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Sustainable Board of Directors: Evidence from the Research Productivity of Professors Serving on Boards in the Korean Market

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Abstract: We examine the relationship between the expertise of outside directors from academia and firms' financial performance using a unique dataset on the research publications of such directors. Specifically, we use research publication history in finance or an academic concentration in business or law as a proxy for expertise and measure the influence of this expertise on Korean financial firms' short-term and long-term performance. We find a positive (negative) association between research intensity (a business or law concentration) and short-term corporate performance. Firms with greater information and agency problems appear to benefit more from research-intensive academic outside directors than other firms do. Thus, we propose that firms in emerging economies elect research-intensive academic outside directors to contribute to sustainable corporate governance and firm performance.

Keywords: sustainable board of directors; academic outside director; Chaebol; corporate governance; firm performance

1. Introduction

A key strand of the literature details the benefits and challenges of establishing sound corporate governance when electing board members to address agency problems [1,2]. The role of board members as independent overseers was largely compromised by serious information problems created by powerful CEOs [3] until a series of financial regulations, most notably the Sarbanes–Oxley Act of 2002 (SOX), prompted dramatic changes in the market expectations regarding the director role in the US. (Relatedly, Linck et al. [4] report that many US firms, in complying with SOX board reforms, increased the sizes of their boards, replaced numerous inside directors with outside directors, and elected more outside directors who were not sitting executives, all of which contributed to more independent board systems). Since then, a growing body of literature has highlighted the advising and monitoring role of outside directors.

Corporate governance is defined as the system through which companies are directed and controlled. Definitions of corporate governance vary widely. Shleifer and Vishny state, “Corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment” [4] (p. 737). This definition focuses on the ways that outside investors protect themselves against expropriations by insiders. Sir Adrian Cadbury, head of the Committee on the Financial Aspects of Corporate Governance in the United Kingdom, stated, “Corporate governance is the system by which companies are directed and controlled.” This definition

is broader and focuses on the set of mechanisms through which firms operate when ownership is separate from management. Zingales defines corporate governance as “the complex set of constraints that shape the ex post bargaining over the quasi-rents generated by the firm” [5] (p. 499). This definition focuses on the division of claims and can be expanded to some extent to include corporate governance as a complex set of constraints that determine the quasi-rents (profits) generated by the firm during the course of their relationships with stakeholders, and shape ex post bargaining over these quasi-rents.

Firms with strong governance may have higher valuations, better operating or financial performances, more innovation, less volatile stock prices, less information asymmetry, and less earnings management. Many studies have documented the effect of corporate governance and the channels through which it operates on firms. For example, Giroud and Mueller demonstrate the various benefits of good governance for firms in competitive and noncompetitive industries [6]. They suggest that weak governance and less competitive pressure result in higher agency costs, and that firms with weak governance make more value-destroying acquisitions. In an earlier study, Masulis et al. find that acquirers earn lower abnormal returns during announcement periods when they have more antitakeover provisions [7]. Choi et al. show that the quality of the board and transparent disclosures positively influence a firm’s innovation activity [8].

In particular, although the existing literature documents a steady increase in the number of professor-directors in corporate America, (approximately 33% of the companies in Standard and Poor’s Composite 1500 index had at least one professor on their boards from 1998 to 2006 [9]. This proportion rose to about 40% by 2011 [9]) the empirical evidence on the effects of such directors on corporate outcomes is relatively scarce and remains inconclusive [2,10]. For instance, Francis et al. [9] report that professor outside directors provide boards with value-enhancing advice, whereas Duchin et al. [11] find no significant relationship between the presence of such directors and firms’ financial performance. As Anderson et al. [12] and White et al. [13] suggest, this discrepancy may have resulted from an inaccurate classification of academic directors as a homogenous group without considering the possible heterogeneities among outside directors and among professor-directors. Along with these empirical challenges, the US market seems to value counsel from CEOs outside directors more than from any other group. For example, Fich [14] finds that the market reacts most favorably to appointments of the CEOs of other companies as outside directors, and White et al. [13] show that professors with scholarly renown or focuses on business or law may be sufficient for small- or mid-cap firms that lack the necessary resources to attract CEO directors. Furthermore, Linck et al. [15] report that sitting and former CEO directors constitute approximately 66% of the director pool, whereas professors comprise only about 5% of this pool. Based on these observations, we argue that academic directors may only marginally impact corporate policies and outcomes at an aggregate level, as they are viewed as mere alternatives to CEO directors. Thus, we consider other markets in which professors collectively represent a larger share of the entire director pool and are the most coveted outside director candidates.

Compared to the US market—in which the most stringent financial regulations, such as SOX, are strictly enforced to strengthen board independence—emerging markets suffer from unusually serious agency problems and high information asymmetry, both of which undermine overall market efficiency and board efficacy. In the Korean market, these issues of weak corporate governance are exacerbated by the presence of chaebols (i.e., large family-owned businesses). By exploiting cross-subsidization [16], the owner-managers of chaebols accumulate ownership concentrations to tightly manage the entire group. Additionally, chaebols’ boards are often governed by their affiliates [17], who, unbeknownst to outside shareholders, may approve corporate decisions driven by managerial self-interest. Furthermore, Baek et al. [18] note that the owners of chaebols offer discounted equity-linked private securities to controlling shareholders when the issues are related to intragroup deals. Consequently, chaebols and their associates engender profound agency problems within their constituent firms and high levels of information asymmetry between managers and minority shareholders [19].

Thus, the outside director system, first implemented in Korea as part of the Asian financial crisis reform in 1997, may be an important and effective corporate governance mechanism. Professor outside directors, whose academic expertise and resistance to external influences differentiate them from other types of outside directors [10], can provide firms with undeterred benefits, particularly if firms have poor corporate governance. Nonetheless, despite the growing number of academic outside directors in Korea, surprisingly few studies devise accurate measurements of professors' expertise and directly examine the relationship between this expertise and a firm's financial performance. In light of this gap in the literature, we employ the academic concentrations of professor outside directors (*Major_PROF*) and research productivity over the past ten years (*Research_PROF*) as proxies for their expertise; next, we test their impacts on variables that measure firm performance (i.e., return on equity (ROE), the return on assets (ROA), and Tobin's Q). Extending Lee and Chung's [20] study, we examine the effect of academic outside directors' expertise on Korean financial firms' corporate outcomes.

The remainder of this paper is organized as follows. Section 2 describes the sample selection process, defines the explanatory and response variables, and develops our main hypotheses. Section 3 reports the test results and discusses our findings. Section 4 provides managerial implications and proposals for future work.

2. Methodology

The sample selection and variable construction criteria used in this study were largely based on recent studies of corporate governance issues in the Korean market, such as those of Cho et al. [21] and Liu et al. [22]. Our sample included financial firms listed on the Korean Exchange (KRX) from 2011 to 2015. Specifically, we collected financial information from the Data Guide Pro, which is supplied by FnGuide, a South Korean financial data provider. This database compiles financial information for the firms listed on the KRX and is equivalent to the Compustat database in the United States. We constructed a panel dataset of Korean financial companies that regularly report their financial statements, governance/ownership status, and detailed board composition information. We excluded firms that had received warnings of noncompliance with the minimum financial standards from the KRX, as these firms are more likely to file manipulated financial statements that may have obscured our test results. Thus, our sample spanned 2011 to 2015 and comprised 503 firm-year observations, 201 of which were publicly traded companies listed on the KRX. Additionally, we manually collected directors' research publication data from Korean Researcher Information. Because directly measuring professor-directors' expertise was difficult, we used research productivity (*Research_PROF*) and academic concentration (*Major_PROF*) as proxy variables. We focused on professors who served as outside directors for at least six months in a particular year; this is because a director is highly unlikely to meaningfully influence corporate decisions over fewer than two business quarters.

The accounting literature commonly uses accounting firms' market capitalizations as a proxy for accountants' expertise [23–25]. Following this practice, we posited that research productivity can serve as a good proxy for professors' expertise in their academic disciplines. Specifically, we set *Research_PROF* as equal to one if a professor had at least one research publication on a subject relevant to the financial services sector within the decade prior to serving as a director, and zero otherwise. We also examined the professor-directors' academic concentrations (*Major_PROF*). Intuitively, firms, particularly those belonging to the finance industry, can likely benefit immensely from practical advice from professor outside directors with academic concentrations in either business or law. Specifically, we set *Major_PROF* equal to one if a professor outside director's concentration was in either business or law, and zero otherwise. However, we also considered that business or law professors who were negligent in sharpening their scholarly acumen (i.e., those who lack research publications) serve on boards to earn income. As Francis et al. [10] note, compensation from serving on boards generally constitutes a larger proportion of income for professors than it does for outside directors with other occupations. Thus, firms may waste valuable resources by appointing professors as outside directors. We therefore expected that the research productivity in finance (a business or law concentration)

positively (negatively) impacted corporate performance and value. Simultaneously including these proxies as key explanatory variables in a multiple regression model enabled us to capture the possibly heterogeneous impacts of academic directors' expertise on corporate outcomes. Following previous studies, we incorporated two additional independent variables—the proportion of outside directors on the board (*P_Out_Dir*) and the size of the board (*BOD_SIZE*)—in our main research model. (Following Anderson et al. [12], we initially included the director's gender in our research model as an independent variable (*Gender* equaled one if the director was female and zero otherwise). However, owing to a limited sample size, we refrained from discussing its results and interpretations in the main analysis) Whereas Weisbach [2] and Yermack [26] report a positive association between the proportion of outside directors and firm value, Agrawal and Knoeber [27] find a negative relationship between the two. Lipton and Lorsch [28] and Jensen [3] report that larger boards may not properly monitor managers owing to the longer durations and higher costs of setting corporate policies. Yermack [26] and Eisenberg et al. [29] corroborate this finding of a negative relationship between board size, firm performance, and value. However, Dalton et al. [30] and Coles et al. [31] indicate that when a firm needs managerial advice from various perspectives, board size positively influences the firm's market valuation.

We also included the following control variables (firm-specific characteristics) to incorporate the influences of key regressors on firm performance: firm size (*Size*); firm age (*Age*); the leverage ratio (*LEV*); free cash flow (*FCF*); sales growth (*C_Sales*); earnings before interest and taxes (*EBIT*); research and development expenses (*RD*); advertisement expenses (*ADV*); and selling, general, and administrative expenses (*SGA*). (The definitions of these variables and a related literature review are available upon request). To control for the possibility (based on Coles and Li's [32,33] discussion of the role of unobservable individual effect in corporate governance, one may argue that our study could have also explored such effect in the empirical analysis. However, a professor-director does not usually sit in board seats in other firms in the Korean market, and thus this institutional setting made it difficult to distinguish between the individual professor board effect and the firm fixed effect. Hence, we utilized the commonly used firm fixed effect to simultaneously control the individual effect) of the managers and boards of chaebol member firms making corporate decisions in the interest of the entire group, we also included a dummy variable (*Chaebol_D*) that equaled one if the financial company belonged to a chaebol group and zero otherwise. Lastly, we included the year (*Year_D*) and listing dummies (*List_D*) in our baseline regression model for clearer interpretations of our research outcomes.

Following prior studies, we used the return on equity (*ROE*), the return on assets (*ROA*), and Tobin's Q (*Q*) as measures of a firm's financial performance. Owing to empirical challenges in estimating the replacement cost, we instead used the book value of assets to measure Tobin's Q. To mitigate possible endogeneity issues stemming from misspecifications, we considered a firm fixed effect model with clustered standard errors at the firm level [34]. The baseline panel regression model was as follows:

$$(ROE, ROA, Q)_{i,t} = \beta_0 + \beta_1 Research_PROF_{i,t} + \beta_2 Major_PROF_{i,t} + \beta_3 Gender_i + \beta_4 P_Out_Dir_{i,t} + \beta_5 BOD_SIZE_{i,t} + \beta Control\ Vars + \beta Dummies + \varepsilon_i.$$

We performed two additional tests to check whether academic outside directors' expertise affected firm performance even in the presence of controlling shareholders and for firms with high information asymmetry. Owing to their large stakes, controlling shareholders have incentives to monitor managers for ensuring better corporate outcomes and, thus, better investment returns. Alternatively, they may exploit their large stakes to pursue their own interests, possibly resulting in greater dissent among shareholders [35]. Typically, tenured professors have almost lifetime employment, and their accomplishments are subject to the scrutiny of both the public and their peers for longer than those of individuals from other professions are. Given this context, we argue that serious academics are less likely to collude with controlling shareholders for private benefits, as such willful negligence of their oversight duty taints their reputations and possibly results in the prevention or termination of new or existing contracts with hiring institutions. Thus, academics with high (low) research productivity are deemed more (less) likely to offer impartial, value-enhancing advice to firms. To test this hypothesis

in our baseline model, we included a binary indicator dummy (*ControlSH_D*) that equaled one if a controlling shareholder existed within a financial company and zero otherwise. Growth-related capital expenditures (i.e., *RD*, *ADV*, and *SGA*) are likely already reflected in firms' yearly *ROE* and *ROA* measures [20]. Thus, we included these control variables only when estimating Tobin's *Q*.

As documented by numerous earlier studies, information asymmetry can worsen agency problems and may deteriorate firm value in the long run. Following Boone et al. [36] and Duchin et al. [11], we used stock return volatility (*Volatility*) as a proxy for a firm's information asymmetry. Specifically, we defined *Volatility* as the standard deviation of daily stock returns for firm *i* in year *t*. As in our discussion of collusion issues, we postulated that professor outside directors could effectively mitigate agency problems in informationally opaque firms. To better understand these effects, we included a set of interaction terms between *ControlSH_D* (*Volatility*) and key regressors (i.e., *Research_PROF*, *Major_PROF*, *Gender*, *P_Out_Dir*, and *BOD_SIZE*).

3. Empirical Analysis

The descriptive statistics for the 503 observations are presented in Table 1. In our sample of financial firms, 66.35% had at least one professor outside director (*PROF*) serving on the board for a minimum of six months, and the average number of seats occupied by such directors (*N_PROF*) was 1.6931. The mean proportion of outside directors on these boards (*P_Out_Dir*) was 54.94%, and the mean board size (*BOD_SIZE*) was 6.9560, suggesting that each financial firm in our sample employed 3.8216 outside directors on average and that professors constituted 44.30% of outside directors. These findings imply that professors are desirable candidates for outside directorships in Korean financial firms.

Note that the mean, 25th percentile, and median of *Major_PROF* were 0.8732, 1, and 1, whereas those of *Research_PROF* were 0.4981, 0, and 1, respectively, indicating that the majority of academic outside directors had business or law concentrations and that slightly fewer than half of these directors had produced no research output in the past ten years. The standard deviations of key variables were material, suggesting sufficient variation in the sample.

Table 1. Descriptive statistics.

	Mean	Std. Dev.	Min	25th Pct.	Median	75th Pct.	Max
<i>Board Characteristics</i>							
<i>PROF</i>	0.6635	0.4732	0.0000	0.0000	1.0000	1.0000	1.0000
<i>N_PROF</i>	1.6931	1.0310	1.0000	1.0000	1.0000	2.0000	6.0000
<i>Research_PROF</i>	0.4981	0.5312	0.0000	0.0000	1.0000	1.0000	1.0000
<i>Major_PROF</i>	0.8732	0.3351	0.0000	1.0000	1.0000	1.0000	1.0000
<i>Gender</i>	0.0417	0.2012	0.0000	0.0000	0.0000	0.0000	1.0000
<i>P_Out_Dir</i>	0.5494	0.1916	0.0000	0.5450	0.5710	0.6670	1.0000
<i>BOD_SIZE</i>	6.9560	1.9757	3.0000	6.0000	7.0000	8.0000	18.0000
<i>Firm Performance</i>							
<i>ROE</i>	6.2096	9.5306	-73.8000	3.2700	7.0800	9.4700	38.5300
<i>ROA</i>	1.6714	4.1071	-16.1300	0.2900	0.6800	1.2600	32.6200
<i>Q</i>	0.9696	0.0386	0.8382	0.9451	0.9676	0.9905	1.0867

Notes: This table presents the means, standard deviations, minimums, medians, maximums, and lower/upper quartiles of key variables based on a sample of 503 firm-year observations from 2011 to 2015. Yearly distributions of the board characteristics are available upon request.

Next, in Table 2 we examined the impacts of *Research_PROF* and *Major_PROF* on *ROE*, *ROA*, and *Q* based on the multiple regression model from the previous section. Whereas *Research_PROF* was significantly positively related to *ROE* and *ROA*, *Major_PROF* was significantly negatively associated with *ROE* and *ROA*. The regression coefficients on both measures were not statistically significant when *Q* was the dependent variable. Most notably, the adjusted R-squared for *ROA* was 0.5536, indicating that our model explains most of the variation in the response variable. Overall, these results confirmed

our main hypothesis that professor outside directors' research productivities, rather than their academic concentrations, most accurately represented their degrees of expertise and that financial companies can enhance their short-term performance and value by heeding the counsel of research-intensive academic outside directors.

Table 2. Influence of academic outside directors' expertise on firm performance.

Variable	ROE	ROA	Q
<i>Intercept</i>	1.3433 (0.41)	5.2322 *** (5.74)	1.2233 *** (12.08)
<i>Research_PROF</i>	0.6232 * (1.81)	1.4712 ** (2.27)	0.0020 (1.55)
<i>Major_PROF</i>	−3.3948 * (−1.83)	−2.1242 * (−1.79)	0.0141 (0.60)
<i>Gender</i>	4.8294 ** (2.21)	0.8982 * (1.89)	0.0562 ** (2.20)
<i>P_Out_Dir</i>	0.6438 (0.69)	1.2669 (0.77)	−0.0087 (−0.32)
<i>BOD_SIZE</i>	−0.3556 * (−1.89)	−0.0692 (−0.93)	−0.0026 (−1.46)
<i>SIZE</i>	0.8776 *** (2.74)	0.1029 (0.81)	−0.0006 (−0.21)
<i>LEV</i>	−19.851 *** (−7.69)	−14.686 *** (−14.41)	0.0483 (0.88)
<i>C_Sales</i>	−0.0348 (−0.89)	−0.0260 * (−1.69)	0.0021 (0.32)
<i>Age</i>	0.2464 (0.68)	−0.2068 (−1.46)	−0.0055 * (−1.74)
<i>FCF</i>	9.0816 ** (2.26)	9.0079 *** (5.67)	0.1020 * (1.85)
<i>EBIT</i>			−0.0029 (−0.18)
<i>RD</i>			4.6274 ** (2.34)
<i>ADV</i>			0.2324 (1.07)
<i>SGA</i>			−0.0620 *** (−5.29)
<i>Chaebol_D</i>	−3.0447 *** (−3.81)	−0.6446 ** (−2.04)	0.0044 (0.71)
<i>List_D</i>	1.6252 ** (2.02)	0.0287 (0.09)	0.0076 (0.28)
<i>Year effects</i>	Yes	Yes	Yes
<i>Firm fixed effects</i>	Yes	Yes	Yes
<i>Adj. R²</i>	0.1667	0.5536	0.3049

Notes: This table presents the estimation results for panel regressions of ROE, ROA, and Q on *Research_PROF* and *Major_PROF*. Values in parentheses are *t*-statistics based on firm-clustered standard errors [32]. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Next, we investigated the influence of academic outside directors' expertise on firms with high agency problems (*ControlSH_D*) and on firms with high levels of information asymmetry (*Volatility*). As reported in Panel A of Table 3, we found that *Major_PROF* had a statistically insignificant effect on all the firm performance variables, whereas *Research_PROF* was positively and significantly related to Q. Furthermore, the coefficient on the interaction term *Major_PROF* × *ControlSH_D* was statistically insignificant, whereas that on *Research_PROF* × *ControlSH_D* was significantly positively associated with ROE, ROA, and Q. Based on these results, we reaffirmed our hypothesis that research-intensive academic outside directors can offer valuable advice to financial companies, especially those with high agency problems due to the presence of controlling shareholders. Panel B of Table 3 provides the results for informationally opaque firms. Similarly, we found that only *Research_PROF* × *Volatility* was significantly related to the performance variables (ROE, ROA, and Q). The positive coefficient on *Research_PROF* × *Volatility* suggested that financial companies with unusually high information

problems could benefit more from scholarly outside directors than firms under otherwise normal circumstances can.

Table 3. Influence of academic outside directors' expertise on firms with high agency problems and high information asymmetry.

Panel A	ROE	ROA	Q
<i>Intercept</i>	−34.558 (−1.50)	10.9751 *** (2.96)	−0.2819 (−0.39)
<i>Research_PROF</i>	−0.3168 (−1.68)	−0.0359 (−1.18)	0.0213 ** (2.23)
<i>Major_PROF</i>	−3.3481 (−0.44)	−0.1422 (−0.12)	0.9646 (1.81)
<i>Gender</i>	18.287 (1.55)	5.2062 (0.75)	0.0312 (1.11)
<i>P_Out_Dir</i>	−3.6989 (−0.28)	2.3068 (1.07)	−0.0365 (−0.59)
<i>BOD_SIZE</i>	1.0546 (0.77)	0.1494 (0.68)	−0.0056 (−0.71)
<i>R_PROF × ControlSH_D</i>	1.3435 * (1.81)	2.2342 ** (2.17)	0.0231 ** (2.19)
<i>M_PROF × ControlSH_D</i>	−1.8232 (−0.72)	−0.4522 (−0.61)	0.1192 (1.03)
<i>Gender × ControlSH_D</i>	5.3170 *** (2.93)	346203 ** (2.12)	5.9821 *** (2.91)
<i>P_Out_Dir × ControlSH_D</i>	−4.0800 (−0.20)	−2.7855 (−0.84)	0.4638 (1.42)
<i>BOD_SIZE × ControlSH_D</i>	−0.3170 (−0.93)	−0.6203 (−1.12)	0.0654 (1.17)
<i>ControlSH_D</i>	19.2256 (1.17)	4.2102 (1.65)	1.4621 (0.59)
<i>SIZE</i>	3.0878 ** (2.50)	0.1373 (0.69)	0.0409 * (1.83)
<i>LEV</i>	−36.411 *** (−3.94)	−16.835 *** (−11.32)	0.2151 (0.97)
<i>C_Sales</i>	3.8857 (1.17)	0.9163 * (1.72)	0.0079 (0.20)
<i>Age</i>	−1.9208 (−1.46)	−0.3314 (−1.57)	0.0617 (1.79)
<i>FCF</i>	0.7027 (0.05)	4.1050 * (1.97)	−0.0264 (−0.09)
<i>EBIT</i>			0.1367 (1.00)
<i>RD</i>			−42.496 (−1.01)
<i>ADV</i>			6.6035 ** (2.85)
<i>SGA</i>			−0.0455 (−0.45)
<i>Chaebol_D</i>	2.0832 (0.60)	−0.2394 (−0.43)	−0.0011 (−0.02)
<i>List_D</i>	−6.8147 ** (−2.18)	−1.0394 ** (−2.07)	0.9232 (1.34)
<i>Year effects</i>	Yes	Yes	Yes
<i>Firm fixed effects</i>	Yes	Yes	Yes

Table 3. Cont.

<i>Adj. R</i> ²	0.3215	0.8827	0.6458
Panel B	<i>ROE</i>	<i>ROA</i>	<i>Q</i>
<i>Intercept</i>	−94.674 (−1.16)	−7.8672 (−0.80)	1.8774 ** (3.17)
<i>Research_PROF</i>	1.3528 (1.08)	0.1850 (1.22)	−0.0040 (−0.47)
<i>Major_PROF</i>	21.1422 (0.68)	4.7963 (1.28)	−0.4328 (−1.32)
<i>Gender</i>	4.7621 (0.16)	1.3433 (0.19)	−0.0582 (−0.37)
<i>P_Out_Dir</i>	−102.71 (−0.91)	−15.926 (−1.18)	−0.2841 (−0.42)
<i>BOD_SIZE</i>	5.1848 (0.72)	0.6665 (0.92)	0.0090 (0.23)
<i>R_PROF</i> × <i>Volatility</i>	2.8373 * (1.81)	2.1142 ** (2.23)	1.1243 * (1.81)
<i>M_PROF</i> × <i>Volatility</i>	−5.3410 (−0.18)	−2.2312 (−0.27)	6.2241 (1.23)
<i>Gender</i> × <i>Volatility</i>	3.8791 ** (2.29)	1.9230 ** (2.15)	4.1928 * (1.81)
<i>P_Out_Dir</i> × <i>Volatility</i>	−102.71 (−0.91)	−15.926 (−1.18)	4.1980 (0.29)
<i>BOD_SIZE</i> × <i>Volatility</i>	−172.46 (−0.50)	−23.407 (−0.56)	0.6065 (0.98)
<i>Volatility</i>	−1667.0 (−0.32)	−240.47 (−0.38)	−22.102 (−0.71)
<i>SIZE</i>	5.1848 ** (2.72)	0.6665 ** (2.92)	−0.0005 (−0.03)
<i>LEV</i>	14.1152 (0.79)	−3.4174 (−1.58)	−0.2878 (−1.40)
<i>C_Sales</i>	5.0910 (0.92)	0.6761 (1.01)	0.0088 (0.26)
<i>Age</i>	−1.6794 (−0.95)	−0.1403 (−0.66)	0.0019 (0.18)
<i>FCF</i>	−42.303 (−0.96)	−6.4878 (−1.22)	0.0707 (0.29)
<i>EBIT</i>			−0.1320 (−1.76)
<i>RD</i>			23.5868 (0.71)
<i>ADV</i>			6.3785 *** (3.36)
<i>SGA</i>			−0.2817 *** (−3.77)
<i>Chaebol_D</i>	9.7557 (1.63)	1.2224 (1.70)	0.0021 (0.04)
<i>List_D</i>	0.0165 (0.46)	−0.0044 (−0.14)	0.6728 (1.35)
<i>Year effects</i>	Yes	Yes	Yes
<i>Firm fixed effects</i>	Yes	Yes	Yes
<i>Adj. R</i> ²	0.4767	0.5340	0.7172

Notes: Panel A of the table presents the estimation results for panel regressions of *ROE*, *ROA*, and *Q* on *Research_PROF* and *Major_PROF* using various interaction terms related to the controlling shareholder dummy (*ControlSH_D*). Values in parentheses are *t*-statistics based on firm-clustered standard errors [32]. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Panel B of the table presents the estimation results for panel regressions of *ROE*, *ROA*, and *Q* on *Research_PROF* and *Major_PROF* using various interaction terms related to stock return volatility (*Volatility*). Values in parentheses are *t*-statistics based on firm-clustered standard errors [32]. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

A few previous studies investigate the role of professors in boards of directors. For example, Audretsch and Stephan [37] investigate the advisory roles of university-based scientists and find that such professors have positive effects, such as transferring knowledge to the firm, determining the quality of the firm's research in both capital and resource markets, and helping chart the firm's scientific direction. In addition, Jiang and Murphy [38] find that firms with former business professors as directors outperform those without such directors. Güner et al. [39] show that finance professors are significantly associated with lower pay-performance sensitivity, and Francis et al. [10] demonstrate both that professor-directors positively affect financial performance and that professors in business-related disciplines provide the most benefits to firms. In contrast, Duchin et al. [11] indicate that academic board members do not affect a firm's financial performance.

Our study was the first to focus on the research productivity of professor-directors in the emerging Korean market, and we found that research-intensive outside professor-directors were positively associated with firm value and performance and contributed to sustainable corporate governance. This finding builds on the aforementioned studies.

Our main finding may have resulted from high-performing or highly valued firms preferring to hire academic-intensive professor-directors. To address this endogeneity concern, we considered an instrumental variable approach, following Liu et al. [22], Li [40], and Abramo et al. [41]. We calculated the industry average number of professor-directors and employed it as an instrumental variable. Specifically, for each firm in each year, we computed the average number of professor-directors in that firm's industry in that year. The rationale was that a firm's number of professor-directors was likely to be correlated with the average number of professor-directors in that firm's industry because firms in the same industry have similar investment opportunities and business environments. However, the industry average was unlikely to directly influence a firm's performance and value.

Using these instrumental variables, we re-estimated the baseline panel regression model. Table 4 presents the results using the industry average number of professor-directors as an instrument to provide a robustness check. The results were generally consistent with those in Table 2, corroborating the findings that the research productivities, rather than the academic concentrations of professor outside directors, most accurately represented their degrees of expertise, and that financial companies could enhance their short-term performance and value by heeding the counsel of research-intensive academic outside directors.

Table 4. Influence of academic outside directors' expertise on firm performance: instrumental variable approach.

Variable	ROE	ROA	Q
<i>Intercept</i>	0.0511 *** (3.05)	0.0593 *** (3.37)	0.0514 *** (3.00)
<i>Research_PROF_IV</i>	1.9832 *** (3.81)	2.1435 *** (3.53)	0.0124 (1.66)
<i>Major_PROF_IV</i>	−1.2322 * (−1.91)	−1.3431 * (−1.81)	0.0098 (0.91)
<i>Gender</i>	0.0206 ** (2.29)	0.0266 *** (3.77)	0.0206 * (1.71)
<i>P_Out_Dir</i>	0.0034 (0.46)	0.1096 (1.06)	0.0034 (0.39)
<i>BOD_SIZE</i>	0.0114 (0.86)	−0.3424 (−1.01)	0.0114 (0.56)
<i>SIZE</i>	−0.0186 ** (−2.04)	−0.3069 (−1.09)	−0.0186 (−1.62)
<i>LEV</i>	−0.0766 *** (−2.91)	−0.1008 *** (−3.61)	−0.0766 *** (−3.84)
<i>C_Sales</i>	−0.0326 *** (−20.82)	−0.0356 *** (−9.86)	−0.0326 *** (−10.10)

Table 4. Cont.

<i>Age</i>	0.0002 (1.01)	0.0008 (1.81)	0.0002 (0.51)
<i>FCF</i>	−0.0064 *** (−14.43)	−0.0074 *** (−5.51)	−0.0064 *** (−7.09)
<i>EBIT</i>			0.0003 (0.55)
<i>RD</i>			−0.0068 *** (−18.71)
<i>ADV</i>			−0.0803 *** (−9.58)
<i>SGA</i>			0.0070 *** (4.43)
<i>Chaebol_D</i>	−0.0119 *** (−6.86)	−0.0093 ** (−3.16)	−0.0135 *** (−8.46)
<i>List_D</i>	−0.0020 *** (−5.46)	−0.0033 *** (−3.41)	−0.0025 ** (−2.72)
<i>Year effects</i>	Yes	Yes	Yes
<i>Firm fixed effects</i>	Yes	Yes	Yes
<i>Adj. R²</i>	0.1615	0.2058	0.2057

Notes: This table presents the estimation results for panel regressions of ROE, ROA, and Q on instrumented versions of *Research_PROF* and *Major_PROF*. Values in parentheses are *t*-statistics based on firm-clustered standard errors [32]. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

As additional robustness checks, we constructed the alternative measure of *Research_PROF_A* as the average number of citations of a professor's publications in WoS/Scopus for last 10 years. In addition, we also constructed *Research_PROF_B* as the total number of publications within the last decade, instead of using the indicator variable of *Research_PROF* as equal to one if a professor had at least one research publication on a subject relevant to the financial services sector within the decade prior to serving as a director and zero otherwise. We then we re-estimated the baseline panel regression model. Panel A of Table 5 presents the results using *Research_PROF_A* and *Research_PROF_B*. The results were largely consistent with those in Tables 2 and 4, confirming the findings that the research productivities rather than the academic concentrations of professor outside directors better explained their degrees of expertise, and that firms—especially those in the financial industry—benefit from the expertise, especially in their short-term performance.

Table 5. Influence of academic outside directors' expertise on firm performance: alternative measures of *Research_PROF*.

Panel A	ROE	ROA	Q
<i>Intercept</i>	1.3343 *** (3.12)	1.2333 *** (3.53)	0.9763 *** (5.22)
<i>Alternative_Research_PROF_A</i>	0.8976 ** (2.12)	1.0982 *** (4.32)	−0.0098 (−1.32)
<i>Major_PROF</i>	−1.1189 ** (−2.23)	−0.8721 * (−1.93)	−0.0124 (−1.21)
<i>Gender</i>	0.0321 ** (2.18)	0.0187 ** (2.17)	0.0211 ** (2.13)
<i>P_Out_Dir</i>	0.0124 (0.91)	0.0872 (1.31)	0.0187 (1.23)
<i>BOD_SIZE</i>	0.0211 (1.26)	−0.0922 (−1.52)	−0.0242 (−0.82)
<i>SIZE</i>	−0.0232 (−1.12)	−0.1982 (−1.14)	−0.0982 (−1.31)
<i>LEV</i>	−0.0987 *** (−3.21)	−0.1981 *** (−4.53)	−0.0872 *** (−5.98)
<i>C_Sales</i>	−0.0198 *** (−8.34)	−0.0278 *** (−3.98)	−0.187 *** (−5.43)

Table 5. Cont.

<i>Age</i>	0.0017 (1.17)	0.0081 (1.23)	0.0023 (1.31)
<i>FCF</i>	−0.0421 *** (−5.21)	−0.0234 *** (−5.52)	−0.0071 *** (−4.18)
<i>EBIT</i>			0.0012 (1.23)
<i>RD</i>			−0.0102 *** (−8.14)
<i>ADV</i>			−0.0093 *** (−4.32)
<i>SGA</i>			0.0062 *** (3.43)
<i>Chaebol_D</i>	−0.0323 *** (−3.34)	−0.0311 ** (−3.52)	−0.0212 *** (−5.32)
<i>List_D</i>	−0.0114 *** (−4.34)	−0.0089 *** (−4.53)	−0.0091 * (−1.98)
<i>Year effects</i>	Yes	Yes	Yes
<i>Firm fixed effects</i>	Yes	Yes	Yes
<i>Adj. R²</i>	0.1232	0.1972	0.1923
Panel B	ROE	ROA	Q
<i>Intercept</i>	2.9823 *** (4.11)	2.2322 *** (3.98)	1.0723 *** (3.23)
<i>Alternative_Research_PROF_B</i>	1.1523 *** (3.56)	1.1498 *** (3.71)	0.0084 (1.73)
<i>Major_PROF</i>	−1.1221 * (−1.93)	−1.0921 (−1.21)	0.0018 (0.21)
<i>Gender</i>	0.0167 ** (2.23)	0.0176 ** (2.21)	0.0198 * (1.82)
<i>P_Out_Dir</i>	0.0123 (1.46)	0.0232 (1.12)	0.0143 (1.39)
<i>BOD_SIZE</i>	0.0276 (1.26)	0.0876 (1.23)	0.0542 (1.56)
<i>SIZE</i>	−0.0212 (−1.76)	−0.2123 (−1.23)	−0.0123 (−1.21)
<i>LEV</i>	−0.0343 ** (−2.11)	−0.0808 ** (−2.09)	−0.0343 (−1.14)
<i>C_Sales</i>	−0.0123 ** (−2.12)	−0.0171 ** (−2.16)	−0.0781 *** (−5.34)
<i>Age</i>	0.0001 (1.23)	0.0087 (1.31)	0.0012 (1.21)
<i>FCF</i>	−0.0098 *** (−4.17)	−0.0087 *** (−3.98)	−0.0124 *** (−5.15)
<i>EBIT</i>			0.0232 (1.51)
<i>RD</i>			−0.0218 *** (−5.22)
<i>ADV</i>			−0.1981 *** (−3.71)
<i>SGA</i>			0.0176 (1.23)
<i>Chaebol_D</i>	−0.0332 *** (−4.31)	−0.0376 ** (−3.97)	−0.0231 *** (−7.83)
<i>List_D</i>	−0.0177 *** (−3.63)	−0.0193 *** (−3.98)	−0.0091 (−1.72)
<i>Year effects</i>	Yes	Yes	Yes
<i>Firm fixed effects</i>	Yes	Yes	Yes
<i>Adj. R²</i>	0.0921	0.1083	0.1872

Notes: This table presents the estimation results for panel regressions of ROE, ROA, and Q on alternative measures of *Research_PROF*. Values in parentheses are *t*-statistics based on firm-clustered standard errors [32]. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

The differences between Tables 2 and 5-Panel A on the control variables which had different significances (e.g., *C_Sales*: rather insignificant in Table 2 and highly significant in Table 5 or *List_D*) could be attributed to an alternative definition of *Research_Prof_A*. Hence, this may indicate a limitation of this study regarding the definition of *Research_Prof*. Therefore, we believe the alternative definitions of *Research_Prof* complement the original one.

4. Conclusions

Although many recent studies establish a positive link between the presence of academic outside directors and firm performance in both the US and emerging markets, only a select few studies account for possible heterogeneities among these directors. As Anderson et al. [12] and White et al. [13] note, categorizing professor-directors as a uniform group may yield limited, erroneous interpretations. Thus, we considered academic concentrations and research productivities as proxies for professor outside directors' expertise and examined their impacts on the performance and value of Korean financial companies. Using a unique, manually constructed dataset of 503 observations, we found that professors with research publications in the financial sector enhanced firms' short-term performance, whereas business and law professors with no publications deteriorated firms' short-term performance. Moreover, research-intensive outside directors were particularly effective in improving both the short- and long-term performance of firms that are affected by information and agency problems. Thus, our narrow focus on financial companies in the Korean market, which suffers from unique challenges created by chaebols, allowed us to suggest that firms in other emerging economies may elect research-intensive professors to serve as outside directors to maintain sustainability in corporate governance and firm performance.

Our study contributes to the existing literature in several ways. First, we built on the few studies that examine the impact of a university professor serving as an outside director on firm performance and value. This impact has not been studied extensively, especially in the financial industry. