financial approach considers variability in capital investments as undesirable because of the "diminishing marginal returns to investments," though only "to the extent that output is a concave function of investment" (Froot *et al.*, 1993: 1630); in other words, output goes down when capital investments go

down, leading to less optimal returns in case of variations. Froot and his co-authors (1993, 1994) acknowledge that, in an uncertain market, changes in business conditions may alter or shift the function altogether. Nonetheless, according to the financial approach, when variation in returns is high, firms that respond by varying their capital investments will achieve a lower level of success than those that employ any other organizational risk—variation in capital investments combination because variability of investments is detrimental for returns. In fact the financial perspective recommends hedging as a risk management strategy to stabilize capital investments when cash flow is uncertain.

These two competing views on risk, variation in capital investments and firm performance, are reflected in the following alternate hypotheses:

Hypothesis 2a: Variation in capital investments will positively moderate the relationship between organizational risk and firm performance.

Hypothesis 2b: Variation in capital investments will negatively moderate the relationship between organizational risk and firm performance.

The Organizational Context

Researchers have found that the organizational context has a significant influence on business investment decisions. Bower (1970) argues that capital investments are constrained by the organizational structure and systems in place. Noda and Bower (1996) show that resource commitment processes are critically influenced by the strategic and structural contexts of the organization. Therefore, it is likely that the relationship between organizational risk and variation in capital investments

will be affected by the organizational context. Firms may be more or less able to withstand the effect of uncertainty of returns on the basis of certain organizational factors. We suggest that capital intensity, availability of slack resources, and variability in employment level of the firm will moderate the relationship between risk and capital investments. Capital intensity represents the operating leverage of the firm, and may play a significant role in determining whether or not capital investments are affected by income-stream uncertainty. A long stream of research on organizational slack suggests that the investment choices made by managers may be enabled or constrained depending on the availability of slack resources within the organization (Steensma and Corley, 2001). Similarly, prior research indicates that investments in capital assets may be associated with changes in human capital (Cascio *et al.*, 1997; Kallapur and Trombley, 1999). Therefore we examine the moderating effect of these three organizational contexts (capital intensity, availability of slack, and level of employment) on the relationship between organizational risk and variability in capital investments.

Capital Intensity. Capital intensity, or the level of physical assets, represents the operating leverage of the firm (Barton and Gordon, 1988) and indicates the proportion of fixed to variable costs. Because capital assets are usually fixed and irreversible in nature, greater capital intensity denotes higher fixed costs and resource commitments and more pressure on the cash flow of the firm. In many capital-intensive industries, the investment level is not only high but occurs in a concentrated manner, so that firms invest in big projects in

good years but cut back in lean years because of their high fixed costs.

Because capital-intensive firms are characterized by an emphasis on the capital budget, we suggest that they are more likely to be sensitive to changes in firm returns and variation in profitability. We therefore expect that the capital intensity of the firm will further accentuate the effect of firm returns uncertainty on capital investments decisions. Firms that have greater levels of capital assets will react more to decreased profitability because they have higher fixed costs, which makes their capital budgets more sensitive to changes in the income stream. Therefore, firms with high capital intensity will cut back more on capital investments during periods of low profitability and invest more during profit upswings.

Hypothesis 3: Greater organizational risk is associated with greater variation in capital investments when capital intensity is high than when it is low.

Organizational Slack. An organization's excess resources, which buffer the firm from external shocks and changes, are referred to as slack. Behavioral theory argues that slack provides a cushion that enables firms to maintain stability when faced with performance variability (Cyert and March, 1963), which indicates a negative relationship between firm return uncertainty and organizational slack. Empirically, Bromiley (1991) and Wiseman and Bromiley (1996) find negative associations between various measures of slack and organizational risk; Palmer and Wiseman (1999) find a negative relationship between slack and managerial risk-taking.

Accordingly, we expect that organizational slack will buffer the effect of organizational risk on capital invest-

ments decisions. Firms with high levels of slack may not need to vary their capital investments decisions as frequently in response to variation in their returns for two reasons. First, as predicted by behavioral theory, higher levels of slack make the firm less sensitive to fluctuations in the environment. Therefore, firms can absorb income stream uncertainty to some extent and show less variation in their capital investments in response to organizational risk. Second, slack is inherently more variable than capital investments because it consists of excess resources that may not have immediate uses, whereas capital investments refer to long-term capabilities (Maritan, 2001). During periods of low and high profitability, slack can more easily be cut back or added to than capital assets, so a firm would vary its slack assets before its capital investments. Therefore, we expect that firms with more slack resources will exhibit less variation in capital investments in response to organizational risk.

Hypothesis 4: Greater organizational risk is associated with greater variation in capital investments when slack is low than when it is high.

Variability in Employment. Scholars have suggested that investment decisions for physical and human assets are related. For example, Kallapur and Trombley (1999) argue that a firm's investment opportunity set, which consists of the ratio of capital expenditure to assets, among other measures, depends on firm-specific factors such as the physical and human capital in place. Cascio, Young, and Morris (1997) demonstrate that firms are more successful when they make changes in their employment along with changes in their capital assets, and Koch and McGrath (1996)

suggest that firms often leverage labor with greater capital assets. These arguments prompt us to examine whether the relationship between variation in firm returns and variation in capital investments is affected by changes in the employment levels of the firm.

Variability in employment demonstrates the firm's flexibility in adjusting its level of employment; greater variability represents greater fluctuations in employee numbers over time, whereas lesser variability suggests relatively fixed levels of employment (Gerhart and Trevor, 1996). Firms may use part-time or contractual employees or resort to frequent hiring and firing to adjust their levels of employment according to fluctuations in demand and supply. Financial literature on operating leverage indicates that investments in capital assets are inherently less reversible than are investments in people, which implies that capital is less variable than labor (Dugan and Shriver, 1992). Therefore, it may be easier for a firm to change its employment level than its level of capital investments. Accordingly, we expect that firms with greater employment variability will have less variation in capital investments in response to organizational risk.

Hypothesis 5: Greater organizational risk is associated with greater variation in capital investments when variability in employment is low than when it is high.

A model with all of our proposed relationships is shown in Figure I. This figure not only highlights the individual hypotheses, but puts all our hypotheses together in the same contextual framework.

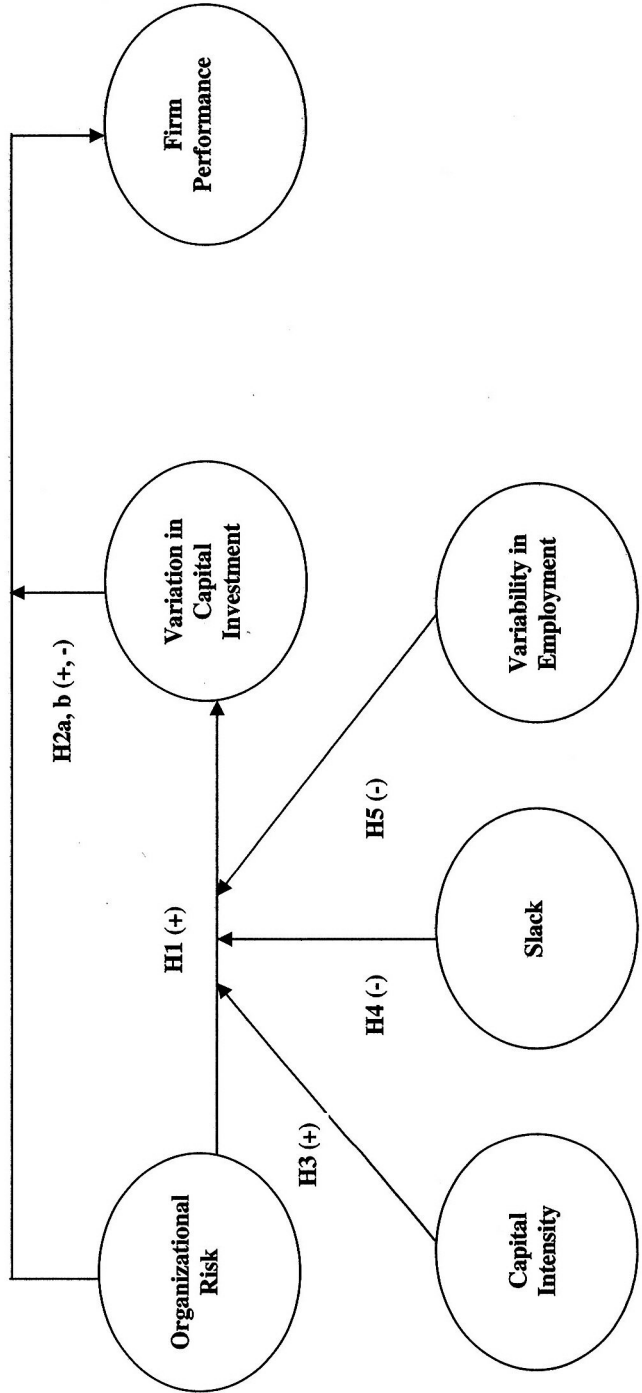
METHODS

We applied panel data analysis techniques (Markus, 1979) on pooled cross-sectional (firm), time-series (year) data from Standard and Poor's COMPUSTAT annual database for the period 1985-2002. We chose this period to represent several business cycles, so that sporadic or occasional fluctuations in an economic cycle would not bias the variability patterns. All firms included in the sample satisfied two criteria. First, they have (a) positive values for capital expenditure, (b) property, plant, and equipment, (c) total assets, (d) net sales, selling, and general administrative expenses, (e) total debt, (f) total equity, (g) market price of stock as of closing day, and (h) employee numbers. Second, no firms were missing time series data for the chosen period on these variables.

Measures

Organizational Risk. We used two measures of uncertainty of returns—one accounting measure, variance in the return on equity (ROE), and one market-based measure, variance in market price of stock as on the financial closing day. Earlier research has used both variability of firm profitability and volatility of stock prices as representing firm risk (Bowman, 1980; Arend, 2004). Return on equity is computed as operating income before extraordinary items divided by net equity. We calculated the variance in ROE and variance in market price of stock over the previous five years. For example for firm 1-1990 observation, variance in ROE is over 1985-89. Factor scores of these two measures were used to create an overall

Figure I
A Conceptual Model of Organizational Risk, Variation in Capital Investments, Firm Performance and Moderating Contexts



measure of risk (see Table 1) because they have an advantage over scales, in that they represent the shared variance between factors (Miller and Bromiley, 1990).

Capital Investments. Variance of annual capital expenditure (CAPEX) and annual value of property, plant, and equipment (PPE) are two measures of variation in capital investments. Commonly used as a proxy measure for capital investments in financial literature (Cleary, 1999), CAPEX represents funds used for additions to property, plant, and equipment (excluding amounts from acquisitions) during a year. In turn, PPE represents the amount of capital assets held by a firm each year and is a proxy for the capital investments of the firm in prior years. The variance of CAPEX and PPE were calculated over the previous five years (i.e., the firm 1-1990 variance is over 1985-89). We used factor scores of the two variance measures of capital investments to compute an aggregate measure of variation in capital investments (see Table 1).

Firm Performance. Firm performance was measured by averaging the return on assets (ROA) and return on sales (ROS) over the current year and last two years (e.g., 1987 firm performance is the average of 1985-87). Averaging firm performance over a time period smoothes out fluctuations in performance and ensures that the overall performance level is reflected (Shen and Cannella, 2002). We computed the factor scores of the two profitability measures to obtain an aggregate measure for firm performance, as seen in Table 1 (Miller and Bromiley, 1990).

Organizational Contexts and Control Variables. Following several past studies, we used the ratio of property,

plant, and equipment to total assets as the measure for capital intensity (Barton, 1988). Scholars have proposed a number of measures of organizational slack, from which we chose Bourgeois' (1981) conceptualization of slack through deliberate action of managers because it fits with our research emphasis of investment behavior. Bourgeois (1981) noted that an increase in general and administrative expenses would indicate management's injection of slack into the system by their investment in more overhead items. Therefore, we measured slack as selling and general administrative expenses over sales (Steensma and Corley, 2001), also known as recoverable slack (Geiger and Cashen, 2002). Variability of employment (Gerhart and Trevor, 1996) was measured as the variance of total number of employees over the last five years.

Four control variables are included in our models. First, to account for industry-level differences in the capital investments behavior of firms, we controlled for industry, using the two-digit standard industrial classification (SIC). Second, because previous research has shown that firm size is a significant predictor of firm performance and variation in stock returns (Fama and French, 1992), we controlled for firm size, measured as the natural logarithm of the total number of employees averaged over time. Third, we controlled for sales growth for each year during the period of our study because sales growth may have a significant impact on the investment behavior of the firm. Higher sales growth may prompt managers to invest in extra capacity while lower sales may induce curtailment of physical assets. Fourth and finally, we controlled for debt-equity,

Table 1
Rotated Factor Patterns

| Variables | Factor 1: Variation in Capital Investments | Factor 2: Risk | Factor 3: Firm Performance |
|---|--|----------------|----------------------------|
| Variation in capital expenditure | 0.925 | 0.034 | -0.027 |
| Variation in property, plant, and equipment | 0.841 | 0.021 | -0.019 |
| Variation in return on equity | 0.023 | 0.683 | -0.014 |
| Variation in stock price | 0.039 | 0.781 | -0.056 |
| Return on assets | -0.027 | 0.182 | 0.763 |
| Return on sales | -0.016 | 0.268 | 0.833 |
| Variance explained | 1.942 | 1.560 | 1.035 |
| Proportion | 0.311 | 0.220 | 0.162 |
| Cumulative | 0.311 | 0.531 | 0.693 |

Bold factor loadings have absolute values greater than .40.

the leverage ratio of the firm. Debt-equity ratio indicates how the investments are financed—a high ratio shows more borrowed capital, while a low ratio signifies more equity financing. Either way it may have limiting effects on investment patterns. For example, high debt restricts the capacity to borrow more, while high equity may lead to dilution of equity and lower the capacity to raise money from the markets. Therefore, we controlled for its effect.

Data and Analysis

Five initial years of data (1985-1989) were lost due to calculation of variance measures (i.e., variance measures were available from 1990). In addition, to include appropriate time lags in the data (in keeping with our argument that investment decisions and performance effects occur with a lag), we lagged firm performance measures by a year in relation to risk-variation in capital investments measures (i.e., for 1991 firm performance, the risk and variation in capital investments measure of 1990 was taken). Therefore, the final dataset consisted of 1,284 firms, each with twelve years of data (1991-2002), resulting in 15,408 firm-year observations. Forty-seven industries at two-digit SIC level were represented in the data. These include primary industries (SIC 10, 13, 14, 16), manufacturing (SIC 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39), transportation and utilities (SIC 42, 48, 49), trade, retail, and automotive dealers (50, 51, 52, 53, 54, 55, 56, 57, 58, 59), banking, financial, and real estate (61, 62, 65, 67), services (70, 73, 76, 78, 79), and public administration and miscellaneous (SIC 80, 87, 99).

We used the SAS procedure TSCSREG (time-series, cross-section regression), which analyzes panel data sets that consist of multiple time-series observations on each of several cross-sectional units (firms in this case). This procedure requires that each firm has the same number of time-series observations. Since ordinary least squares estimates of panel data can result in biased estimates due to the non-independence of errors within cross-sections, this procedure employs Hausman's test for random effects with autoregressive errors, and provides generalized least squares estimates. For testing the moderating effects, the products of the standardized variables were used as interaction terms (Cohen and Cohen, 1983) in PROC TSCSREG.

RESULTS

The results of our analysis are shown in Tables 2 and 3. The correlations, means, and standard deviations are in Table 2. As we expected, the measures of organizational risk are positively correlated with the measures of variation in capital investments. Hypothesis 1, which postulates a positive relationship between organizational risk and variation in capital investments, is supported (see Table 3). The coefficient estimate of overall risk is positive and significant for variation in capital investments (regression coefficient = .04, $p < .05$), and the r -square for the model is .17.

Hypotheses 2a and 2b postulate two competing views regarding the effect of the risk—variation in capital investments relationship on long-term firm performance. First, we find that organizational risk is negatively related to firm performance (regres-

Table 2
Descriptive Statistics and Correlation Coefficients

| Variable | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-------------------------------------|------|------|------|------|------|------|------|------|------|-----|
| 1. Firm size | 5.16 | 2.22 | | | | | | | | |
| 2. Sales growth | 4.47 | 2.28 | -.11 | | | | | | | |
| 3. Debt equity | 3.74 | 8.28 | .04 | .00 | | | | | | |
| 4. Variation in capital investments | 0.22 | 1.01 | -.32 | .22 | -.01 | | | | | |
| 5. Risk | 0.10 | 0.61 | -.09 | .11 | .05 | .12 | | | | |
| 6. Firm performance | 0.12 | 0.36 | .17 | .15 | .00 | -.08 | -.09 | | | |
| 7. Capital intensity | 0.33 | 0.20 | .07 | -.01 | .05 | .07 | .05 | .02 | | |
| 8. Slack | 0.26 | 0.35 | .25 | .24 | -.02 | -.08 | .03 | -.27 | -.13 | |
| 9. Variability in employment | 0.17 | 1.11 | -.23 | .09 | -.02 | -.31 | .06 | -.08 | -.07 | .13 |

Correlations of .03 and above are significant at $p < .05$.

sion coefficient = $-.03$, $p < .05$), consistent with the effects that Miller and Bromiley (1990) found (see Table 3). Similarly, variation in capital invest-

ments is negatively related to firm performance (regression coefficient = $-.10$, $p < .001$). The interaction between risk and variation in capital invest-

Table 3
Results of Hypotheses Tests

| Variables | Variation in Capital Investments | Performance Effects | Variation in Capital Investments | Variation in Capital Investments | Variation in Capital Investments |
|---|----------------------------------|---------------------|----------------------------------|----------------------------------|----------------------------------|
| | H1 | H2a, b | H3 | H4 | H5 |
| Industry ^a | | | | | |
| Size | -.14*** | .10*** | -.14*** | -.12*** | -.16*** |
| Sales growth | .07*** | .16*** | .07*** | .08*** | .06*** |
| Debt equity | .00 | .00 | .00 | .00 | .00 |
| Risk | .04* | -.03* | .03** | .05*** | .06*** |
| Variation in capital investments | | -.10*** | | | |
| Risk × variation in capital investments | | .09*** | | | |
| Capital intensity | | | .11*** | | |
| Risk × capital intensity | | | .02* | | |
| Slack | | | | -.01† | |
| Risk × slack | | | | -.03** | |
| Employment variability | | | | | -.10*** |
| Risk × employment variability | | | | | -.02* |
| R ² | .17 | .08 | .18 | .17 | .20 |

^a Dummy coded.

† $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

vestments is significant and positive (regression coefficient = .09, $p < .001$) for firm performance, and the r-square for the model is .08. Because our main effects are consistent with previous research, we believe that our data partially support Hypothesis 2a.

Hypothesis 3, which predicts a positive moderating effect of capital intensity on the relationship between organizational risk and variation in capital investments, is supported (see Table 3). The coefficient of the interaction of risk and capital intensity is positive and significant (regression coefficient = .02, $p < .05$). Hypothesis 4, which predicts a negative moderating effect of organizational slack on the risk variation in capital investments relationship, also is supported (see Table 3). The coefficient of the interaction of risk and slack is negative and significant (regression coefficient = -.03, $p < .01$). Hypothesis 5, which asserts that variability in employment negatively moderates the relationship between variation in profitability and variation in capital investments, is supported (see Table 3). The results show that the regression coefficient of the interaction term between variability in employment and organizational risk is negative and significant (-.02, $p < .05$).

We followed the procedure outlined by Aiken and West (1991) to graphically interpret interaction terms in Hypotheses 2a, 2b, 3, 4, and 5. We plotted two lines for each interaction effect: one for high and the other for low levels of the moderator variable. The high and low values (mean \pm standard deviation) of the dependent variable (y-axis) were plotted against high and low values of the independent variable (x-axis). The direction and intersection of the resulting lines are shown in Figures II,

III, IV, and V. Firm performance is high when high-risk firms show greater variation in capital investments (Figure II). This indicates that firms that face high risk and can vary their capital investments are more successful. Variation in capital investments is high when both capital intensity and organizational risk are high (Figure III). Therefore, capital intensity has a positive moderating effect on the risk-variation in capital investments relationship. Variation in capital investments is high when slack is low and organizational risk is high (Figure IV), which indicates a negative moderating effect of slack. Finally, variation in capital investments is high when variability in employment is low and organizational risk is high (Figure V), which indicates a negative moderating effect of variability in employment on the organizational risk—capital investments relationship.

DISCUSSION AND CONCLUSION

Research Implications

We studied the relationship among organizational risk, variation in capital investments, and firm performance using competing perspectives from strategic management and finance. Consistent with both strategic management and financial management, we find that firms with greater organizational risk are associated with greater variations in capital investments. On the other hand, these two literatures predict different outcomes for the interaction effects of the organizational risk—variation in capital investments relationship on firm performance. The contingency dynamic fit perspective in strategic management suggests that firms that

Figure II
Moderating Effect of Variation in Capital Investments-Organizational Risk on Firm Performance

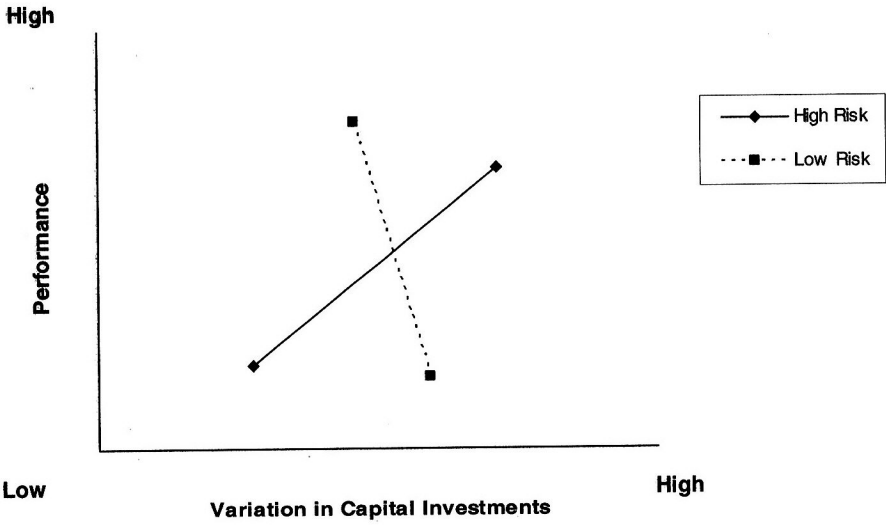


Figure III
Moderating Effect of Organizational Risk-Capital Intensity on Variability in Capital Investments

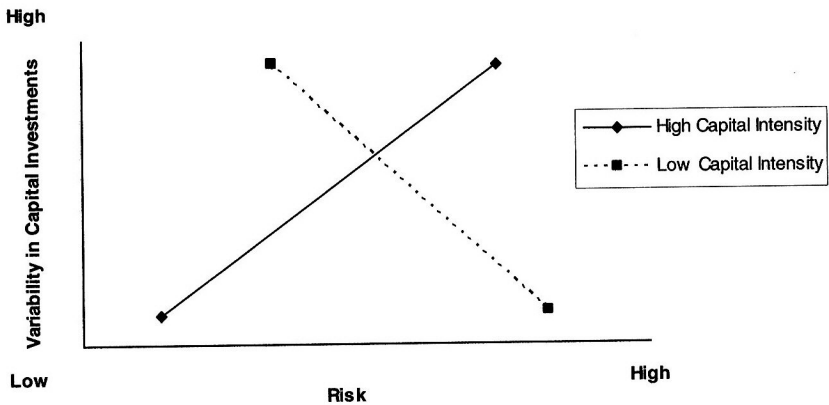


Figure IV
Moderating Effect of Organizational Risk-Slack
on Variability in Capital Investments

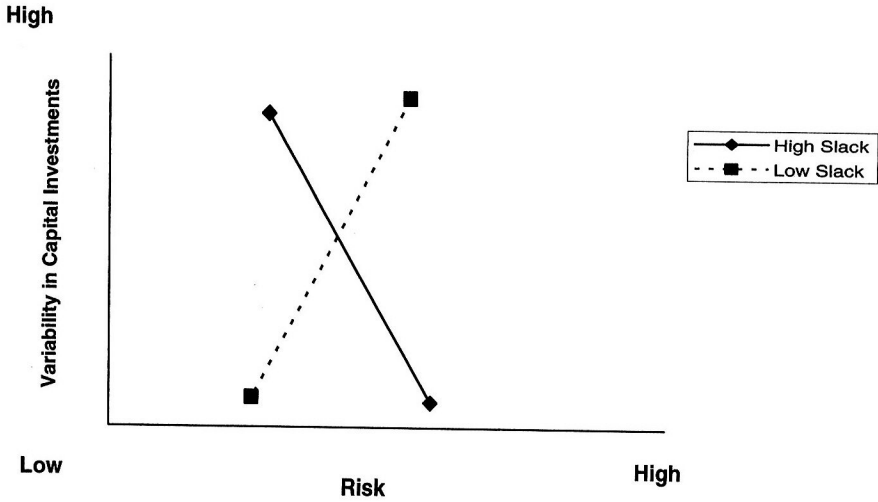
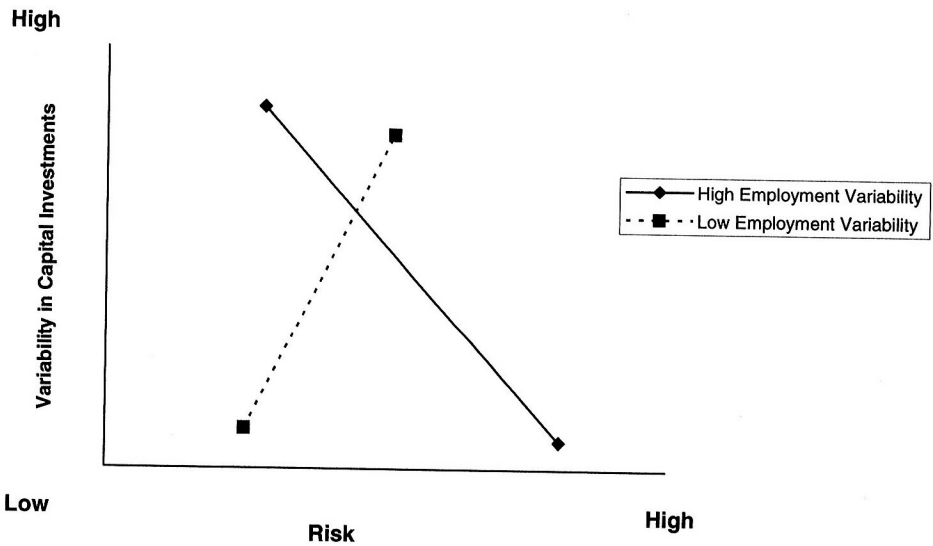


Figure V
Moderating Effect of Organizational Risk-Employment Variability
on Variability in Capital Investments



make adjustments to their investments in response to income stream uncertainty will be more profitable in the long run (Cyert and March, 1963; Rindova and Kotha, 2001; Thompson, 1967). However, in the finance literature, Froot *et al.* (1993, 1994) suggest that firms should aim to stabilize their investment patterns for greater returns.

Accordingly, we tested two competing hypotheses for the interaction effect of risk-variation in capital investments on firm performance: one stating that continuous adjustment to capital investments in response to income stream uncertainty would influence firm performance in a positive manner, the other just the opposite. Consistent with the strategic management perspective, our results show that high organizational risk firms with higher variation in capital investments outperform low-risk firms with high variation in capital investments, and that low-risk firms with lower variation in capital investments outperform high-risk firms with lower variation in capital investments. We have faith in this finding, because our main effects behave in a manner akin to the effects found in other studies that examine similar relationships. Therefore, our findings lend more credence to the contingency fit approach in strategic management—the high risk—high variation in capital investments and low risk—low variation in capital investments combinations seem to generate higher levels of performance, in contrast to the high risk—low variations in capital investments or low risk—high variation in capital investments.

We also find that the organizational contexts of capital intensity, slack, and variation in employment moderate the relationship between

variation in profitability and capital investments. By indicating that firms with greater capital intensity and greater risk have greater variation in their capital investments decisions, the results reaffirm the assertion that capital-intensive firms, which have greater operational leverage, are more sensitive to risk (Lev, 1974; Miller and Bromiley, 1990). Firms with more organizational slack exhibit less variation in capital investments in response to risk, consistent with the behavioral theory prediction that greater slack enables firms to absorb greater risks (Cyert and March, 1963). Finally, we find that firms that exhibit greater variability in employment respond less to risk in relation to capital investments. This finding supports our position that capital investments are inherently less flexible than is employment and, therefore, firms that respond to greater risk with greater variability in employment exhibit less variation in capital investments. The results also show that firms with greater income stream uncertainty and those that make more changes in employment make fewer changes in their capital assets.

Managerial Implications

From a practitioner's point of view, our findings have several significant implications. First, managers should be aware that the level of organizational risk determines the variability in capital expenditures. Therefore, they should monitor risk closely. Second, because low variation in capital investments in combination with low organizational risk and high variation in capital investments in combination with high organizational risk outperform other combinations of risk-variation in capital investments, manag-

ers in low-risk situations should consider strategies for stabilizing their capital investments, while those in high-risk firms should be ready to vary their capital expenditure. This key finding suggests that managers of low-risk firms must understand the importance of stabilizing their capital investments and decide on strategies for doing so. For example, they may use financial hedging tools like options for their capital investments (e.g., oil companies often lease their drilling sites instead of buying them outright in order to stabilize investments over a long period and not stagger it in any one period). In contrast, managers of high-risk organizations seem to perform better when they are flexible enough to vary their capital investments. Clearly, this entails a different set of strategies for their capital investments processes. For example, they should invest heavily during rising returns and cut back during downturns.

Finally, the moderating context variables provide significant guidance for managing variability in capital investments. Managers should therefore pay close attention to these organizational contexts before deciding their strategy. We find that in capital intensive firms the variability in capital investments in response to organizational risk is accentuated. This is good for high-risk firms but may create problems for low-risk firms. In either case, managers should factor in the effect of capital intensity in their strategy for capital investments. On the other hand, our results show that slack resources and variability in employment buffer the effect of risk on variability in capital investments. This helps low-risk firms to stabilize their capital investments pattern, so these firms should adopt strategies to in-

crease slack and employment variability. For example, the retail industry, where variability of returns is low (compared to say, computer manufacturers), primarily uses employment variability to adjust to seasonal variations in cash flow; they restructure capital investments only when there is a need for major strategic changes. However, a high-risk firm with high slack and employment variability may see somewhat reduced performance effects of risk-variability in capital investments interaction. For example, a technology firm (e.g., computer hardware manufacturer) would have a cyclical pattern of capital investments in keeping with the cyclical returns.

Limitations and Scope for Future Research

It is appropriate here to point out some limitations of our study that should be addressed through future research. First, methodologically, capital expenditures, the value of plant, property, and equipment, and capital expenditures over sales are broad approximations of the capital investments decisions of a firm. This is a shortcoming of accounting data in itself, because such data, due to aggregation and other adjustments, inevitably lose some of their richness. A more fine-grained analysis of different types of capital expenditures may provide a better picture of how capital investments decisions vary over time. For example, maintenance and replacement expenses may be disaggregated from expenses for new capital assets. Internal firm data or other secondary sources may reveal what percentage of capital expenditures is spent on investments as opposed to routine maintenance, replacements,

or additions. Furthermore, qualitative or survey data may indicate whether managers intentionally vary capital investments decisions in response to risk—that is, to what extent the variation in capital investments is intended or forced.

Second, we focus on two dimensions of organizational risk — variation in returns on equity and variations in market price of stock. Bromiley, Miller, and Rau (2001) provide a nice summary of the different types of risk constructs, and replicating this study using alternate specifications of risk, like perceptual risk, and managerial risk-taking (Palmer and Wiseman, 1999), may enhance the validity of our findings. In the future, researchers should also explore more organizational context variables that may affect the risk-variation in capital investments relationship. For example, human capital factors—such as managerial demographics, experience, risk-taking propensity (i.e., how managers respond to risk) (Palmer and Wiseman, 1999), a firm's competitive position, and other contextual variables suggested by Cyert and March (1963)—such as aspiration and expectation levels of managers—may affect this relationship.

Third, an interesting research question that arises from our study is: do firms in different industries behave differently in their capital investments decisions in response to risk? We have assumed an industry effect and have controlled for it because the focus of our study is more on the overall risk-variation in capital investments relationship. However, an inter-industry as well as intra-industry analysis may throw additional light on this relationship.

Limitations aside, this study is the first in the risk literature to explicitly investigate the organizational risk-variation in capital investments relationship at the firm-level from a longitudinal perspective. Although, in practice, firms resort to adjustments in capital budgets in view of uncertain profitability and market returns, no study has analyzed this relationship. Maritan (2001) studied the capital investments decision-making process in relation to the uncertainty associated with an investment project, but the level of analysis was individual projects. We explicitly focus on the pattern of capital investments behavior in the form of variation in capital investments, which has not been explored previously. Therefore, our study opens up a new research area for the strategic management literature.

Our study also expands research on organizational risk by investigating it as an explanatory variable for strategic investment decisions and showing that it is a significant predictor of variation in capital investments (a major resource-commitment decision of the firm). Following the tradition of Bowman (1980, 1982) and other researchers, we show that the organizational risk-firm performance relationship can be better understood by examining the context of the firm, in that we find that low-risk firms that vary their capital investments are outperformed by high-risk firms that vary their capital investments. Additionally, the revelations about the moderating effects of three contextual variables—capital intensity, slack, and variability in employment—shed more light on the risk-capital investments behavior of firms.

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Diana Bilimoria

This study examines the proposition that the presence of women on a company’s board of directors is positively associated with gender diversity in its top management team. Regression analyses indicate that after controlling for firm size and profits, industry type and profits, number of officers, and number of board members, the number of women corporate directors on a *Fortune 500* board is positively associated with the number of women officers at the company, the number of women officers holding line jobs, the presence of a critical mass of women officers, the number of women officers with high-ranking or “clout” titles, and the presence of women among the company’s top earners. These results indicate the importance of women board members for top management team diversity, and suggest that companies striving for increased gender diversity in their senior officer ranks and more facilitative environments for their top women employees should pay attention to their board-level representation of women.

Mousumi Bhattacharya and Kathleen K. Wheatley

Researchers in strategic management and finance agree that organizational risk (i.e., variations in firm returns) should influence capital investments decisions. However, the risk-capital investments relationship remains scantily explored. In this study we examine three issues: 1) How does organizational risk affect decisions about capital investments from a longitudinal perspective?, 2) Do organizational risk and decisions about capital investments jointly influence firm performance?, and 3) Is this relationship contingent on organizational context? The analysis of pooled cross-sectional time-series data for 1,284 U.S. firms over a period of 12 years shows that organizational risk and variation in capital investments are related, but the extent of their relation depends on the organizational context. In addition, firms that face greater organizational risk and are more flexible in their capital investments outperform firms that are less flexible. Overall, this longitudinal study provides support for a behavioral contingency approach to understanding capital investments decisions by showing that the link between organizational risk

