**THE IMPACT OF BOARD DIVERSITY ON FIRM PERFORMANCE THROUGH BOARD MONITORING INTENSITY: EVIDENCE FROM CONTROLLED FIRMS \***

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**The impact of board diversity on firm performance through board monitoring intensity: Evidence from controlled firms**

**Abstract**

The main objective of this paper is to investigate the impact of board diversity on the financial performance of controlled firms with homogenous boards with respect to statutory diversity. We combine multiple demographic diversity indicators in a diversity index to account for the critical mass of diversity needed for critical inquiry. We use market and accounting based financial ratios to measure firm performance and use *gender, nationality, education* and *age* as our demographic diversity indicators. Second, to understand the process by which board diversity affects firm performance, we focus on board monitoring intensity. This construct is defined as a composite variable consisting of indicators representing a board’s monitoring efforts: the *number of board meetings*, *number of committees established by the board*, *auditor quality*, and the *firm’s disclosure levels.* We find a positive relationship between board diversity and performance, weakly mediated by board monitoring intensity, and a positive relationship between board diversity and board monitoring intensity, moderated by the controlling shareholders’ *propensity to expropriate* – proxied by the deviation of control rights from cash flow rights. We expect that our model and findings will be interesting for researchers, investors, board members, and regulators.

*Keywords:* Corporate governance, board diversity, board monitoring, disclosure, firm performance, controlled firms.

*JEL Classification*: G3, J16, L25

**The impact of board diversity on firm performance through boards’ monitoring intensity and firm performance: Evidence from controlled firms**

1.**Introduction**

Issues related to corporate boards have interested researchers from different diciplines for the past decade, representing a shift of interest from top management teams (TMT) to the boards, underscored by the increased emphasis on the control role of boards by regulators and investors. This change may relate to the growing need for corporate accountability, stemming from the unprecedented economic and social impact of governance failures.

 Building on previous literature on TMT (Finkelstein and Hambrick, 1996; Wiersema and Bantel, 1992) and the growing financial economics literature on corporate governance (see for ex. Clapper and Love, 2004 and a recent review by Claessens and Yurtoglu, 2012bu tek basina siritiyor), research on boards focuses on the association between *board composition* and firm performance. Although results remain equivocal (ee for ex., Hermalin and Weisbach, 2003; Black and Kim, 2008; Black, de Carvalho and Gledson, 2008; Ararat and Dallas, 2011), the prevailing homogeneity of boards as a club of “pale and male fifty-somethings” has raised significant ethical, political, and economic issues (Daily and Dalton, 2003; Carver, 2002). While independence has been investigated as the key statutory attribute of board diversity, the rhetoric has recently changed to a broader conceptualization, in response to the normative calls for diversity. For instance, some governments have legislated for greater representation of women on boards, while others included diversity criteria in soft laws.[[1]](#endnote-1)

The economic rationale behind board diversity traditionally stems from two main theories: resource dependency (Pfeffer and Salancik, 1978) and agency (Jensen and Meckling, 1976; Fama, 1980; Eisenhardt, 1989) theories, which relate to the service and control tasks of boards, respectively (Forbes and Milliken, 1999). We adress the latter, particularly focusing on controlled firms with dominant ownership.[[2]](#endnote-2)

Although early investigations of board diversity differentiate between demographic (observable) and cognitive (unobservable) diversity (Milliken and Martins 1996; Forbes and Milliken, 1999), our perspective draws from models of *variation* (Harrison and Klein, 2007) and the assumption that demographic diversity leads to *variety* with respect to cognitive styles. We argue that demographic diversity leads to more effective board monitoring, enhancing firm performance. Resulting differences in cognitive styles may enrich the supply of ideas available to the board (Williams and O’Reilly, 1998). Indeed, our board diversity indices (BDIs) are positively associated with firm performance.

Although the greatest potential for theoretical progress emerges from research on the *processes* through which board attributes are linked to performance outcomes, it presents severe challenges as well (Roberts, McNulty and Stiles, 2005). We contribute by predicting that more diversified boards perform their monitoring roles more effectively by meeting frequently, creating board committees, choosing better quality auditors, and reducing information asymmetry through transparent disclosures. To measure monitoring intensity, these indicators are combined into a composite board monitoring index (BMI). We find that BMI weakly mediates the relationship between BDI and firm performance.

We further hypothesize that firm ownership structure – in particular, the dominant shareholders’ propensity to expropriate value – is likely to moderate the relationship between BDI and BMI. The more likely controlling shareholders are to expropriate minority investors, proxied as an excess of voting rights in relation to cash flow rights (the wedge, as defined by Yurtoglu (2000, 2003)), the less effectively boards will mitigate agency conflicts, no matter how diverse. We find evidence that diversity reduces the negative impact of the wedge on BMI, pointing to a special role for diverse boards, especially when expropriation likelihood is high.

 To our knowledge, this study is the first to combine multiple diversity attributes of a board into a composite index by using the Blau (1977) measure of variety, except for Randøy and colleagues’ (2006) investigation of the determinants of board diversity measured as a composite index (of % female board members + % foreign board members + % mean age of the board). A related contribution is our creation of a composite board monitoring index to measure board monitoring efforts. Second, given the effect of ownership structure on the relationship between board diversity and performance (e.g., Klein, Saphiro and Young, 2005; Ben-Amar, Francoeur and Hafsi, 2011), we find the moderating effect of ownership dominance manifested in the diversity–monitoring relationship, rather than in the diversity–performance or monitoring–performance relationships. Our third contribution stems from our initiatory investigation of board monitoring intensity as a process through which board diversity affects performance. The small size and cross-sectional nature of our sample may limit the generalizability and significance of our findings; however, we believe our exploratory analysis will encourage further research around the model and proxies developed here.

**2. Motivation and prior research**

**2.1. Why diversity matters: theory and empirical evidence** (add here the arguments and citations for the diversity-board monitoring relationship)

Prior research on the economic rationale for diversity differentiates between demographic and statutory diversity (Ben-Amar, Francoeur and Hafsi, 2011). The former is associated with the service task of the board, based on stewardship theory, social network theory, and the resource-based view of the firm; the latter, with the control task of the board, based mainly on agency and partly on stakeholder theories (Minichilli, Zattoni and Zona, 2009). We depart from these studies by arguing that demographic diversity also contributes to value creation through output, behavioral, and strategic control, as framed in Huse’s (2005) typology of board tasks. Demographic diversity is defined as “the number of different statuses among which a population is distributed” (Blau, 1977). Intuitively, demographic diversity is associated with cognitive diversity, as it has the potential to enhance differences in perspectives (Hillman, Canella and Harris, 2002). Cognitive diversity increases cognitive conflict, stimulating “critical and investigative interaction processes” (Amason, 1996) and enhancing the effectiveness of board control (Forbes and Milliken, 1999). Inversely, board cohesiveness leads to a dysfunctional state of reduction in independent critical thinking and strife for unanimity (Janis, 1983).

Most empirical studies investigate one or a few demographic diversity indicators considered to be better proxies of the different perspectives individuals may bring to organizations, such as gender, nationality, age, and race. We follow Molz’s (1988) early attempts by constructing a composite diversity index which captures the indicators that we posit are associated with board monitoring intensity and control. Our argument for combining different indicators is that diverse opinions may be marginalized (Westphal and Milton, 2000) and, thus, a critical mass may be needed for critical inquiry (Konrad, Kramer and Erkut, 2008). Although diversity is argued to enhance critical inquiry by increasing cognitive conflict, the literature also explores conflict’s negative effects (Mace, 1986) and the curvilinear, inverted U-shape nature of its relationship with performance (Frink *et al.*, 2003). We expect that in controlled firms, the negative effects of conflict are less likely to be observed at lower levels of diversity, but positive effects may diminish at higher levels. Our construct of diversity is presented in Figure 1.

Based on prior research, we use the following attributes of board diversity:

*Age differences* are likely to lead to variation in values and perspectives since different generations experience different social, political, and economic environments and events. Furthermore, some cognitive abilities diminish with age, as does the willingness to take risks (Vroom and Pahl, 1971). Generational diversity may prevent group-think and lead to better performance by balancing the enthusiasm, energy, and risk appetite associated with younger directors, with the experience, caution, and risk averseness of older ones.

*Gender diversity* is one of the most researched board attributes (Terjesen, Selay and Singh, 2009). At the board level, the focus is on group processes and the specific contributions of female directors (Huse, 2008). The studies focusing on firm performance generally borrow from resource dependence theory to argue for the case of women on boards (Hillman, Shropshire and Canella, 2007). Drawing from agency theory however, Carter, Simkins and Simpson (2003) find a positive relationship between gender diversity and firm value in Fortune 1000 boards. Adams and Ferreira (2009) demonstrate that for companies with weak shareholder rights, gender diversity in boards enhances firm value when the firm can benefit from additional board monitoring. This finding is particularly important for our study, since it involves an environment with weak shareholder rights. Further studies reveal that female directors take their role more seriously, prepare better for meetings (Izraeli, 2000), ask more questions, and become more vocal when there are three or more female directors (Konrad, Kramer and Erkut, 2008).

 *International directors* also bring diverse opinions and perspectives: language, religion, family upbringing, and life experiences differ from country to country. They may also represent foreign shareholders and stronger notions about the control role of the board, if they come from countries with stronger shareholder rights. Their presence may signal foreign shareholders’ emphasis on oversight and may manifest itself in more board monitoring efforts (Lee, Rhee and Yoon, 2012).

Finally, we argue that board members’ *level of education* also leads to diverse perspectives and potential cognitive conflicts. Since Hambrick and Mason’s (1984) early formulation of the upper echelon framework, the amount and type of formal education have been featured as important demographic characteristics indicating cognitive orientations, with more education linked to greater cognitive complexity (Datta and Rajagopalan, 1998; Finkelstein and Hambrick, 1996). On the other hand, directors with limited education are likely to be the founding entrepreneurs and may bring more intuitive and entrepreneurial skills.

In controlled firms where boards are dominated by owners/managers or their affiliates, statutory diversity is likely to be either ineffective, if existent at all, or its effect will be contingent on supporting regulations. Recent finance literature has provided mixed evidence on the role of board independence on firm performance in less developed markets where monitoring is less effective (Black, Jang and Kim, 2006; Black and Kim, 2007; Ararat, Orbay and Yurtoglu, 2011). In line with the latter study, we find a negative but insignificant effect of independence on firm performance. We also compare a diversity index composed of only four demographic indicators and a five-attribute index that also includes statutory diversity and find that independence negatively affects accounting performance, while augmenting our diversity index with independent members enhances market performance.

Most developing economies are also dominated by family controlled business groups. These family dominated boards are relatively more homogenous in director status, objectives and values. We thus conjecture that other measures of statutory diversity in prior research would be less effective in our context (see section 2.4).

