BOARD HETEROGENEITY AND STABILITY IN FIRM PERFORMANCE: AN EMPIRICAL STUDY UTILIZING MULTI-THEORETIC APPROACH

Kong-Hee Kim*, Abdul A. Rasheed**

Abstract

There has been scant research exploring the implications of board heterogeneity for board's functioning and subsequent corporate outcome of stability in firm performance. A number of hypotheses are developed based on a multi-theoretic approach incorporating board resources, board dynamics, and board independence. Results of testing the hypotheses reveal that board heterogeneity in organizational tenure, functional experience, and educational specialty is related to the stability of returns. Furthermore, increased ownership position by directors and institutional investors strengthens the relationship between board heterogeneity and stability of returns. The results of this study suggest that board heterogeneity increases organizational rationality and further the stability in firm performance through its more effective control and counsel functions to management.

Keywords: Board Heterogeneity, Stability in Firm Performance, Board Equity Ownership, Institutional Ownership Concentration

*Department of Management, St. Cloud State University, St. Cloud, Minnesota, 56301-4498
Tel.: (320) 308-3911
Fax: (320) 308-5184
Email: kkim@stcloudstate.edu
**Department of Management, College of Business Administration, Box 19467, University of Texas at Arlington, Arlington, TX 76019-0467
Tel.: 817 272 3867
Fax: 817 272 3122
Email: abdul@uta.edu

Organizational risk has important implications for executives, shareholders, suppliers, and employees (Bromiley, 1991; Shapira, 1995; Sanders and Hambrick, 2007). Performance volatility not only hinders organizational planning activities but also increases chance of corporate decline and mortality by diminishing firm's ability to respond to critical changes in the external environment (Palmer and Wiseman, 1999). Stability in firm performance, on the other hand, is often viewed as indicative of executive capability to environmental changes. Lower organizational risk (e.g., stability in corporate income streams) would be reflective of firm capability in predicting environmental changes, maintaining firm-environment alignment, and developing sustainable competitive advantages (Miles and Snow, 1978). In the face of relentless global competition and accelerating technological change, income stability allows a firm to buffer its core from extreme environmental fluctuations.

Board of directors has the final authority to assess and approve all major risk-related organizational decisions such as mergers and acquisitions, consolidation, and the reorganization of subsidiaries. Each of these decisions involves considerable risk for the organization because changes in market domains and technologies have outcomes that are not easy to predict. A growing body of research in recent years has examined the implications of board heterogeneity for organizational outcomes such as corporate strategic change (Haynes and Hillman, 2010; Goodstein et al., 1994), board's internal dynamics (Westphal and Bednar, 2005), and board engagement in the discussion of entrepreneurial issues (Tuggle et al., 2010). Unfortunately, board researchers and practicing managers know little about how board heterogeneity is related to the organizational risk through its functioning.

Research on the impacts of board heterogeneity on board's controlling and counseling functions require a multi-theoretic approach. This is because board performance is the outcome of a number of factors such as board resources, board internal dynamics, and economic behavior of directors. In recent years, corporate governance researchers have emphasized the need for integrative theoretical approaches in revealing subtle mechanisms among governance constituents (Hillman and Dalziel, 2003; Devers et al., 2008; Haynes and Hillman, 2010; Deutsch et al., 2010). For instance, Hillman and Dalziel (2003) argued that board independence may not be a sufficient condition for board effectiveness in control function over management; rather board independence should be understood together with a board's capability. Recent research focusing on the behavioral agency model (BAM) argues for the incorporation of a behavioral perspective into the elements of traditional one principal-one agent situations (Deutsch et al., 2010: 221). In this regard, heterogeneity of directors—as a source for diversity in a board's human capital and cognitive behavior—should have substantial implications for the board's functioning and therefore on subsequent corporate outcomes such as organizational risk (reflected in this study as performance volatility).

From a resource dependence perspective, it has been argued that greater variety of human capital through heterogeneous composition of boards would lead to a wider range of information, experience, and expertise in a board (Cannella et al., 2008; Carpenter et al., 2004; Finkelstein and Hambrick, 1996). From a group dynamics perspective, heterogeneity in board members' cognitive backgrounds should affect their interpersonal behaviors hampering the formation of conformity in a group **(**Pelled et al., 1999; Li and Hambrick, 2005), which would facilitate board independence in thoughts and actions. It may be harder for a CEO to dominate a board whose members have diverse cognitive orientations and behaviors rather than a board with cognitive homogeneity which inevitably leads to group cohesion and conformity. That is, a board's expanded informational base and independence derived from its heterogeneous composition increases its decision comprehensiveness and rationality. This in turn should enhance the stability in firm performance through effective control and advisory functions of the board. Additionally, from an agency theory perspective, equity ownership with the firm should have impact on the board members' engagement in monitoring, controlling, and counseling functions over management (Jensen and Meckling, 1976).

In order to explore the implications of board heterogeneity for organizational risk, this study develops a multi-theoretic model that draws from the theoretical underpinnings of resource dependence, board group dynamics, and the agency-theoretic perspectives. We empirically examined the association between board heterogeneity and the volatility of returns using a sample of 298 Fortune 1000 firms. The results of testing a number of hypotheses developed from a multi-theoretic model support the argument that board heterogeneity is negatively related to volatility of returns. Moreover, the relationship becomes stronger when the board members have higher firm equity ownership. The results of this study highlight the importance of using a multi-theoretic approach in exploring the role of board heterogeneity. Our results suggest that board heterogeneity increases board effectiveness in controlling and advisory roles, which in turn enhances organizational rationality leading to lower levels of performance fluctuation.

THEORY AND HYPOTHESES

Strategic decision making is a complex and dynamic process, especially because most decisions are made under conditions of uncertainty. Highly complex environments increase organizational risk. Unpredictability of rivals and strategic variety of firms in the industry all increase environmental complexity. Strategic decisions that contribute to the volatility of returns include R&D investments, changes in diversification posture, acquisitions and divestitures, and changes in competitive strategy (Sanders, 2001). Volatility of returns can also result from strategic initiatives involving the reallocation of resources or structural changes (Palmer and Wiseman, 1999). Thus, decisions and actions by managers (and sometimes inactivity as well) might result in higher levels of risk. Overall, volatility in corporate performance arises from changes in the congruency in firm-environment relationships (Miles and Snow, 1978). The congruency perspective suggests that the firm's risk is reduced through better alignment between the organization (e.g., structure, resources, and control systems) and the environment, and attainment of sustainable competitive advantage over rivals (Winfrey and Budd, 1997).

Research on organizational risk has often downplayed the distinctions between managerial risk taking and organizational risk (Miller and Bromiley, 1990). The confusion between managerial risk taking and organizational risk may stem from the implicit assumption that managerial risk taking is isomorphic to

higher organizational risk (Palmer and Wiseman, 1999). Managerial risk taking can be defined as managerial willingness to accept uncertainty, while organizational risk is volatility in firm performance (Gomez-Mejia et al., 2007; Palmer and Wiseman, 1999). While much of the research in financial economics centers on the assumption of a positive relationship between risk and return (Bettis and Mahajan, 1985), management scholars are more concerned about the implications of risk for *management*, (Henkel, 2009; McNamara and Bromiley, 1999). Organizational researchers argue that significant fluctuations in firm performance could undermine planning activities inside the organization and have negative consequences for firm survival and growth (Miller and Chen, 2003).

Board heterogeneity that reflects diverse functional areas, technologies, markets and competitive facets contributes to greater informational comprehensiveness in the assessment of strategic options. Resource dependence theory views that directors represent valuable resources for the firm (Pfeffer and Salancik, 1978; Ruigrok et al., 2006). Directors of boards—often composed of current or former executives from different industries and functional areas, lawyers, and former government officials—bring about valuable information, experience and network ties to the firm. The human capital of directors facilitates their monitoring and counsel functions while helping expand the firm's resource base through network linkages to other organizations (Golden and Zajac, 2001). In this regard it could be argued that heterogeneous boards have more breadth of expertise, skill sets, and organizational experiences, while having minimum redundancy in directors' knowledge structure. Thus, board heterogeneity is expected to be a source of advantage for firms operating in uncertain environments because it can enable firms to anticipate and respond to competitive moves, industry opportunities, and trends in macro environments. Conversely, homogeneous board membership would result in narrow-mindedness and redundancy in knowledge and information, which in turn would undermine comprehensiveness in decision making. Cannella et al (2008) provide empirical evidence that the benefit of functional diversity among top executives becomes stronger as environmental uncertainty increases. Similarly, boards with tenure diversity should have more diversity in information and task-related experience compared to a board that is composed of directors who have served the firm for many years together. That is, directors' prior experience with other organizations expands their knowledge about markets, business formats, and organizational control systems, serving as conduits of information between the firm and its external environments.

While cognitive diversity inherent in heterogeneous boards may help in the evaluation of strategic alternatives, the same cognitive diversity of a board may also have substantial impact on board's decision-making behavior. Previous scholars focusing on demography suggested that group phenomena in homogeneous versus heterogeneous teams are different (Jackson, 1992). The main source for the different group phenomena would be the cognitive and attitudinal differences among team members (Finkelstein and Hambrick, 1996). Homogeneous group members often share similar perceptions, beliefs, and knowledge, thus leading to similar interpretations and solutions to environmental stimuli (Hambrick et al., 1993). Subsequently, homogeneous group members are more likely to feel pressures toward uniformity and conformity because similarity provides positive reinforcement for one's attitudes and beliefs (Williams and O'Reilly, 1998). Conversely, board heterogeneity, characterized by diversity of knowledge, attitudes, problem-solving skills, and risk preferences should promote diversity of perspectives and ideas in a board, mitigating pressures to maintain the status quo and conformity to group norms. Directors in this compositional context are more likely to initiate independent analyses and air different perspectives and opinions in boardroom discussions (Golden and Zajac, 2001). From a process perspective, it would be less likely for a CEO to dominate the decision-making process of the board if the board members' cognitive orientations are diverse.

This board compositional condition not only facilitates maximum utilization of a board's human capital in conducting board's functions in monitoring, controlling, and counseling over management but also helps reduce biases and polarization at the apex of corporation. Previous scholars have identified various sources for cognitive biases, such as fads-and-fashions effect (Shiller, 1984), representativeness heuristic (Jackson and Dutton, 1988), and anchoring in risk-taking behavior (Kahneman and Tversky, 1979). For example, a CEO can simply define environmental forces as an "opportunity" or "threat" and take subsequent strategic actions while ignoring upside and downside potentials associated with such strategic initiatives. Similarly, CEOs with substantial discretion can have overconfidence about their own problem-solving capabilities, often underestimating the uncertainties associated with risky strategic options (Sitkin and Pablo, 1992). When the board is less independent from the CEO, a CEO may have more power and discretion to drive the firm in risky directions (Li and Tang, 2010) and dampen the independent judgment

of the board (Boyd, 1994; Haynes and Hillman, 2010). As discretion generally increases when there is less constraint (Hambrick, 2007), an independent board may reduce the CEO's potential biases and hubris through more objective judgments of management proposals (Crossland and Hambrick, 2007; Li and Tang, 2010). Thus, a more objective review of management proposals conducted by independent directors would substantially reduce the potential for volatility in firm performance. That is, boards comprised of directors from diverse knowledge domains and cognitive behaviors should help minimize biases in strategic information processing, enhance the organizational rationality, and reduce the potential for fluctuations in firm performance.

Therefore, we argue that board heterogeneity increases board resources necessary for a comprehensive assessment and appropriate counsel on strategic options proposed by management. It also promotes board independence necessary for objective judgment of management proposals. Board heterogeneity fosters a board context that helps facilitate maximum utilization of directors' human capital, while reducing informational biases and groupthink syndrome at the apex of the corporation. Board heterogeneity in human capital and cognitive behavior expands the breadth of knowledge, reduces biases in information processing, and enhances board independence in relation to the CEO, contributing to greater organizational rationality. Thus, we posit that board heterogeneity in tenure, functional experience, and educational specialization reduces the potential for volatility of returns.

Hypothesis 1a: Board heterogeneity in tenure will be negatively associated with volatility in firm performance.

Hypothesis 1b: Board heterogeneity in functional experience will be negatively associated with volatility in firm performance.

Hypothesis 1c: Board heterogeneity in educational specialization will be negatively associated with volatility in firm performance.

Moderating Effects of Equity Ownership

The principal-agent framework has been the primary theoretical lens that board researchers have traditionally employed. However, in recent years, there have been efforts to incorporate behavioral perspectives into traditional principal-agent economic model (Deutsch et al., 2010, Hambrick et al., 2008). Hillman and Dalziel (2003) asserted that board's performance in monitoring and counseling over CEOs is a function of both the board's economic incentives and board resources. Higher equity ownership by directors should enhance board members' vigilance in monitoring and controlling functions because equity ownership position with the firm stimulates board members' stewardship behavior. Stock ownership motivates directors to identify themselves with the firm, fostering a board climate that encourages board members' engagement in the discussion of risk-related strategic choices. By the same token, board members with higher equity ownership are more likely to infuse their expert knowledge and information into the boardroom discussions pertaining to corporate risk-related decisions. The advantageous resource base derived from board heterogeneity could be further leveraged in this board context, reducing informational biases and groupthink syndrome of the board as well as complacency on the part of the CEO. Therefore, higher equity ownership by directors increases the impact of board heterogeneity on stability in firm performance because firm equity ownership stimulates stewardship behavior of directors while increasing directors' vigilance on risk-related strategic decisions and subsequent organizational decision rationality.

Hypothesis 2a: The association between board's tenure heterogeneity and stability in firm performance will be stronger in firms with higher board equity ownership.

Hypothesis 2b: The association between board's functional heterogeneity and stability in firm performance will be stronger in firms with higher board equity ownership.

Hypothesis 2c: The association between board's educational heterogeneity and stability in firm performance will be stronger in firms with higher board equity ownership.

Often, the presence of large institutional investors enhances the board's control power in the relationship between the CEO and the board. Executives including the CEO have to seriously consider the voting

power of large institutional investors because those institutional investors have the power to replace board members as well as the CEO. The presence of ownership concentration on a small number of institutional investors suggests a power shift from the CEO to the board and fosters a governance context promoting board vigilance over managerial initiatives. Block-holding institutional investors with vested voting power on the board may encourage the board members to be more vigilant on risk-related strategic decisions. In this board context, board members are likely to be more active in the discussion of strategic endeavors, and the benefits of board heterogeneity would be better leveraged in monitoring and counseling functions, reducing CEO biases and hubris in organizational decisions. Therefore, we suggest that higher institutional ownership concentration in the firm strengthens the impact of board heterogeneity on stability of firm performance.

Hypothesis 3a: The association between board's tenure heterogeneity and stability in firm performance will be stronger in firms with higher institutional ownership concentration.

Hypothesis 3b: The association between board's functional heterogeneity and stability in firm performance will be stronger in firms with higher institutional ownership concentration.

Hypothesis 3c: The association between board's educational heterogeneity and stability in firm performance will be stronger in firms with higher institutional ownership concentration.

METHODS

To empirically test the hypotheses, we randomly selected 300 firms from Fortune 1000 list for the year of 2002. The data setting was chosen because Fortune 1000 firms encompass a variety of industry environments, diversification postures, and corporate governance structures, which enhances the generalizability of the study findings by reducing industry- and firm-specific biases as much as possible. Firm performance data for two firms were not available (e.g., bankruptcy during the period), thus 298 firms were used in the analyses; 151 firms out of 298 sample firms are in manufacturing industries, and 25 firms are in finance and insurance industries. Demographic proxies of 3245 directors, in total, were examined and coded to capture the degree of board heterogeneity.

Variables and Measures

For the categorical variables of board heterogeneity in functional and educational backgrounds, this study uses an entropy-based index of heterogeneity (Blau, 1977; Polzer et al., 2002). It is calculated as follows:

$$1-\sum_{i=1}^{N}(P_i)^2$$

where P_i is the proportion of a group's individual in the ith category. This index ranges from 0 = absolute homogeneity to 1 = absolute heterogeneity. We employed Michel and Hambrick (1992)'s categorization of functional backgrounds, in which output functions included marketing and sales; throughput functions included operations, R&D, and engineering; and peripheral functions included law, finance, and accounting. Heterogeneity in educational specializations captured dispersion of the highest obtained university degree achieved as defined by five educational specializations: arts, sciences, engineering, business and economics, and law (Wiersema and Bantel, 1992). The continuous variable of board tenure heterogeneity is measured using the coefficient of variation (Pelled et al., 1999). Board tenure was measured by length of time each board member had served in the current position. Larger coefficients imply greater heterogeneity. The logarithm of the heterogeneity measure is used to reflect the decreasing rate of the effect of dissimilarity (Wiersema and Bantel, 1992). Data on directors' profiles were drawn from companies' proxy statements and Standard & Poor's Register of Corporations, Directors, and Executives.

Firm risk is captured by the amount of financial performance fluctuations over time (Donaldson, 1999). In strategic management research, measures of historical fluctuations in an income stream have been the most commonly adopted risk measures (Miller and Bromiley, 1990). We used the standard deviation of ROA as a proxy for instability of returns and examined the variance of firm performance for the period from 1998 to 2003 based on yearly data. ROA data were obtained from Compustat database. Board equity

ownership identifies the degree to which directors hold equity positions in their firms and was measured as the percentage of total common stock held by the directors. Since exercise of stock options is not guaranteed, we eliminated stock options granted to directors from the measure of board equity ownership. Data on directors' firm equity ownership were obtained from corporate annual proxy statements of form 10Ks. We used the Herfindahl Index for calculating the extent of institutional ownership concentration accounted by the top five institutional investors in the firm (Hartzell and Starks, 2003). Larger values in the Herfindahl index indicate a more concentrated ownership structure in the firm. Data on institutional equity holdings were available from the Mergent database.

Controls

A number of variables that are known to influence the variability of returns were used as control variables. Because variability of returns may vary across industries due to industry-specific situations, we controlled for the industry (Bromiley, 1991). We included a dummy variable of industry category that corresponds to the 2-digit SIC code of the firm. In addition, industry profitability was controlled because conditions in industry profitability may affect the variability of returns for firms in the industry. Industry profitability was calculated as average percentage change in profit during the period for all firms included in the sample. Firm size, measured as the total annual revenue for the year of 2002, was included to control for the potential influence of economies of scale on variability of returns (Wan and Hoskisson, 2003). Past firm performance, measured as the average ROA during 1999-2001, was controlled since prior firm performance could influence firm's risk propensity (Kahneman and Tversky, 1979). Since unrelated diversified firms venture into market domains outside their expertise areas and typically have high debt position, we controlled for the degree of unrelated diversification. We used the entropy measure of diversification (Jacquemin and Berry 1979) in which the unrelated diversification component is captured by the degree to which a firm's sales are allocated across unrelated (different two-digit SIC codes) industry segments (Clarke et al., 2004). Diversification indices were computed using the line-of-business sales data obtained from Compustat. We also controlled for CEO equity ownership, calculated as the percentage of total common equity owned by the CEO. Additionally, board size was included to control for the potential impact of board size on board's capability in monitoring and controlling organizational decisions.

Statistical Analysis

Hierarchical regression models were developed in the statistical analyses. We first entered control variables in the first hierarchical model. After entering the control variables, the independent variables of board heterogeneity were then entered in the second model. The coefficients and incremental F-statistics were tested for significance to see whether adding the independent variable enhanced explanatory power in the model. The two-way interaction terms reflecting moderating effects of board equity ownership and institutional ownership concentration were entered in the final regression model. Coefficients and incremental variances explained by the two-way interaction terms were tested for significance (Cohen et al., 2003).

RESULTS

Table 1 presents the means, standard deviations, and correlations for the variables. Descriptive statistics show that directors on average have 6.6 percent of the equity ownership (excluding the ownership by CEO) whereas CEOs have 1.7 percent of the ownership. Sample firms have 11 directors on average. Examination of the correlation coefficients suggests that board heterogeneity in tenure and functional and educational backgrounds is negatively correlated with variance in corporate income flows ($p<.05$). Board size is also negatively correlated with variance of returns ($p<.01$).

In the regression analyses, we first checked normality assumptions in the data distribution. The variables of institutional ownership concentration and CEO equity ownership showed skewness in the distribution of data; thus, log transformation was applied on these variables. We also examined Cook's *D* values to check for possible outliers. However, no reason was found to remove any cases from the sample. Mean centering was applied when we tested the moderating effects to remove potential bias caused by multicollinearity effects from the interaction terms. After the scale transformation, all of the variance inflation factors in the regression models were below 10, which suggest little collinearity effects after the scale transformation (Aiken and West, 1991).

Table 1. Descriptive Statistics and Pearson Correlation Coefficients

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. Volatility in Firm Performance	4.05	4.66												
2. Tenure Heterogeneity	.20	.28	-.14*											
3. Functional Heterogeneity	.51	.12	-.15*	.09										
4. Educational Heterogeneity	.58	.11	-.17**	.06	.29***									
5. Institutional Ownership Concentration	.02	.02	.05	-.05	-.01	-.07								
6. Board Equity Ownership	.07	.19	.08	-.07	-.02	-.03	.03							
7. Industry Type	42.84	16.15	-.01	-.16**	.05	-.12*	.01	.04						
8. Industry Profitability	-.01	.20	-.02	.10	-.04	-.07	.04	.08	-.18**					
9. Firm Size	13.70	22.47	-.14*	.01	.11	.07	-.08	-.10	.10	.03				
10. Past Firm Performance	4.15	6.42	-.43***	.13*	-.01	.12*	-.18**	-.15*	-.15	.17**	.06			
11. Unrelated Diversification	.23	.31	-.00	-.06	.05	-.03	-.09	-.12*	-.03	.01	.24***	-.04		
12. CEO Equity Ownership	.02	.05	.02	-.01	.07	-.13*	-.03	.09	.07	.02	-.03	-.13*	.11	
13. Board Size	10.95	2.81	-.20**	.10	.21***	.24***	-.17**	-.07	.03	-.07	.31***	.10	.09	-.10

* p < .05; ** p < .01; *** p < .001

We also conducted an endogeneity test. That is, although the objective of this study is to assess the impact of board heterogeneity on variability of returns, levels of variance in income flows can reciprocally affect the board's compositional structures, causing the coefficients of these variables to be overestimated. We first obtained the residual from the original regression model regressed on variability of returns, and the residual was then used as an independent variable in the second stage regression model regressed on institutional ownership concentration. The results of the robustness tests showed non-significance of this residual variable, which suggests little concern for endogeneity (Green, 2003). Additionally, we conducted post-hoc statistical power analyses based on the effect size (R-squared), sample size and the significance level of .05 (Ferguson and Ketchen, 1999). The statistical power for the regression models used in hypothesis testing were greater than .97, suggesting a sufficient statistical power.

The results of the hierarchical regression analyses are presented in Table 2, 3, and 4. Hypothesis 1 predicts that board heterogeneity will be associated with lower levels of variance in firm performance. The results provide evidence that board tenure heterogeneity is negatively associated with variability of returns, thus supporting Hypothesis 1a (β= -.10; p<.05; ΔR^2= 0.01; Table 2). Board heterogeneity in functional experience is also negatively related to the variance in firm performance (β= -.12; p<.05; ΔR^2= 0.01; Table 2). Thus, Hypothesis 1b receives strong support. Board heterogeneity in educational specialty is negatively related to variance of returns at p<.10 significance level (β= -3.62; ΔR^2= 0.01; Table 2; Hypothesis 1c). We also conducted supplementary analyses using capital market measures of risk (beta—the sensitivity of the return on a firm's stock to general market movements). The results showed that board tenure heterogeneity is negatively associated with stock market measures of risk. However, board heterogeneity in functional and educational backgrounds is not significantly related to capital market measures of risk (details will be provided upon requests).

Table 2. Regression Analyses: Board Heterogeneity and Volatility in Firm Performance

Variable	Control Variables	Tenure Heterogeneity	Functional Heterogeneity	Educational Heterogeneity
Intercept	10.40 ***	9.64 ***	11.67 ***	11.72 ***
Industry Type	-.02	-.04	-.02	-.01
Industry Profitability	.08	.10 †	.08	1.80
Firm Size	-.10 †	-.10 †	-.09	-.00 †

Past Firm Performance	-.42 ***	-.41 ***	-.42 ***	-.30 ***
Unrelated Diversification	-.01	-.02	-.01	-.21
CEO Equity Ownership	-.08	-.08	-.07	-.26
Board Size	-.16 **	-.15 **	-.14 *	-5.99 *
Board Equity Ownership	-.02	-.03	-.02	-.37
Institutional Ownership Concentration	-.12 *	-.13 *	-.12 *	-.25 *
Tenure Heterogeneity		-.10 *		
Functional Heterogeneity			-.12 *	
Educational Heterogeneity				-3.62 †
R^2	.24	.25	.26	.25
Adjusted R^2	.22	.23	.23	.23
F	10.21 ***	9.66 ***	9.79 ***	9.53 ***
ΔR^2		.01	.01	.01
F for ΔR^2		3.79 *	4.83 *	2.80 †

† < .10; * p < .05; ** p < .01; *** p < .001

Table 3. Effect of Board Heterogeneity and Board Equity Ownership on Volatility in Firm Performance

Variable	Control Variables	Independent Variables	Interaction Model 4	Interaction Model 5	Interaction Model 6
Intercept	10.39 ***	11.64 ***	10.87 ***	11.61 ***	11.63 ***
Industry Type	-.01	-.01	-.01	-.01	-.01
Industry Profitability	1.93	1.98	1.48	2.05	2.04
Firm Size	-.00 †	-.00	-.00	-.00	-.00
Past Firm Performance	-.30 ***	-.29 ***	-.27 ***	-.29 ***	-.29 ***
Unrelated Diversification	-.12	-.25	-.27	-.29	-.29
CEO Equity Ownership	-.25	-.22	-.25	-.22	-.22
Board Size	-6.88 **	-4.82 *	-4.18 †	-4.78 †	-4.80 †
Tenure Heterogeneity		-1.53 †	-.20	-1.55 †	-1.55 †
Functional Heterogeneity		-3.42 †	-3.48 †	-3.38	-3.42 †
Educational Heterogeneity		-2.63	-2.87	-2.61	-2.57
Institutional Ownership Concentration		-15.40	-15.02	-16.55	-16.34
Board Equity Ownership		.10	-.09	.16	.16
Tenure Heterogeneity × Board Equity Ownership			-11.97 ***		
Functional Heterogeneity × Board Equity Ownership				-1.02	
Educational Heterogeneity × Board Equity Ownership					-.81
R^2	.23	.26	.29	.26	.26
Adjusted R^2	.21	.23	.26	.23	.23
F	12.29 ***	8.23 ***	8.96 ***	7.62 ***	7.62 ***
ΔR^2		.03	.03	.00	.00
F for ΔR^2		2.19 †	13.36 ***	.44	.42

† < .10; * p < .05; ** p < .01; *** p < .001

Table 4. Effect of Board Heterogeneity and Institutional Ownership Concentration on Volatility in Firm Performance

Variable	Control Variables	Independent Variables	Interaction Model 1	Interaction Model 2	Interaction Model 3
Intercept	11.70 ***	13.09 ***	13.07 ***	12.65***	12.62 ***
Industry Type	-.01	-.02	-.02	-.01	-.01
Industry Profitability	1.73	1.78	1.73	2.07	2.15 †
Firm Size	-.00	-.00	-.00	-.00	-.00 †
Past Firm Performance	-.30 ***	-.30 ***	-.30 ***	-.29***	-.29 ***
Unrelated Diversification	.05	-.09	-.08	-.25	-.35
CEO Equity Ownership	-.25	-.22	-.22	-.23	-.22
Board Size	-6.91 **	-4.79 †	-4.75 †	-4.68†	-4.68 †
Tenure Heterogeneity		-1.43 †	-2.22	-1.54†	-1.62 †
Functional Heterogeneity		-3.60 †	-3.57 †	-5.75*	-3.34
Educational Heterogeneity		-2.77	-2.86	-2.63	-5.20 *
Institutional Ownership Concentration		-15.40	-20.71	8.05	14.65
Board Equity Ownership		.10	.09	.10	.11
Tenure Heterogeneity × Institutional Ownership Concentration			-.18		
Functional Heterogeneity × Institutional Ownership Concentration				-.51*	
Educational Heterogeneity × Institutional Ownership Concentration					-.57 **
R^2	.23	.26	.26	.27	.28
Adjusted R^2	.21	.23	.23	.24	.25
F	12.29 ***	8.23 ***	7.63***	7.99 ***	8.36 ***
ΔR^2		.03	.00	.01	.02
F for ΔR^2		2.19 †	.60	4.08 *	7.56 **

† < .10; * p < .05; ** p < .01; *** p < .001

Hypothesis 2 suggests that the effect of board heterogeneity on variability of returns will be stronger in firms with higher board equity ownership. The results show that the impact of board tenure heterogeneity

on variability of returns is stronger in firms with higher board equity ownership. Thus, Hypothesis 2a received empirical support (β= -11.97; p<.001; ΔR^2= 0.03; Table 3). Figure 1 shows how the relationship between board tenure heterogeneity and variability of firm performance changes as a function of board equity ownership. However, there was no significant effect found for Hypothesis 2b (predicting interaction effect between board functional heterogeneity and board equity ownership on variability of returns) and Hypothesis 2c (suggesting interaction effect between board educational heterogeneity and board equity ownership on variability of returns).

Figure 1. The Effect of Board Tenure Heterogeneity and Board Equity Ownership on Volatility in Firm Performance

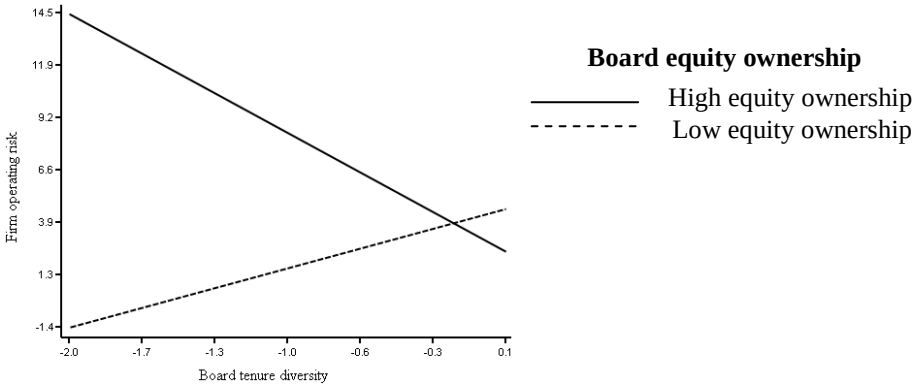


Figure 2. The Effect of Board Functional Heterogeneity and Institutional Ownership on Volatility in Firm Performance

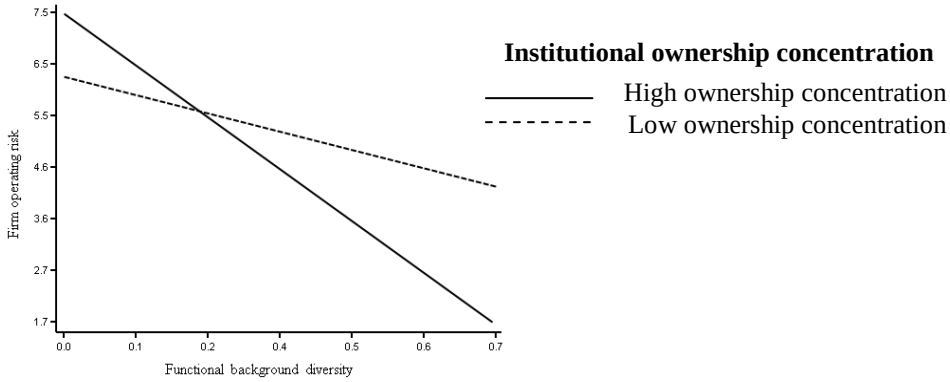
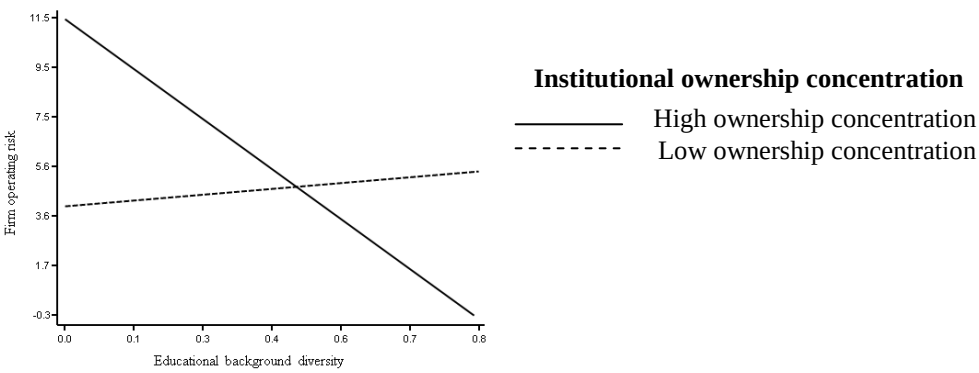


Figure 3. The Effect of Board Educational Heterogeneity and Institutional Ownership on Volatility in Firm Performance



Hypothesis 3 predicts institutional ownership concentration to moderate the relationship between board heterogeneity and variability of returns, suggesting that the effect of board heterogeneity on variance in corporate performance will be stronger when firm's ownership structure is concentrated on a small number of institutional investors. The interaction term between board's heterogeneity in functional experience and institutional ownership concentration has a statistically significant effect on variability of returns (β= -.51; p<.05; ΔR^2= 0.01; Table 4). The results provide support for Hypothesis 3b, suggesting that higher institutional ownership concentration strengthens the effect of board's functional diversity on variability of returns. The effect is graphically presented in Figure 2. There was also a significant and negative moderating effect of institutional ownership concentration on the relationship between board heterogeneity in educational specialization and variability of returns, supporting Hypothesis 3c (β= -.57; p<.01; ΔR^2= 0.02; Table 4). The results suggest that the effect of board's educational heterogeneity on stability of returns is stronger in firms with institutional ownership concentration (plotted in Figure 3). However, there was no significant effect found for Hypothesis 3a predicting a moderating effect of institutional ownership concentration in the relationship between board's heterogeneity in educational specialty and variability of returns. Control variables of firm size, past firm performance, and board size are significantly associated with lower variance in firm performance. Corporate unrelated diversification has no significant impact on variability of returns.

DISCUSSION

The results of this study show that board heterogeneity is associated with lower levels of variance in firm performance. More specifically, board heterogeneity in tenure, functional experience, and educational specialty is related to lower levels of variability in firm performance. These results suggest that dissimilarity among board members' knowledge structure enhances heterogeneity in information, knowledge, skills, and information-processing behaviors, which is conducive to decision comprehensiveness in environmental scanning, interpretation, and assessment of strategic options. Given that board's effectiveness in control and advisory functions is a collective outcome of board members, board heterogeneity reduces informational uncertainty and biases associated with the assessment of strategic options proposed by management. Cognitive heterogeneity in a board leads to consideration of more information and enhancement of creativity and flexibility in information processing behavior. As a variety of perspectives are used in decision-making processes, it leads to the evaluation of more alternatives and more careful exploration of the consequences of the strategic alternatives. Board heterogeneity also increases board independence in thought and perspectives because there is less pressure for conformity often experienced by a homogeneous board. This compositional condition facilitates board members to actively air opinions and perspectives in boardroom discussions, promoting objectivity in the judgment of management proposals and a reduction of informational bias and polarization within the board. The interplay of competing perspectives in board's decision-making processes enhances strategic decision comprehensiveness and organizational rationality. A somewhat opposing perspective holds that group diversity could lead to behavioral disintegration among group members and subsequent loss of process efficiency (e.g., Pelled et al., 1999; Li and Hambrick, 2005). For example, board heterogeneity could cause delays in managerial initiatives. However, given the results of this study showing a positive relationship between board heterogeneity composition and stability in firm performance, we argue that board heterogeneity has little dysfunctional impact on board decision making because delaying decisions in strategic management environment could increase the volatility in corporate performance. In addition, prior empirical research provided evidence that firms with more demographically heterogeneous executive teams had higher levels of strategic change (Wiersema and Bantel, 1992). Heterogeneity in board members' cognitive behaviors, preferences, and knowledge structures stimulates constructive debate in board room discussions, thereby mitigating the potential for CEO domination and hubris that could intensify the variability of firm performance.

In recent years, research attention has been directed to board compositional characteristics and processes that enhance board's ability in advising and counseling (Carter et al., 2003; Charan, 1998; Tuggle et al., 2010). The results of current research provide empirical evidence regarding how board heterogeneity affects board's effectiveness in control and advisory functions and further the organizational rationality and stability in firm performance. That is, the findings of this study provide important insight in extending previous theoretical conceptualization on the role of board heterogeneity. Given the scant empirical research on the implications of board heterogeneity for corporate strategic management (Goodstein et al., 1994), the current article extends the knowledge by providing empirical evidence that

board heterogeneity through increased effectiveness in board's functions has a positive impact on organizational rationality reflected as stability in firm performance.

The results also highlight the combined effects of incentive systems and board resources on a board's engagement in control and advisory functions. The linkage between board heterogeneity and stability in firm performance is stronger in firms with higher board equity ownership and institutional ownership concentration. For example, board heterogeneity in functional and educational backgrounds is more strongly related to the stability in firm performance when firm's ownership structure is concentrated on a small number of institutional investors in the firm. The relationship between board tenure heterogeneity and stability of returns is stronger when the board members possess higher equity ownership. The results imply that board equity ownership and institutional ownership concentration encourage the directors to be more active in the discussion of strategic choices, thus increasing the impacts of board heterogeneity on stability of firm performance. Therefore, we suggest that a combination of board incentives and resources derived from board heterogeneity encourage directors to play a stronger control and advisory functions in risk-related organizational decisions. The results are in line with prior findings that board's contribution to strategic management is a function of board's incentives and capability (Golden and Zajac, 2001).

Given the fact that global competition renders corporations to be exposed to heightened volatility in firm performance, firm capability in securing stability in firm performance is becoming increasingly important. In this regard, board of directors as a group of experts can play a significant role in reducing performance volatility through better strategic decision making characterized by greater comprehensiveness and rationality. The results of this research suggest that board heterogeneity in knowledge structure and cognitive behavior is a source for organizational rationality and further the stability of firm performance. The mechanism for this phenomenon would be that board heterogeneity in terms of organizational tenure, functional experience, and educational specialty benefits the board by bringing a variety of perspectives and expertise from different fields. This compositional condition in a board at the same time enhances board independence in thoughts and minds constraining CEO domination and bias at the apex of a corporation. In addition, the results highlight the role of contextual variables such as board equity ownership and institutional ownership concentration that strengthen the impact of board heterogeneity on stability in firm performance. We also note a number of limitations which could also lead to additional directions for future research. Although stability in firm performance benefits the corporation in terms of operational and strategic continuity, empirical evidence on the linkage between firm risk and firm performance has been controversial (e.g., McNamara and Bromiley, 1999). We suggest that the controversy is analogous to the debate on the linkage between managerial risk taking and organizational risk as outcome variable (Palmer and Wiseman, 1999). Prescriptive guidelines based on the results of this study are limited to the role of board heterogeneity for board effectiveness and organizational risk. Although this study measured organizational risk based on accounting based performance measures, future researchers should extend the insights by employing external stakeholder views on the firm.

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