**2.2 Intensity of board monitoring efforts and performance outcomes**

A limited amount of research investigates intervening variables to uncover how diversity affects performance (Minichilli, Gabrielsson and Huse, 2007).[[3]](#endnote-3) We focus on a board’s monitoring efforts to attenuate the agency conflicts in a firm. We develop a composite index as a proxy for the combined intensity of internal control mechanisms and the board’s capacity to affect performance. We posit that *number of board meetings* and *number of committees* indicate the level of effort i*n board monitoring* and control (Sharma, Naiker and Lee, 2009). Our composite index also includes *auditor quality*, and we conjecture that the boards that better implement their monitoring function are more likely to select a Big-N audit firm as their external auditor. Several authors consider the Big-N to be brand-name audit firms that perform higher quality audits (Simunic and Stein, 1987; DeFond, 1992), and hiring a Big-N audit firm mitigates the price discounts associated with agency problems (Fan and Wong, 2005). Prior research has also found that investors have more confidence in financial statements audited by the Big-N (Teoh and Wong, 1993).

Prior empirical research has also found consistent evidence of a strong association between *transparency and sound disclosure practices* and cost of capital. Both country level (e.g., La Porta *et al.*, 1998; La Porta, López-de-Silanes and Zamarripa, 2003; Shleifer and Wolfenzon, 2002) and firm level evidence corroborate these findings. Indeed, Lambert, Leuz and Verrecchia (2007) posit that increased public disclosure will reduce the appropriation of cash flows by managers and controlling shareholders and the cost of monitoring insiders. Similarly, Mitton (2002) finds that listed companies with higher disclosure quality and outside ownership perform better in Indonesia, Korea, Malaysia, the Philippines, and Thailand. . In this paper, we consider disclosure intensity to be one of the outcome indicators of a board’s monitoring efforts.

**2.3 Moderating effect of ownership dominance: the wedge**

In many emerging economies, the existence of controlling shareholders highly correlates with business group structures. Although not all related party transactions are value destroying and not all group affiliated firms are vehicles of expropriation (Khanna and Yafeh, 2007), such group structures maximize the returns to controlling shareholders through related party transactions, exercised through disguised control structures (Morck, Wolfenzon and Yeung, 2005). The wedge, measured as the ratio of voting rights to cash flow rights, negatively correlates to firm value (Yurtoglu, 2003; Black *et al.*, 2012). We posit that the wedge represents the propensity to expropriate, and the higher the wedge, the more resistant are the controlling shareholders to board monitoring that limits their freedom in pursuing value-reducing transactions. Family control is also associated with the misuse of company assets, informality in corporate affairs, and avoidance of internal controls (Morck and Yeung, 2009). Alongside the wedge, we therefore test for the moderating effect of family control on the relationship between BMI and BDI.

**2.4 The context: corporate landscape in Turkey**

Our sample is drawn from the Istanbul Stock Exchange (ISE). Turkey’s population is not overtly racially or ethnically diverse; education, wealth, and the power associated with position are the primary determinants of social status. Although Turkish women legally have equal rights, discrimination in education and employment exists. Generational diversity, measured by age intervals, may influence perspectives, especially when one considers Turkey’s rapid transformation since the 1990s – liberalization, institutionalization, and democratization fueled by the process of EU accession (Ararat and Uğur, 2005). We thus choose gender, education, age, and nationality (Turkish versus non-Turkish) as our diversity indicators.

Many listed firms in Turkey are pyramidal conglomerates headed by holding firms controlled by families or individuals.[[4]](#endnote-4) The majority of listed companies have a controlling shareholder with more than 50% of the shares, while some are jointly controlled by two major shareholders (Yurtoglu, 2003). Prior research has observed that such pyramidal structures are conduit to an excessive wedge, facilitating expropriation of minority shareholders through various tunneling activities (e.g., Bae, Kang and Kim, 2002; Morck *et al.*, 2005). The right to nominate board members in ISE firms is confined to the shareholders attending the general assemblies; hence, directors, including those labeled as “independent,” are nominated and elected by the controlling shareholders. Although board positions have been predominantly occupied by insiders and their affiliates, pressure from foreign institutional shareholders and the corporate governance (CG) code, promulgated on a comply or explain basis in 2004, have recently induced infrequent inclusion of independent directors in boards.[[5]](#endnote-5) Theoretically, one would expect independence, our measure of statutory diversity, to be control enhancing; this view is supported by recent empirical evidence (Zattoni and Cuomo, 2010; Black and Kim, 2007). However, Ararat, Orbay and Yurtoglu (2011) find a significant negative effect of “independent” members on firm performance in Turkey, attributing these results to an unobservable affiliation of independent directors with the controlling shareholders.

1. Another frequently used measure for statutory diversity (independence) is the separation of the CEO and chairperson; however, this is an ineffective measure of independence in Turkey as these roles are frequently allocated between members of the same family or affiliated directors. The separation of executive and non-executive directors also defies its purpose, since CEOs are excluded from the board in 30% of firms and non-executive members can have executive powers (Ararat, Orbay and Yurtoglu, 2011). Overall, statutory diversity is unlikely to disturb the homogeneity of the boards in our context .**Objectives of the study and hypotheses**

Based on the above discussion and summarized in the conceptual model depicted in Figure 2, we test the following three main hypotheses:

**H1:** There is a positive association between board diversity and firm performance.

**H2:** Board monitoring intensity mediates the relationship between board diversity and firm performance. In line with Barron and Kenney, 19 )Our sub-hypotheses to test the mediating effect are:

**H2a:** There is a positive relationship between board diversity and board monitoring intensity.

**H2b:** There is a positive relationship between board monitoring intensity and firm performance.

**H2c**: Adding BMI to the BDI–performance relationship reduces or nullifies the relationship between BDI and performance.

**H3:** The wedge (OwnDom) and family control moderate the relationship between board diversity and monitoring efforts. That is, we expect the coefficient of the interaction term BDI\*OwnDom to be statistically significant.

A priori, our expectation about the sign of the coefficient of BDI\*OwnDom is indeterminate. On the one hand, we expect board diversity to positively impact the association between ownership dominance and BMI; that is, in more diverse boards, we expect the negative relationship between OwnDom and BMI to be less negative, minimizing the Type 2 agency conflict. On the other hand, the coefficient of the interaction term may be negative since dominant owners may block monitoring initiatives.

1. **Sample characteristics and the choice of variables**

Our sample is composed of the top 100 firms in the ISE (ISE-100 index) for which we collected board diversity, monitoring intensity and ownership data, and TD scores for 2006. The 2007 financial and accounting data are used to measure performance. Five real estate investment trusts are excluded to constitute a sample of 95 firms. In contrast to the sample size disadvantage of cross-sectional data, single year data allows for control of year- and regulation-specific differences. The year 2006 was intentionally selected for its neutrality. Many financial reporting and CG reforms occurred during 2002-2005: 2004 was the first year the Capital Markets Board (CMB) mandated the appearance of the CG Code compliance reports in public firms’ annual reports; in 2005, the International Financial Reporting Standards (IFRS) became mandatory for all public firms. By 2006, such improvements in disclosure were no longer significant (Aksu and Espahbodi, 2008), as disclosure converged around legal reporting requirements. Finally, 2006 immediately preceded the early-on signs of the recent global economic crisis.

In general, the data for the independent variables are hand-collected from annual reports, websites of the sample firms, and through correspondence with investor relations departments. The data to measure firm performance, our dependent variable, primarily derive from Thompson-Reuters’ Datastream and the ISE website. We systematically use four common accounting and market-based performance measures to confirm the robustness of our results and because we have no a priori expectations of whether board diversity and monitoring intensity will impact the reported accrual based earnings of the firm or market participants’ expectations. Our accounting based performance measures are profitability ratios based on historical accounting numbers: (i) ROA (return on assets = net income/total assets) and (ii) ROE (return on equity = net income/book value of owner’s equity). The market-based performance measures are more forward-looking, reflecting market expectations about firm viability and growth potential: (iii) market-to-book (MTB) ratio (MVE/BE = market value of equity/book value of equity) and (iv) Tobin’s Q (TQ = (MVE+TL)/TA = (market value of equity plus book value of total liabilities)/total assets).

Table 1 summarizes the descriptive statistics of sample firm characteristics. The average size (ln (TA), measured in 1000 TL) and leverage (TL/TA), commonly used as control variables in prior performance research, are 20.98 and 52%, respectively. The average ROE is 12% while ROA is 7%, indicating effective use of leverage by sample firms. Average MTB and TQ are 1.86 and 1.31, respectively, with large variability in the MTB ratio.

(Place Table 1 here)

The sample data indicate a high level of family concentration and low foreign ownership. 63% of sample firms are family controlled. On average, the largest shareholder owns 49% of the shares, and 65% of shares are closed to trading. The average wedge is 1.38 and 50% of sample firms have wedge ratios above one.

Our main independent variable is *board diversity*. Our five diversity indicators are variety in nationality (Turkish vs. non-Turkish), gender, independence, age, and education. We measure the first three as dichotomous indicator variables. Age and education are measured as categorical variables and only for boards where this data are available for more than half of the board members. We classify age into five categories: 25-35 (1), 36-45 (2), 46-55 (3), 56-65 (4), and greater than 65 years (5). Education is similarly classified into five categories (elementary, secondary, university, masters, and PhD), roughly based on the total number of years in education (5, 11, 16, 20, and more than 20).

We then construct a composite diversity index, by calculating a Blau value (Blau, 1977) for each diversity attribute and totaling them to create a Blau index for each board in our sample. We follow Harrison and Klein (2007) who note that heterogeneity in categorical attributes should be defined as “variety” and measured using the Blau Index, defined as:

 k

Blau Index = 1 - ∑ Pi2,(1)

 i=1

*where:*

Pi = the proportion of the board members in the ‘i’th category of a given attribute, and

 k = the number of categories in a given attribute.

We chose the Blau Index in creating a composite diversity measure rather than simple statistical methods such as summing, averaging or weighted averaging etc. because the Blau Index easily handles categorical attributes; takes into account both the number of attributes we are combining, the number of categories in each attribute, the proportion of members in each category and also can be standardized to account for differences in the number of categories in each attribute. The higher the number of categories (i.e., the higher the diversity) in an attribute, the lower the sum of the proportions, hence, the larger the Blau index value. To calculate board variety across several attributes, we standardize the Blau values for each attribute for differences in the number of categories by dividing each by its *theoretical maximum value of (k-1)/k* (Agresti and Agresti, 1978)*.* Finally, we form a composite Board Diversity Index (BDI) for each board by totaling the standardized Blau values for each attribute. Since we are interested in whether independent members have a special role, we create two BDI indices, a 4-attribute one (BDI-4) and a 5-attribute one that also includes the diversity provided by independent members (BDI-5). Table 2, Panel A presents the descriptive statistics of board characteristics. The mean age and years of education are 54 and 16 (university graduate), respectively. Analysis of the frequency distributions indicates that more than half of the boards have no independent members or women directors, and 73% consist of only Turkish nationals. An average board’s ratios of non-Turkish, female, and independent board members are about 10%. 86% of the boards have between 5-9 board members.

(Insert Table 2 around here)

 The Blau values for each diversity attribute indicate that the highest (lowest) variety occurs in the age (gender) distribution in an average board. The mean of our composite BDI-4 is 1.73, while that of BDI-5, which also includes the Blau value for independent members, is 2.08.

The components of our BMI are designed to capture the processes used to monitor conflicts of interest between stakeholders to mitigate opportunism and resultant agency costs, and to create credible information disclosure to lessen information asymmetry between insiders and outsiders. They are the *number of meetings* held by the boards, *number of board committees*, *audit quality,* and *transparency and disclosure (TD) scores*. As in previous studies, we use brand name as our proxy for *audit quality*and classify audit firms as Big-4, smaller international firms, and local audit firms. The identity of the audit firm comes from signatures under the Independent Auditor’s Report in annual reports. The TD scores[[6]](#endnote-6) are based on 3 disclosure categories: (i) Ownership and investor relations, (ii) Financial transparency and disclosure, and (iii) Board and management structure and processes. We define (i) and (iii) above as *non-financial disclosure* and the sum of the scores for all three categories as the *total disclosure score.* We conjecture that non-financial disclosure – which pertains to the management and board processes, remuneration issues, and shareholder’s rights – represents voluntary disclosure not driven by regulation and, thus, is in and of itself a good proxy of board monitoring effectiveness.

Table 2, Panel B includes the descriptive statistics for these monitoring intensity indicators and their composite values. A typical board meets 28 times annually and has as few as 2 board committees. More than 50% of our sample firms use a Big-4 audit firm. Finally, the 2006 non-financial disclosure scores of the sample firms are at best moderate, while their total disclosure scores are better, thanks to the reporting standards mandated by IFRS in 2005.

We use different standardization methods and combinations of monitoring attributes to propose the following 4 composite BMI indices: 1) 3-attribute z-scoreBMI: z-values are calculated to standardize the # of meetings, # of committees, and total TD scores, and are then summed for each firm; 2) 3-attribute %-of-maxBMI : Each monitoring attribute is represented as a % of the maximum value for that attribute and then summed;[[7]](#endnote-7) 3) 4-attribute categoricalBMI: After examining the frequency tables, observed thresholds, and subsample sizes for all four BMI attributes, we categorize each attribute into 3 monitoring effort levels, low, medium and high, and assign the respective scores of 1, 2 and 3. We then sum the categorical scores for each board, assuming equal weighting of the attributes; 4) Non-financial TDscoreBMI: The sample firms’ non-financial TD scores. Variance is largest in %-of-maxBMI.

Finally, Table 2, Panel C presents the Pearson correlation coefficients for the components of the composite BDI and BMI indices. No significant correlation exists among the BDI attributes, while each strongly correlates with the composite BDI at p=0.00. Likewise, no or very weak correlation exists between BMI attributes. As expected, the strongest correlation (0.90) is between total TD score and non-financial TD score, which are not combined in any composite BMI. Correlation of the non-financial TD score with all other BMI attributes justifies its use as a separate board monitoring indicator.

1. **Research design and methods of analysis**

Multiple regression analysis estimates the set of relationships between board diversity (our independent variable); board monitoring intensity (our mediating variable), the wedge, and family control (our moderating variables); and firm performance (our dependent variable). We generally assume linearity in the relationships, except for testing for a possible quadratic relationship between BDI and performance.

We first regress the period t+1 performance measures on our control variables and board diversity indices, both measured in the current period t (2006). We use firm size and leverage as control variables in all performance regressions (Campbell and Vera, 2008; Erhardt, Werbel and Shrader, 2003). We also use a bank dummy as another control in some specifications, since performance and board monitoring characteristics of banks may differ due to stricter regulatory control. However, we only tabulate results with the two former controls and refer to some results with the bank dummy in robustness tests.

After estimating the impact of each board diversity attribute one-by-one, we include all in the regression equation to observe if they incrementally impact firm performance:

(1a): Performance (ROA, ROE, MTB or TQ) = β0 + β1 (WOM, INT, AGE, INDEP, EDU) + β6LEV + β7*ln*TA + ε

(1b): Performance (ROA, ROE, MTB or TQ) = β0 + β1WOM + β2INT + β3AGE + β4INDEP + β5EDU

+ β6LEV + β7*ln*TA + ε,

*where:*

ROA = Return on assets (net income/total assets),

ROE = Return on equity (net income/owners’ equity),

MTB = Market-to-book ratio (market value of equity/book value of equity),

TQ = Tobin’s Q = ((market value of equity + total liabilities)/total assets),

WOM = Blau index value for women,

INT = Blau index value for non-Turkish (international) members,

AGE = Blau index value for age variety,

INDEP = Blau index value for independent members,

EDU = Blau index value for educational variety,

LEV = Leverage = Total liabilities/Total assets, and

*ln(*TA) =  *ln(*Total Assets).

Next, our composite board diversity indices (BDIs), our main variables of interest, are included in our regression equation, with the same control variables. Given recent findings (Adams and Ferreira, 2009; Ben-Amar, Francoeur and Hafsi, 2011), we also augment our model with a quadratic term for BDI, since the slope of BDI is expected to decrease or become negative at higher levels of diversity. Henceforth, we will use the term “Performance” for our various dependent variables:

(1c): Performance = β0 + β1BDI + β2LEV + β3*ln*TA + ε

(1d): Performance = β0 + β1BDI + β2 BDI2 + β3LEV + β4*ln*TA + ε,

*where:*

BDI = the composite board diversity index generated by summing the standardized Blau indices for our 4 or 5 diversity attributes;

The rest of the variables are as defined above.

In our second set of regressions, we test the mediating effect of board monitoring intensity (BMI) on the relationship between board diversity and performance, based on Baron and Kenny’s (1986) formulation. We first estimate the relationship between our composite BDI and BMI, then regress firm performance on BMI, and finally augment the BDI–performance relationship by adding BMI as an additional independent variable:

(2a): BMI = a + b BDI + c Leverage + d ln(TA) + ε

(2b): Performance = a + b BMI + c Leverage + d ln(TA) + ε

(2c): Performance = a + b BDI + c BMI + c Leverage + d ln(TA) + ε

When the mediator variable is added to the model, the effect of BDI should either decrease (partial mediation) or become statistically insignificant (full mediation) (Mount, Ilies and Johnson, 2006).

We finally test the moderating effect of our proxies for the dominant owners’ propensity to expropriate (OwnDom) on the relationship between BDI and BMI.[[8]](#endnote-8) Our proxies for OwnDom are the wedge and family dummy. We add them separately and also as multiplicative interaction terms to our model (2a) above:

(3): BMI = a + b BDI + c OwnDom + d BDI­\*OwnDom + e Leverage + f ln(TA) + ε,

*where:*

OwnDom = a) family dummy = 1 if the firm is family controlled, 0 otherwise.

b) wedge = vr/cfr = voting rights (vr) held by the dominant shareholders as a % of their cash flow rights (cfr).

We expect negative coefficients for the family dummy and wedge, as dominant owners/managers may block board monitoring efforts. We expect board diversity to positively impact the negative association between ownership dominance and BMI.

The direction of the relationships tested may not be obvious because better performing firms may have more diverse boards or effective monitoring capabilities. However, since our tests investigate several sets of signed associations and moderating effects, controlling for endogeneity in each association is almost impossible. Furthermore, finding that BMI is a process through which BDI affects performance makes it unlikely that the BDI–performance relationship is in the opposite direction.

1. **Empirical results and analysis**

**6.1 Board diversity and performance**

Table 3 shows the results for the association between board diversity and firm performance, based on equations (1a)-(1d). First, we add our control variables and each diversity attribute, measured as Blau indices, to the model one-at-a-time. Table 3, Panel A shows a positive but insignificant relationship between *blau int,* *blau* *wom,* *blau edu,* and *blau age* and our performance measures. In contrast, we observe a negative but insignificant relationship between *blau ind* and our performance measures. Hence, none of these ‘one variable at a time’ results are significant at acceptable levels.

Next, we include all Blau diversity attributes in the performance regressions in Table 3, Panel B. *Blau int* is the only diversity measure that significantly impacts both market measures of performance, at p=0.03 for TQ and 0.11 for MTB.[[9]](#endnote-9) The other significant relationships are the negative effect of *blau ind* on our accounting performance measures of ROA and ROE (coefficients=-0.09 and -0.12, p-values=0.07 and 0.15 (marginal), respectively) and the negative effect of *blau edu* on ROE (coefficient=-0.14, p=0.09). We conclude that diversity measures individually or altogether are not consistently positive or significant. As expected, our control variable leverage (and firm size) is mostly significant and negatively (positively) related to a firm’s accounting performance, but the opposite holds for market performance.[[10]](#endnote-10)

(Table 3 around here)

 Since our main proposition is that a composite measure of variety better portrays the cognitive diversity in boards, we next test the same relationship with our composite BDI measures. We include a quadratic term for BDI as well (Table 3, Panel C). We first regress each performance measure on BDI-4 (blau(wom+int+age+edu)BDI) and its squared term based on Model 1(d) and find that all specifications are valid with significant F-values, except the MTB model. BDI-4 has a strong positive linear and negative quadratic impact on both accounting performance measures (ROA: linear coefficient=0.18, p=0.02; quadratic coefficient=-0.05, p=0.03; ROE: linear coefficient=0.43, p=0.01; quadratic coefficient=-0.11, p=0.02). These results indicate that BDI-4 initially has a strong positive impact on accounting performance measures, but as the diversity level increases, the impact decreases and may become negative. For our market-based performance measures, coefficients of the linear (quadratic) BDI-4 are also positive (negative) but not significant. These results are robust to the inclusion of a bank dummy as a third control variable (not shown).

Nevertheless, BDI-5 (blau(wom+int+age+edu+ind)BDI) does have a positive linear and negative quadratic impact on only the market-based performance measures (TQ: linear coefficient=0.60, p=0.04; quadratic coefficient=-0.14, p=0.04; MTB: linear coefficient=1.30, p=-0.11; quadratic coefficient=-0.31, p=0.10). Hence, an interesting finding of this study is that the augmentation of diversity with independent board members seems to have a significant positive impact on market performance, i.e., their presence seems to be a positive signal in terms of market expectations. However, independent board members reduce the combined impact of other diversity attributes on accounting performance measures. This supports our conjecture that independent members may be affiliates in controlled firms, suggesting more accrual based earnings management, and hence insignificant association with performance. It may also be worth noting that the positive linear trend coefficients on the 4- and 5-attribute BDIs are always larger than the corresponding negative coefficients on the quadratic terms.

* 1. **Board monitoring intensity (BMI) as a mediator**

As mentioned above, in order to conclude that BMI mediates the relationship between BDI and performance, significant positive associations should exist between BDI and performance, BDI and BMI, and BMI and performance. Furthermore, when BMI is added to the BDI–performance relationship as another independent variable, the effect of BDI on performance should decrease or disappear. We test how well these stringent conditions hold in the following sub-sections.

*6.2.1 Board diversity and board monitoring intensity*

We first separately regress our four BMI indices – the 3-attribute % of maxBMI, 3-attribute z-scoreBMI, 4-attribute categoricalBMI, and non-fin TDscoreBMI – on BDI-4 and BDI-5. In Table 4, we present the results for regressions of the 3-attribute % of maxBMI on BDI-4, as an example.[[11]](#endnote-11) We estimate the BDI–BMI regressions both with (Model 2: coefficient=22.92, p=0.43) and without (Model 1: coefficient=10.47, p=0.10) our control variables. These results indicate that diversity has no significant incremental explanatory power when these significant controls (ln(TA) and leverage, with or without the bank dummy) are in the model (R2=31%). Expecting a similar decline in the effect of BDI on BMI when board diversity is excessive, we also augment the model with a quadratic BDI term. These untabulated results show a positive coefficient for BDI and a negative one for BDI2 (R2=33%), as expected, but both are insignificant.

(Place Table 4 around here)

We extend our analysis of the relationship between BDI and BMI by focusing on ownership dominance (OwnDom). We first use a family dummy that equals 1 if a family collectively owns the largest controlling % of shares in the firm. We find that BDI-4 has a robust, positive impact on BMI when the family control dummy is in the model. For example, BDI-4 has a coefficient of 12.83 (p=0.04), 0.57 (p=0.14), and 0.64 (p=0.08) in regressions of % of maxBMI (Model 3), categoricalBMI (untabulated), and z-scoreBMI (untabulated), respectively. In these regressions, the family dummy consistently has a large negative coefficient, significant at p=0.02, 0.16, and 0.03, respectively, when BDI-4 is in the model and significant at p=0.02, 0.11, and 0.03 when BDI-5 (not tabulated) is in the model. Overall, the results in this section indicate that while board diversity enhances BMI, family control impedes it and prompted us to investigate if ownership dominance also has a moderating effect on the BDI–BMI relationship.

*6.2.2 Family control and the wedge as moderators in the BDI*–*BMI relationship*

As hypothesized in H3, we expect our proxies for the likelihood of expropriation by controlling shareholders to affect the sign and/or magnitude of the BDI–BMI relationship. Hence, we add family control and then the wedge as moderating variables to our regressions of BMI on BDI. Table 4, Models 4-6 depict the results. First, we add the family dummy, both as a separate independent variable and as a multiplicative interaction term, to Model 3 above. Although family control had a negative direct impact on BMI, it does not moderate the BDI–BMI relationship. With the impact of family control and the interaction term, the coefficient of BDI-4 (21.66) is still positive and significant (p=0.07).

We next explore if the wedge moderates the BDI–BMI relationship. We indeed find both a direct negative impact for the wedge itself and a robust positive impact for the interaction term, wedge\*BDI. The results are robust to the inclusion of a bank dummy[[12]](#endnote-12) as a further control variable, and to the use of all four proxies of BMI, for both BDI-4 and BDI-5. We again present the results for only % of maxBMI in Table 4, Models 5 and 6. When the wedge and its interaction with BDI-4 are included alongside BDI-4, we have a valid model (R2=33%). BDI-4 has a weakly significant (p=0.11) negative coefficient (-22.14), the wedge has a larger, significant (p=0.06) negative coefficient (-34.60), and the wedge\*BDI-4 interaction term has a significant (p=0.05) positive coefficient (19.05). These results confirm the negative effect of the wedge on board monitoring efforts and the positive moderating effect of diversity on the relationship between the wedge and BMI. That is, in diverse boards, the significant negative effect of the wedge on BMI is significantly reduced by almost half (-34.60+19.05=-15.55). Symmetrically, in high wedge firms, the insignificant negative impact of BDI-4 gets smaller and becomes almost positive (-22.14+19.05=-3.09). The results are at least as strong (exactly the same R2 and F-values) when BDI-42 is added to the model. In this case, the coefficient of BDI-4 and its square term are 8.48, and -9.84, respectively, both insignificant. However, the negative impact of the wedge and the positive impact of the interaction term on % of maxBMI is now larger and more significant, with respective coefficients of -39.33 (p=0.04) and 21.56 (p=0.03). In diverse boards, the negative impact of the wedge is again halved (-39.33+21.56=-17.77). Symmetrically, in high wedge firms, the insignificant positive impact of diversity on BMI increases almost four times (8.48+21.56=30.04) and becomes significant.

These interesting results contribute to the ownership dominance/board monitoring literature in four respects. First, the strong negative impact of the wedge on BMI supports Hypothesis 3 and mirrors the results of the family ownership dummy in section *6.2.1*. Hence, with high wedge, we expect amelioration in board monitoring efforts. Second, since the interaction of BDI with family was insignificant, as opposed to the significant interaction effect with the wedge, we conclude that it is not family control per se but their voting rights in excess of cash flow rights that weaken the relationship between BDI and BMI. Third, the negative effect of the wedge on BMI seems stronger than the positive impact of diversity when both appear in the models. BDI loses significance and its coefficient even becomes negative when the wedge and its interaction with BDI enter the model. Fourth, the robust positive impact of the wedge and diversity on the BDI–BMI relationship point to a strong symmetric set of moderating effects in the BDI–wedge–BMI relationship. Diversity seems to have a special positive role to play when likelihood of expropriation is high.

These results prompted our investigation for a similar direct negative impact and positive moderating effect of the wedge in the other performance regressions. In regressions of performance measures with the wedge and BDI-4 as our main independent variables, the wedge has a negative but insignificant effect on performance, and the interaction terms of wedge\*BDI-4 are mostly positive but insignificant. Only in ROE regressions is the wedge coefficient negative (-0.25) and significant (p=0.02) and the interaction term positive (0.12) and significant (p=0.30). Again, in high diversity firms, the negative performance effect of the wedge is ameliorated. In performance regressions with the wedge and any of the 4 BMI indices, both the wedge and the interaction term wedge\*BMI are mostly insignificant, and their signs are not consistent. Overall, we conclude that the wedge has a stronger, more consistent moderating effect in only the BDI–BMI relationship.

*6.2.3. Board monitoring intensity and performance*

In Table 5, we estimate the relationship between our BMI proxies and firm performance, using the same control variables. Since we hypothesize that board diversity affects performance through the board’s main governance function of monitoring, we expect to observe a stronger relationship between BMI and performance.

 We first regress our performance measures on separate board monitoring effort attributes (Table 5, Panel A). We find that the number of meetings does not affect any performance measures; however, the number of board committees significantly impacts ROE and MTB with respective coefficients of 0.03 (p=0.05) and 0.15 (p=0.09). Total TD scores affect TQ and MTB with significant coefficients of 0.04 (p=0.01) and 0.01 (p=0.07). Finally, the coefficient of auditor quality (0.20) is significant at p=0.05 only in TQ regressions. When all four attributes are included in the performance regressions, we again find that only the coefficients of the # of board committees and total TD score are positive and significant, but only in MTB regressions (see Panel B). Although our monitoring attributes are not consistently significant when included alone or together in performance regressions, the most robust ones are number of board committees and total TD scores.

 We finally estimate the combined effect of our four composite BMI indices on performance and report the results in Table 5, panel C. As hypothesized, each of the four BMI indices are significantly associated with most of our performance measures. The 3-attribute z-scoreBMI predicts future ROE, Tobin’s Q, and market-to-book ratio with significant positive coefficients of 0.02, 0.06, and 0.23 and respective p-values of 0.07, 0.13, and 0.00. Likewise, the incremental positive impact of the 3-attribute %-of-maxBMI on ROE and MTB is significant, both at p=0.03, while the 4-attribute categoricalBMI significantly impacts all future performance measures positively (also when a bank-dummy is included in the model) at p=0.08, 0.01, 0.06, and 0.04, in tabulated order. Finally, the non-fin TDscoreBMI predicts TQ with a significant coefficient of 1.47 (p=0.01) and MTB with a significant coefficient of 3.11 (p=0.01). It is interesting to note that the non-fin TDscoreBMI, which assesses the richness of non-financial information disclosure, predicts only market measures of performance, indicating that non-financial disclosure is indeed value relevant. Overall, Table 5 results indicate that the composite BMI indices have higher, more robust explanatory powers than separate monitoring attributes, just like the composite BDI indices.

*6.2.4 BDI + BMI and performance*

Table 6 includes the key estimations to conclude whether BMI mediates the BDI–performance relationship. To test this stringent mediating relationship and to make sure the results are robust, we run a set of separate regressions for each of our 4 performance measures as the dependent variable with our 4- and 5-attribute BDIs, each of our four BMIs, and our controls as the independent variables, as in model (2c) above. We then compare the coefficients and p-values of BDI-4 and BDI-5 in Table 3, Panel C with those in Table 6, Panels A and B and the related R2 values. To the extent that the coefficients of BDI are smaller and less significant and the regressions have higher R2 values in Table 6 compared to Table 3, we can say that a mediating relationship holds.

In general, we have stronger results with BDI-5 as the test variable, compared to BDI-4, and weakest results when the 4-attribute categoricalBMI enters the model as an independent variable. In Table 3, there is a strong significant relationship between BDI-4 and only the accounting measures of performance, ROA (linear coefficient=0.18, p=0.02; quadratic coefficient=-0.05, p=0.03) and ROE (linear coefficient=0.43, p=0.01; quadratic coefficient=-0.11, p=0.02). When z-scoreBMI, %-of-maxBMI , and4-attribute categoricalBMI are added to the ROA models with BDI-4 in Table 6, Panel A, the coefficients (p-values) of BDI-4 decrease (increase) only slightly to 0.17 (p=0.03), 0.17 (p=0.03), and 0.16 (p=0.05), respectively. The R2 values also increase slightly (from 29% to 30%, 31%, and 33%). For the ROE models, the coefficients (p-values) of BDI once again decrease (increase) only slightly to 0.40 (p=0.02), 0.40 (p=0.02), and 0.37 (p=0.03) when BMI measures enter the model. Again the R2 values increase slightly from 18% to 20% for %-of-maxBMI and 22% for 4-attribute categoricalBMI. Furthermore, almost all BMI coefficients are very significant. However, the results above show that BMI seems to mediate the relationship between BDI and performance only slightly. Our interpretation for BDI-4 is that both BDI and BMI incrementally and significantly impact accounting performance measures.

In contrast, in Table 3, Panel C, a significant positive relationship exists between BDI-5 and only market performance measures, TQ (coefficient=0.60, p=0.04) and MTB (coefficient=1.30, p=0.11). As depicted in Table 6, Panel B, when our BMI proxies enter the TQ models, the coefficients of BDI-5 decrease to 0.52 (.07), 0.58 (.05), and 0.55 (.05) for z-scoreBMI­, %-of-maxBMI, and non-fin TDscoreBMI, respectively, and R2 values increase from 8% in Table 3 to 9%-15%. In MTB models, augmenting the regressions with the BMI proxies again significantly decreases and even eliminates the significance of BDI-5. In Table 6, Panel B, we observe that the coefficient of BDI-5 decreases to 0.93, 1.16, and 0.98 when the aforementioned BMI proxies are in the model. Furthermore, all three coefficients become insignificant. The BMI coefficients are positive, almost always highly significant (p=0.00-0.06). Likewise, the R2 values increase from 7% in Table 3 to 10%-18%. Hence, all BMI measures, except for the 4-attribute categoricalBMI, seem to fully mediate the relationship between BDI-5 and MTB. In summary, BMI indices weakly mediate the relationship between BDI-4 and accounting performance measures while almost fully mediating the relationship between BDI-5 and market performance measures. The governance mechanism through which a diverse board impacts performance, especially market participants’ perceptions of risk and growth options, seems to be board monitoring intensity.

1. **Conclusion and Discussion**

Our study investigates the relationship between board diversity, board monitoring intensity, and firm performance. We consider board diversity to be an amalgam of the variability in various demographic and cognitive diversity attributes. We further envision that it impacts performance through board monitoring intensity, which acts as a process variable, lending boards more effective monitoring of the conflicts of interest between stakeholders and thus enhancing firm performance.

Our two board diversity indices more significantly impact firm performance than the individual attributes. The diversity indices also positively affect board monitoring intensity, which, in turn, strongly affects firm performance. When both indices are included in performance regressions, the significance of BDI decreases slightly or disappears and no such deterioration occurs in the effect of BMI, indicating that BMI acts at least as a partial mediator in the BDI–performance relationship. We also find interesting evidence that board diversity and the propensity of controlling owners to expropriate, proxied by the wedge ratio, moderate each other’s impact on BMI, whereby diversity significantly reduces the negative impact of the wedge on BMI.

The findings should be of interest to researchers, regulators, investors, and board members themselves. We realize the limitation of our research due to small sample size, as most of the data had to be collected manually. Researchers working on markets for which board data are available can adapt our model and composite diversity and monitoring effort proxies to provide more powerful tests. Our findings can be useful to regulators in formulating recommendations or regulations related to ownership structures, desirable characteristics of boards and their monitoring efforts. Our results are also instructive for investors and proxy advisors and indicate that the mere existence of monitoring vehicles such as audit committees or independent board members may be insufficient to prevent expropriation by dominant shareholders, but diverse boards may moderate the propensity to expropriate, suggesting that diversity and internal control regulations may be useful. Board members themselves should also benefit from the findings in creating boards that are more diligent monitors of shareholders’ rights.

**Figure 1: Conceptualization of our construct of diversity**

The underlined attributes are operationalized as presented in Figure 2.



**Figure 2: Operationalization of the Conceptual Model**

The set of direct, moderating, and mediating relationships between board diversity, board-monitoring intensity, ownership concentration, and firm performance. The boxes contain the proxies measuring these broad constructs. Expected signs of the relationships are in parentheses, each arrow depicting an association.

c

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**Table 1**

**Descriptive statistics on firm-specific characteristics**

 .

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Performance variables** |  **N** | **Mean** | **Median** | **Std. dev.** |  **Min.** |  **Max.** |
|  |  |  |  |  |  |  |
| ROE | 93 | 0.12 | 0.14 | 0.18 | -0.98 | 0.51 |
| ROA | 93 | 0.07 | 0.04 | 0.10 | -0.13 | 0.49 |
| MTB | 93 | 1.86 | 1.54 | 1.17 | 0.30 | 7.35 |
| TQ | 93 | 1.30 | 1.20 | 0.58 | 0.35 | 5.39 |
| **Control variables** |  |   |   |   |   |   |
| LEV | 93 | 0.52 | 0.49 | 0.25 | 0.02 | 0.93 |
| Ln(TA) | 93 | 20.98 | 20.70 | 1.67 | 18.04 | 25.14 |
| **Ownership dominance variables** |  |  |  |  |  |  |
| Wedge = vr/cfr | 94 | 1.38 | 1.00 | 0.79 | 0.42 | 6.56 |
| vr/cfr dummy  | 94 | 0.43 | 0.00 | 0.50 | 0.00 | 1.00 |
| Family dummy | 95 | 0.63 | 1.00 | 0.48 | 0.00 | 1.00 |
| Ownership % of largest owner | 94 | 48.74 | 49.21 | 19.84 | 5.89 | 99.74 |
| 1-float rate  | 94 | 0.65 | 0.69 | 0.18 | 0.11 | 1.00 |
| Foreign dummy | 95 | 0.27 | 0 | 0.45 | 0 | 1 |
| **Industry classifications**  |  |  |  |  |  |  |
| Financial | 95 | 0.16 | 0.00 | 0.37 | 0.00 | 1.00 |
| Manufacturing | 95 | 0.57 | 1.00 | 0.50 | 0.00 | 1.00 |
| Service | 95 | 0.27 | 0.00 | 0.45 | 0.00 | 1.00 |

*Performance variables* are measured as of year t+1 (2007) or calculated as the average of year t (2006) and t+1:

ROE = return on equity = net income(NI)/owners’ equity(BVE);

ROA = return on assets ( net income /total assets)

MTB = market-to-book ratio (market value of equity / book value of equity)

TQ = Tobin’s Q [(market value of equity + total liabilities) /total assets)

*Control variables* are measured as of year t:

LEV = Leverage (total liabilities/total assets)

Ln (TA) = firm size, measured in natural logarithm of assets in 1000 Turkish Liras.

*Ownership dominance variables* are measured as of year t:

Wedge = voting rights(vr)/cash flow rights(cfr), measured as in Yurtoglu (2003);

vr/cfr dummy = 1, if the wedge is above the sample median; 0, otherwise;

Family dummy = 1, if a family collectively owns the largest % of shares; 0, otherwise;

1-float rate = (1-(float rate+“other” ownership)), where “other” ownership is mostly used synonymously with floated shares in ownership structure lists of most ISE companies;

Foreign dummy = 1, if a non-Turkish firm or individual is among the largest 5 shareholders; 0, otherwise.

*Industry classifications* are coded as dummy variables and included in some regression specifications.

**Table 2**

**Descriptive statistics on board characteristics**

**Panel A: Board diversity attributes and composite board diversity indices (BDI)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **BD Attributes** | **N** | **Mean** | **Median** | **St.dev.** | **Min.** | **Max.**  |
| # of independent board members/board | 79 | 0.81 | 0.00 | 1.18 | 0.00 | 4.00 |
| # of foreign board members/board  | 95 | 0.86 | 0.00 | 1.64 | 0.00 | 7.00 |
| # of female board members /board  | 95 | 0.76 | 1.00 | 0.95 | 0.00 | 4.00 |
| Age/board  | 85 | 53.63 | 53.57 | 6.13 | 40.40 | 72.00 |
| Education level (5categories)/board | 85 | 15.94 | 15.86 | 0.88 | 13.40 | 18.43 |
| Independent members/board (%) | 79 | 0.095 | 0.00 | 0.14 | 0.00 | 0.43 |
| International members/board (%) | 95 | 0.104 | 0.00 | 0.19 | 0.00 | 0.70 |
| Female board members/board (%) | 95 | 0.096 | 0.10 | 0.12 | 0.00 | 0.57 |
| **Variety measures and composite BDI** |  |  |  |  |  |  |
| Blu independent (ind) | 79 | 0.14 | 0.00 | 0.19 | 0.00 | 0.49 |
| Blau international (int)  | 95 | 0.12 | 0.00 | 0.20 | 0.00 | 0.50 |
| Blau woman (wom) | 95 | 0.15 | 0.18 | 0.16 | 0.00 | 0.49 |
| Blau age (5 categories) | 85 | 0.56 | 0.63 | 0.20 | 0.00 | 0.78 |
| Blau education (5 edu categories) | 85 | 0.39 | 0.44 | 0.21 | 0.00 | 0.73 |
| BDI(wom+int+age) | 85 | 1.24 | 1.30 | 0.52 | 0.00 | 2.46 |
| BDI(wom+int+edu) | 85 | 1.03 | 0.95 | 0.51 | 0.00 | 2.14 |
| BDI(wom+age+edu) | 85 | 1.49 | 1.48 | 0.51 | 0.35 | 2.58 |
| BDI(for+age+edu) | 85 | 1.43 | 1.43 | 0.57 | 0.00 | 2.58 |
| BDI-4(wom+int+age+edu) | 85 | 1.73 | 1.73 | 0.60 | 0.47 | 2.94 |
| BDI-5(wom+ int+age+edu+ ind) | 72 | 2.08 | 2.04 | 0.77 | 0.47 | 3.69 |
| **Panel B: Board’s monitoring intensity (BMI) attributes and composite BMI indices** |
| **BMI Attributes** |  |  |  |  |  |  |
| # of board meetings | 80 | 28.05 | 22.00 | 23.42 | 3.00 | 132.00 |
| # of committees  | 89 | 2.06 | 2.00 | 1.65 | 0.00 | 8.00 |
| Audit quality code | 95 | 2.60 | 3.00 | 0.66 | 1.00 | 3.00 |
| Total T&D score | 95 | 58.47 | 60.00 | 10.59 | 32.00 |  87.00 |
| Financial T&D score | 95 | 62.49 | 63.00 | 12.89 | 25.00 | 89.00 |
| Non-financial T&D score | 93 |  55.00 |  55.00 |  12.00 |  25.00 | 87.00 |
| **Composite BMI** |  |  |  |  |  |  |
| z-score*BMI* | 95 | 0.03 | -0.26 | 1.96 | -3.66 | 6.58 |
| non-fin TDscore*BMI* | 93 | 0.55 | 0.55 | 0.12 | 0.25 | 0.87 |
| %-of-max*BMI*  | 95 | 100.93 | 97.09 | 35.30 | 33.00 | 217.00 |
| 4-attribute categorical*BMI*  | 95 | 7.99 | 8.00 | 2.16 | 2.00 | 12.00 |

**Table 2 (continued)**

**Panel C: Pearson correlation coefficients for BDI and BMI attributes**

**BDI attributes:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. Blau ind | 1.000 |  |  |  |  |  |  |
| 2. Blau int | 0.096 | 1.000 |  |  |  |  |  |
| 3. Blau wom | 0.184 | -0.194 | 1.000 |  |  |  |  |
| 4. Blau age  | 0.125 | -0.070 | 0.123 | 1.000 |  |  |  |
| 5. Blau edu  | 0.097 | 0.081 | -0.159 | 0.217\* | 1.000 |  |  |
| 6. BDI-4 | 0.202 | 0.540\*\* | 0.371\*\* | 0.537\*\* | 0.493\*\* | 1.000 |  |
| 7. BDI-5 | 0.650\*\* | 0.451\*\* | 0.459\*\* | 0.452\*\* | 0.395\*\* | 0.875\*\* | 1.000 |

 **BMI attributes:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| 1. Total TD score |  1.000 |  |  |  |  |
| 2. Audit quality |  0.302\* | 1.000 |  |  |  |
| 3. # of board meetings |  0.125 | 0.021 | 1.000 |  |  |
| 4. # of committees |  0.215\* | 0.204 | 0.202 | 1.000 |  |
| 5. non-fin TDscore |  0.895\*\* |  0.226\* | 0.157 |  0.258\* | 1.000 |

\*\* p<0.01, \* p< 0.05

See Appendix 1 for definitions of board diversity and board monitoring intensity attributes and of composite BDI and BMI indices.

**Table 3**

**Board diversity on performance**

Coefficients *(p-values in parentheses)* for regressions of accounting and market-based performance measures on control variables and board diversity attributes, calculated as separate Blau index values, and various composite board diversity indices formed additively from these Blau values.

**Panel A: Separate effects of the 5 board diversity attributes measured as Blau variety indices: Model (1a)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Diversity Attributes** | **ROA** | **ROE** | **TQ** | **MTB** |
| **Blau ind** | -0.061 *(0.21)* | -0.084 *(0.31)* | -0.13 *(0.58)* | -0.29 *(0.63)* |
| Ln(TA) |  0.008 *(0.22)* |  0.027 *(0.02)*\*\* | -0.04 *(0.22)* | -0.07 *(0.42)* |
| Leverage | -0.164 *(0.00)*\*\*\* | -0.107 *(0.16)* | -0.09 *(0.68)* |  1.42 *(0.01)*\*\*\* |
| FAdj. R2 |  5.75\*\*\* 0.16 |  2.14\* 0.04 |  1.36 0.01 |  2.42\* 0.05 |
| **Blau int** | -0.01 *(0.79)* |  0.06 *(0.52)* |  0.45 *(0.14)* |  0.92 *(0.15)* |
| Ln(TA) |  0.01 *(0.34)* |  0.03 *(0.04)*\*\* | -0.07 *(0.12)* | -0.13 *(0.15)* |
| Leverage | -0.20 *(0.00)*\*\*\* | -0.23 *(0.01)*\*\*\* | -0.33 *(0.26)* |  1.19 *(0.05)*\*\* |
| FAdj. R2 |  7.70\*\*\* 0.18 |  2.73\*\* 0.05 |  3.24\*\* 0.06 |  1.94 0.03 |
| **Blau wom** |  0.04 *(0.47)* |  0.11 *(0.37)* |  0.21 *(0.59)* | -0.25 *(0.76)* |
| Ln(TA) |  0.01 *(0.31)* |  0.03 *(0.02)*\*\* | -0.05 *(0.24)* | -0.10 *(0.25)* |
| Leverage | -0.20 *(0.00)*\*\*\* | -0.23 *(0.01)*\*\*\* | -0.35 *(0.23)* |  1.12 *(0.06)*\*\* |
| FAdj. R2 |  7.90\*\*\* 0.18 |  2.87\*\* 0.05 |  2.54\* 0.04 |  1.22 0.00 |
| **Blau edu** |  0.01 *(0.90)* |  0.05 *(0.62)* |  0.23 *(0.48)* | -0.19 *(0.79)* |
| Ln(TA) |  0.01 *(0.21)* |  0.03 *(0.02)*\*\* | -0.07 *(0.12)* | -0.11 *(0.25)* |
| Leverage | -0.23 *(0.00)*\*\*\* | -0.28 *(0.00)*\*\*\* | -0.49 *(0.11)* |  1.00 *(0.12)* |
| FAdj. R2 |  10.27\*\*\* 0.25 |  3.37\*\* 0.08 |  3.78\*\* 0.09 |  0.90-0.00 |
| **Blau age** |  0.05 *(0.28)* |  0.06 *(0.57)* |  0.07 *(0.83)* |  0.12 *(0.86)* |
| Ln(TA) |  0.01 *(0.23)* |  0.03 *(0.02)*\*\* | -0.06 *(0.15)* | -0.12 *(0.21)* |
| Leverage | -0.23 *(0.00)*\*\*\* | -0.28 *(0.00)*\*\*\* | -0.48 *(0.11)* |  0.99 *(0.12)* |
| FAdj. R2 |  10.80\*\* 0.26 |  3.40\*\* 0.08 |  3.60\*\* 0.09 |  0.89-0.00 |

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3 (continued)**

**Panel B: Marginal effects of the Blau diversity attributes when all are in performance regressions: Model (1b)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Diversity Attributes** |  |  |  |  | **ROA**  | **ROE** | **Tobin’s Q** | **MTB** |
|  |  |  |  |  |  |  |  |  |
| Blau ind |  |  |  |  | -0.087\**(0.07)* | -0.123*(0.15)* | -0.258*(0.275)* | -0.382*(0.566)* |
|  |  |  |  |  |  |  |  |  |
| Blau int |  |  |  |  | 0.005*(0.91)* | 0.067*(0.40)* | 0.486\*\**(0.033)* | 1.023\**(0.109)* |
|  |  |  |  |  |  |  |  |  |
| Blau wom |  |  |  |  | 0.017*(0.78)* | 0.032*(0.76)* | 0.215*(0.478)* | -0.308*(0.720)* |
|  |  |  |  |  |  |  |  |  |
| Blau edu(5 categorical) |  |  |  |  | -0.03*(0.49)* | -0.141\**(0.09)* | 0.000*(0.999)* | -0.510*(0.441)* |
|  |  |  |  |  |  |  |  |  |
| Blau age (5 categorical) |  |  |  |  | 0.05*(0.40)* | 0.090(0.36) | -0.183(0.508) | -0.005(0.995) |
|  |  |  |  |  |  |  |  |  |
| Ln(TA) |  |  |  |  | 0.010*(0.11)* | 0.030\*\*\**(0.01)* | -0.051*(0.113)* | -0.098*(0.284)* |
| Leverage |  |  |  |  | *-*0.190\*\*\**(0.00)* | -0.119*(0.12)* | -0.157*(0.466)* | 1.448\*\**(0.020)* |
|  |  |  |  |  |  |  |  |  |
| FAdj. R2 |  |  |  |  | 3.96\*\*\*0.23 | 1.96\*0.09 | 1.88\*0.08 | 1.310.03 |

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3 (continued)**

**Panel C: Composite diversity indices (BDI) as the summation of our Blau variety measures and their squares: Model (1d)**

|  |  |  |
| --- | --- | --- |
|  | Model with BDI-4 | Model with BDI-5 |
| Diversity Attributes | ROA | ROE | Tobin’s Q | MTB | ROA | ROE | Tobin’s Q | MTB |
|  |  |  |  |  |  |  |  |  |
| BDI­-4(wom+int+age+edu)  | 0.184\*\**(0.023)* | 0.432\*\*\**(0.012)* | 0.701*(0.203)* | 0.712*(0.545)* | - | - | - | - |
| (BDI-4)2 | -0.051\*\**(0.026)* | -0.114\*\*\**(0.019)* | -0.172*(0.271)* | -0.188*(0.574)* | - | - | - | - |
| BDI-5(wom+int+age+edu+ind)  | - | - | - | - | 0.060*(0.309)* | 0.121*(0.244)* | 0.600\*\**(0.039)* | 1.297\**(0.111)* |
| (BDI­-5)2  | - | - | - | - | -0.016*(0.225)* | -0.032*(0.188)* | -0.137\*\**(0.041)* | -0.312\**(0.097)* |
| Ln(TA) | 0.008*(0.217)* | 0.031\*\**(0.026)* | -0.073\**(0.105)* | -0.124*(0.202)* | 0.010\**(0.109)* | 0.029\*\*\**(0.011)* | -0.047*(0.131)* | -0.079*(0.364)* |
| Leverage | -0.232\*\*\* *(0.000)* | -0.279\*\*\**(0.003)* | -0.464*(0.124)* | 0.999*(0.123)* | -0.203\*\*\*  *(0.000)* | -0.158\*\**(0.041)* | -0.225*(0.288)* | 1.238\*\**(0.040)* |
|  |  |  |  |  |  |  |  |  |
| FAdj. R2 | 9.457\*\*\*0.29 | 4.469\*\*\*0.18 | 3.300\*\*\*0.10 | 0.7550.02 | 6.446\*\*\*0.22 | 2.313\*\*0.07 | 2.819\*\*0.08 | 1.962\*0.07 |

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 1 defines performance measures and control variables; Appendix 1, the diversity measures used as independent variables.

**Table 4**

**The impact of BDI on BMI and the moderating effect of ownership concentration**

Models (1)-(3) report regression coefficients *(t-statistics in parentheses)* from the regressions of the 3-attribute %-of-max definition of the Board Monitoring Index (BMI) on the 4-attribute Board Diversity Index (BDI-4) and several control variables. In Models (4)-(6), the BMI model is augmented with an interaction term to measure the impact of ownership dominance on the relationship between BDI and BMI.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Independent****Variables** | **Model****(1)** | **Model****(2)** | **Model****(3)** | **Model****(4)** | **Model****(5)** | **Model****(6)** |
| constant | 84.35\*\*\**(0.00)* | -118.42\*\**(0.02)* | 92.46\*\*\**(0.00)* | 78.38\*\**(0.00)* | -48.24*(0.36)* | -66.93*(0.22)* |
| Leverage | - | 31.09\*\**(0.05)* | - | - | 35.64\*\**(0.03)* | 35.84\*\**(0.03)* |
| Ln(TA) | - | 8.75\*\**(0.00)* | - | - | 8.15\*\*\**(0.00)* | 8.11\*\*\**(0.01)* |
| BDI-4 | 10.47\* | 22.92*(0.43)* | 12.83\*\*\**(0.04)* | 21.66\**(0.07)* | -22.14\**(0.11)* | 8.48*(0.77)* |
| (BDI-4)2 | - | -5.72*(0.49)* | - | - | - | -9.84*(0.24)* |
| FAMdummy | - | - | -18.5\*\**(0.02)* | 1.803*(0.94)* | - | - |
| (BDI-4)\*FAM | - | - | - | -12.3*(0.39)* | - | - |
| VR/CFR | - | - | - | - | -34.60\*\**(0.06)* | -39.33\*\*\**(0.04)* |
| (VR/CFR)\*(BDI-4) | - | - | - | - | 19.05\*\**(0.05)* | 21.56\*\*\**(0.03)* |
|  |  |  |  |  |  |  |
| Adj.R2 | 0.02 | 0.31 | 0.06 | 0.064 | 0.33 | 0.33 |
| Observations | 84 | 82 | 84 | 84 | 81 | 81 |

 Table 1 defines control and ownership dominance variables; Appendix 1, diversity and monitoring intensity proxies.

Table 5

The effect of board monitoring intensity (BMI) on firm performance

**Panel A: Separate effects of the four board monitoring intensity attributes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Monitoring attributes** | **ROA** | **ROE** | **Tobin’s Q** | **MTB** |
| **# of board meetings** | 0.000*(0.83)* | 0.000*(0.55)* | 0.000*(0.94)* | 0.005*(0.41)* |
| Ln(TA) | 0.006*(0.41)* | 0.021\**(0.09)* | -0.055*(0.29)* | -0.097*(0.36)* |
| Leverage | -0.211\*\*\**(0.00)* | -0.154\*\**(0.05)* | -0.394*(0.25)* | 0.759*(0.27)* |
| FAdj. R2 | 8.354\*\*\*0.21 | 1.5670.021 | 2.1190.041 | 0.772-0.009 |
| **# of committees** | 0.006*(0.39)* | 0.027\*\**(0.05)* | 0.049*(0.28)* | 0.151\**(0.09)* |
| Ln(TA) | 0.005*(0.52)* | 0.024*(0.11)* | -0.071*(0.13)* | -0.138*(0.15)* |
| Leverage | -0.209\*\*\**(0.00)* | -0.285\*\*\**(0.00)* | -0.466*(0.13)* | 0.709*(0.25)* |
| FAdj. R2 | 7.565\*\*\*0.18 | 3.840\*\*\*0.08 | 2.935\*\*0.06 | 1.9070.03 |
| **Total TD score** | 0.001*(0.35)* | 0.001*(0.49)* | 0.012\**(0.07)* | 0.037\*\*\**(0.01)* |
| Ln(TA) | 0.003*(0.670)* | 0.027\**(0.08)* | -0.093\**(0.05)* | -0.221\*\**(0.02)* |
| Leverage | -0.199\*\*\**(0.00)* | -0.237\*\*\**(0.01)* | -0.377*(0.19)* | 1.073\**(0.06)* |
| FAdj. R2 | 8.049\*\*\*0.18 | 2.760\*\*0.05 | 3.632\*\*\*0.07 | 3.997\*\*0.08 |
| **Audit Quality** | 0.004*(0.82)* | -0.025*(0.42)* | 0.198\*\**(0.05)* | 0.203*(0.33)* |
| Ln(TA) | 0.006*(0.42)* | 0.035\*\**(0.02)* | -0.082\**(0.07)* | -0.130*(0.17)* |
| Leverage | -0.197\*\*\**(0.00)* | -0.238\*\*\**(0.01)* | -0.334*(0.24)* | 1.154\**(0.06)* |
| FAdj. R2 | 7.702\*\*\*0.17 | 2.805\*\*0.05 | 3.871\*\*0.08 | 1.5260.01 |
| **Panel B: The marginal effects of monitoring attributes when model includes all** |
| **# of board meetings** | 4.64*(0.91)* | 0.000*(0.63)* | -0.001*(0.84)* | 0.004*(0.49)* |
| **# of committees** | 0.004*(0.57)* | 0.011*(0.33)* | 0.060*(0.23)* | 0.170\**(0.09)* |
| **Total TD score** | 0.001*(0.40)* | 0.002*(0.27)* | 0.010*(0.19)* | 0.039\*\*\**(0.01)* |
| **Audit Quality** | 0.010*(0.55)* | -0.008*(0.76)* | 0.135*(0.26)* | -0.025*(0.92)* |
| Ln(TA) | 0.000*(0.99)* | 0.013*(0.39)* | -0.124\**(0.05)* | -0.259\*\**(0.04)* |
| Leverage | -0.214*(0.00)* | -0.180\*\**(0.03)* | -0.489*(0.18)* | 0.345*(0.62)* |
| FAdj. R2 | 4.23\*\*\*0.20 | 1.090.007 | 1.84\*0.062 | 1.87\*0.064 |

**Table 5 (continued)**

**Panel C: 4 composite board monitoring intensity (BMI) indices on 4 firm performance measures: Model (2b)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Model with z-scoreBMI | Model with %-of-maxBMI | Model with 4-attribute categoricalBMI | Model with non-fin TDscoreBMI |
| **Independent Variables** | ROA | ROE | TQ | MTB | ROA | ROE | TQ | MTB | ROA | ROE | TQ | MTB | ROA | ROE | TQ | MTB |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| z-scoreBMI | 0.007*(0.27)* | 0.022\**(0.07)* | 0.059*(0.13)* | 0.228\*\*\**(0.00)* | - | - | - | - | - | - | - | - | - | - | - | - |
| %-of-maxBMI  | - | - | - | - | 0.000*(0.25)* | 0.001\*\**(0.03)* | 0.002\*\**(0.50)* | 0.009\*\**(0.03)* | - | - | - | - | - | - | - | - |
| 4-attribute categoricalBMI  | - | - | - | - | - | - | - | - |  0.009\**(0.08)* | 0.026\*\*\**(0.01)* | 0.063\**(0.06)* | 0.14\*\**(0.04)* | - | - | - | - |
| Non-fin TDscoreBMI | - | - | - | - | - | - | - | - | - | - | - | - | 0.087*(0.35)* | 0.156*(0.40)* | 1.467\*\*\**(0.01)* | 3.11\*\**(0.01)* |
| Ln(TA)  | 0.003*(0.71)* | 0.020*(0.18)* | -0.086\**(0.08)* | -0.223\*\**(0.02)* | 0.003*(0.73)* | 0.017*(0.24)* | 0.048\**(0.10)* |  0.191\*\**(0.05)* | 0.00*(0.99)* | 0.013*(0.37)* | -0.10\*\**(0.05)* | -0.20\*\**(0.04)* | 0.004*(0.62)* | 0.030\*\**(0.05)* | -0.099\*\**(0.04)* | -0.160\**(0.09)* |
| Leverage | -0.211\*\*\**(0.00)* | -0.280\*\*\**(0. 00)* | -0.478\**(0.11)* | 0.665*(0.26)* | -0.207\*\*\**(0.00)* | -0.271\*\*\**(0.00)* | 0.293*(0.16)* | 0.897*(0. 13)* | -0.20\*\*\**(0.00)* | -0.24\*\**(0.01)* | -0.37*(0.20)* | 1.104\*\**(0.06)* | 0.208\*\*\**(0.00)* |  0.271\*\*\**(0.00)* | -0.438*(0.13)* |  0.742*(0.20)* |
| FAdj. R2 | 8.189\*\*\*0.19 | 3.831\*\*0.09 | 3.278\*\*0.07 | 4.301\*\*\*0.10 | 8.241\*\*\*0.19 | 4.436\*\*\*0.10 | 2.930\*\*0.06 | 2.820\*\*0.06 | 9.00\*\*\*0.21 | 4.91\*\*0.11 | 3.71\*\*0.08 | 2.656\*\*0.05 | 8.459\*\*\*.20 | 3.518\*\*\*0.08 | 4.803\*\*\*0.11 | 3.129\*\*0.07 |

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 1 defines control and performance variables; Appendix 1, monitoring intensity proxies.

**Table 6**

**Mediating effect of BMI on BDI–Performance relationship: Model (2c)**

Coefficients (*p-values in parentheses*) for performance regressions on both BDI and BMI

**Panel A: 4-attribute BDI with different BMI indices as independent variables**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Model with z-scoreBMI | Model with %-of-maxBMI | Model with 4-attribute categoricalBMI | Model with non-fin TDscoreBMI |
| **Independent Variables** | ROA | ROE | TQ | MTB | ROA | ROE | TQ | MTB | ROA | ROE | TQ | MTB | ROA | ROE | TQ | MTB |
| BDI-4 | 0.173\*\**(0.034)* | 0.398\*\*\**(0.019)* | 0.619*(0.261)* | 0.347*(0.760)* | 0.173\*\**(0.032)* | 0.397\*\*\**(0.017)* | 0.662*(0.232)* | 0.514*(0.658)* | 0.157\*\**(0.047)* | 0.367\*\**(0.026)* | 0.593*(0.282)* | 0.420*(0.720)* | 0.185\*\**(0.024)* | 0.417\*\*\**(0.015)* | 0.650*(0.236)* | 0.388*(0.729)* |
| BDI-42 | -0.048\*\**(0.037)* | -0.104\*\**(0.030)* | -0.150*(0.337)* | -0.090*(0.780)* | -0.048\*\**(0.034)* | -0.105\*\**(0.026)* | -0.162*(0.301)* | -0.139*(0.675)* | -0.043\*\**(0.055)* | -0.094\*\**(0.044)* | -0.140*(0.372)* | -0.101*(0.763)* | -0.051\*\**(0.028)* | -0.109\*\**(0.025)* | -0.157*(0.314)* | -0.094*(0.766)* |
| Ln(TA) | 0.005*(0.507)* | 0.021*(0.161)* | -0.098\*\**(0.047)* | -0.233*(0.023)* | 0.004*(0.596)* | 0.017*(0.229)* | -0.088\**(0.073)* | -0.19\*\**(0.055)* | 0.000*(0.977)* | 0.012*(0.423)* | -0.105\*\**(0.039)* | -0.209\*\**(0.053)* | 0.005*(0.464)* | 0.030\*\**(0.055)* | -0.105\*\**(0.040)* | -0.163*(0.118)* |
| Leverage | -0.248\*\*\**(0.000)* | -0.326\*\*\**(0.001)* | -0.578\**(0.066)* | 0.492*(0.446)* | -0.248\*\*\**(0.000)* | -0.327\*\*\**(0.001)* | -0.518\**(0.095)* | 0.730*(0.262)* | -0.237\*\*\**(0.000)* | -0.291\*\*\**(0.001)* | -0.484\**(0.107)* | 0.945 *(0.140)* | -0.244\*\*\**(0.000)* | -0.316\*\*\**(0.001)* | -0.543\**(0.077)* | 0.602*(0.335)* |
| z-scoreBMI | 0.007*(0.223)* | 0.021\**(0.078)* | 0.050*(0.204)* | 0.226*(0.007)* | - | - | - | - | - | - | - | - | - | - | - | - |
| %-of-maxBMI | - | - | - | - | 0.001\**(0.107)* | 0.002\*\*\**(0.017)* | 0.002*(0.427)* | 0.009\*\**(0.059)* | - | - | - | - | - | - | - | - |
| 4-attribute categoricalBMI  | - | - | - | - | - | - | - | - | 0.013\*\*\**(0.016)* | 0.031\*\*\**(0.005)* | 0.051*(0.168)* | 0.139\**(0.080)* | - | - | - | - |
| Non-fin TDscoreBMI  | - | - | - | - | - | - | - | - | - | - | - | - | 0.091*(0.313)* | 0.146*(0.441)* | 1.131\**(0.068)* | 2.811\*\**(0.027)* |
| FAdj. R2 | 7.917\*\*\*0.30 | 4.311\*\*\*0.17 | 2.991\*\*\*0.11 | 2.196\*0.07 | 8.257\*\*\*0.31 | 5.002\*\*\*0.20 | 2.755\*\*0.10 | 1.3610.02 | 9.253\*\*\*0.33 | 5.549\*\*0.22 | 3.059\*\*\*0.11 | 1.2490.02 | 8.251\*\*\*0.31 | 4.166\*\*\*0.17 | 3.4550.13 | 1.2500.02 |

\*\*\* p<0.01. \*\* p<0.05. \* p<0.1

**Table 6 (continued)**

**Panel B: 5-attribute BDI with different BMI indices as independent variables**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Model with z-scoreBMI | Model with %-of-maxBMI | Model with 4-attribute categoricalBMI | Model with non-fin TDscoreBMI |
| **Independent Variables** | ROA | ROE | TQ | MTB | ROA | ROE | TQ | MTB | ROA | ROE | TQ | MTB | ROA | ROE | TQ | MTB |
| BDI-5 | 0.051*(0.385)* | 0.097*(0.346)* | 0.524\**(0.068)* | 0.931*(0.221)* | 0.054*(0.358)* | 0.105*(0.301)* | 0.579\*\**(0.047)* | 1.157*(0.144)* | 0.063*(0.272)* | 0.128*(0.200)* | 0.614\*\**(0.033)* | 1.347\**(0.091)* | 0.060*(0.312)* | 0.105*(0.313)* | 0.553\*\**(0.051)* | 0.979*(0.188)* |
| BDI-52 | -0.014*(0.296)* | -0.026*(0.285)* | -0.118*(0.075)* | -0.219*(0.214)* | -0.015*(0.270)* | -0.028*(0.243)* | -0.132*(0.050)* | -0.275*(0.132)* | -0.016*(0.223)* | -0.031*(0.180)* | -0.136\*\**(0.040)* | -0.308\**(0.094)* | -0.017*(0.227)* | -0.028*(0.241)* | -0.125\*\**(0.055)* | -0.238*(0.165)* |
| Ln(TA) | 0.008*(0.256)* | 0.022\**(0.065)* | -0.069\*\**(0.036)* | -0.186\*\**(0.034)* | 0.007*(0.284)* | 0.021\**(0.074)* | -0.058\**(0.082)* | -0.149\**(0.099)* | 0.004*(0.529)* | 0.016*(0.176)* | -0.07\*\**(0.042)* | -0.163\**(0.086)* | 0.011*(0.148)* | 0.031\*\*\**(0.015)* | -0.069\*\**(0.044)* | -0.100*(0.266)* |
| Leverage | -0.21\*\*\**(0.000)* | -0.19\*\**(0.016)* | -0.338*(0.119)* | 0.688*(0.233)* | -0.21\*\*\**(0.000)* | -.19\*\*\**(0.013)* | -0.276*(0.207)* | 0.902*(0.132)* | -0.212*(0.000)* | -0.17\*\*\**(0.018)* | -0.261*(0.216)* | 1.107\**(0.061)* | -0.21\*\*\**(0.000)* | -0.19\*\*\**(0.015)* | -0.285*(0.175)* | 0.853*(0.126)* |
| z-scoreBMI | 0.005*(0.323)* | 0.015\**(0.112)* | 0.050\**(0.064)* | 0.242\*\*\**(0.001)* | - | - | - | - | - | - | - | - | - | - | - | - |
| %-of-maxBMI | - | - | - | - | 0.000*(0.207)* | 0.001\*\**(0.057)* | 0.001*(0.348)* | 0.009\*\**(0.027)* | - | - | - | - | - | - | - | - |
| 4-attribute categoricalBMI | - | - | - | - | - | - | - | - | 0.011\*\**(0.055)* | 0.023\*\**(0.017)* | 0.042*(0.121)* | 0.153\*\**(0.044)* | - | - | - | - |
| Non-fin TDscoreBMI | - | - | - | - | - | - | - | - | - | - | - | - | 0.022*(0.812)* | 0.085*(0.605)* | 1.053\*\*\**(0.019)* | 2.985\*\*\**(0.012)* |
| FAdj. R2 | 5.354\*\*\*0.234 | 2.413\*\*0.090 | 3.053\*\*\*0.126 | 4.166\*\*\*0.182 | 5.529\*\*\*0.241 | 2.677\*\*0.105 | 2.430\*\*0.09 | 2.688\*\*0.106 | 6.140\*\*\*0.265 | 3.177\*\*\*0.132 | 2.796\*\*0.112 | 2.489\*\*0.094 | 5.530\*\*\*0.247 | 2.387\*\*0.091 | 3.452\*\*\*0.150 | 2.492\*\*0.097 |

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 1 defines performance measures and control variables; Appendix 1, the diversity and board monitoring intensity proxies used as independent variables.

**Appendix 1**

**Definitions of board diversity and board monitoring intensity measures**

1. **Definitions for our 5 board diversity attributes and our composite BDIs:**

*Int-dummy* = 1, if the board member’s nationality is non-Turkish; 0, otherwise.

*Fem-dummy* = 1, if the board member is female; 0, otherwise.

*Ind-dummy* = 1, if the board member is independent of owners or management, as reported by the company in its annual report; 0, otherwise.

*Edu =* board member education level, classified in 5 categories (elementary, secondary, university, Masters, and PhD) according to total number of years of formal education (5, 11, 16, 20, and more than 20).

*Age* = board members’ ages, also classified in 5 categories, where 1 = 25-35, 2 = 36-45, 3 = 46-55, 4 = 56-65, and 5 = greater than 65 years.

*BDI-4* = BDI­-4(wom+int+age+edu) = our composite board level index of board diversity, which measures each board’s variety in terms of our four diversity attributes (gender, nationality, age and education), calculated as follows:

1. Variety is first measured for each of the 4 attributes of the board in the form of the Blau index, defined as:

k

1- ∑ Pi2

i=1

where, Pi = the proportion of the board members in the ‘i’th category of a given attribute;

k = the number of categories in a given attribute.

1. Next, Blau values for each attribute are standardized by dividing each by its theoretical maximum value of *(k-1)/k.*
2. The standardized Blau values for each attribute are then totaled for our Composite Board Diversity Index (BDI-4) for each board.

*BDI-5* = BDI­-5(wom+for+age+edu+ind) = our composite board level index of board diversity, which measures each board’s variety in terms of our five diversity attributes (gender, nationality, age, education, and independence), calculated as explained above for BDI-4, but the Blau values of all 5 diversity attributes are summed in each board.

1. **Definitions for our 4 board monitoring intensity attributes and our 4 composite BMI indices:**

*# of meetings =* the 2006 annual report number of board meetings, categorized as low, medium, and high levels of monitoring effort: 1 = 3-12 meetings, 2 = 13-30 meetings, and 3 > 30 meetings.

*# of board committees* = the 2006 annual report number of board committees set up by the board, also categorized as low, medium, and high levels of monitoring effort: 1 = 0-1 committees, 2 = 2 committees, and 3 > 2 committees.

*Audit quality code* = a categorical variable: 3, if the firm has used one of the big-4 auditing firms; 2, if it used a smaller international audit firm; and 1, if the firm used a local auditor.

*Total TD score* = the number of “yes” answers to the inclusion of 106 informational items related to 3 categories in the 2006 annual reports of sample firms:

1. Ownership and investor relations;
2. Financial transparency and disclosure in financial statements and annual reports;
3. Board and management structure and processes.

Also categorized as low, medium, and high TD scores, corresponding to three levels of monitoring effort.

*z-scoreBMI =* 3-attribute z-score BMI: z-values are calculated to standardize the # of meetings, # of committees, and total TD scores. Each firm’s 3 z-values are then totaled.

*%-of-maxBMI =* 3-attribute % of maximum BMI: # of meetings, # of committees, and total TD score for each firm are represented as a % of the maximum value for that attribute. These 3 standardized percentages are then summed for each firm.

*4-attribute categoricalBMI* = 4-attribute categorical BMI: The categorized 3 effort levels of our 4 monitoring effort attributes are totaled for each board, assuming equal weights for each of 1, 2, or 3, according to their total TD scores.

*non-fin TDscoreBMI* = non-financial T&D score BMI: the number of “yes” answers to the inclusion of 66 annual report informational items related to categories (i) and (iii) above, from the 2006 annual reports of sample firms.

**Footnotes**

1. Norway legislated *mandatory* representation of women in boards, which was fully enforced in 2008 (Hoel, 2008); Spain introduced an equality law in 2007 *recommending* 40% representation by 2015 (De Anca, 2008); and the U.S. Securities and Exchange Commission passed a new rule in 2010 requiring public companies to disclose how they view diversity with respect to their boards. [↑](#endnote-ref-1)
2. Both fundamental governance and agency problems differ significantly between controlled and widely held firms (Bebchuk and Hamdani, 2009). [↑](#endnote-ref-2)
3. An exception is Miller and Triana (2009), who, building on the behavioral theory of the firm (Cyert and March, 1963) and signaling theory (Certo, 2003; Waddock, 2000), use *reputation* and *innovation* as mediating variables of the relationship between demographic diversity and performance. [↑](#endnote-ref-3)
4. In their study of family business groups in 45 countries in 2002, Masulis, Pham and Zein (2011) found that Turkey has 34 family groups that hold 46% of market capitalization, comprise 50% of traded firms, and 21 of them are pyramidal. [↑](#endnote-ref-4)
5. As of June 2012, ISE firms are mandated to have at least one third of their board members be independent. [↑](#endnote-ref-5)
6. The scores are available from Sabanci University Corporate Governance Forum, Istanbul, Turkey and are based on S&P’s Transparency and Disclosure (TD) Index calculation methodology (see Aksu and Kosedag (2006) and S&P (2008) for details). [↑](#endnote-ref-6)
7. These first two composite BMI indices exclude our 3-category auditor quality measure, which is not amenable to standardization by taking a percentage or calculating a z-score. [↑](#endnote-ref-7)
8. We also test their moderating effect on the BDI–performance and BMI–performance relationships and fail to find significant coefficients for OwnDom. [↑](#endnote-ref-8)
9. This effect disappears when controlled for foreign ownership (not tabulated), as foreign board membership and foreign ownership are highly correlated; hence we do not use foreign ownership as a control variable. Similarly, we do not use board size as a control, since Blau calculations and ln(TA) capture the size effect. [↑](#endnote-ref-9)
10. The bank dummy, also used as a control in robustness tests, is always positive and mostly significant. [↑](#endnote-ref-10)
11. The relationship between BDI-4 and our other three proxies of BMI are all positive but weakly significant with p-values ranging between p=0.11-0.16 (untabulated). [↑](#endnote-ref-11)
12. When a bank dummy is included in the models with the wedge ratio, all the signs and significance values of the other variables in the model are quantitatively very similar. The R2 values are as high as 48%. [↑](#endnote-ref-12)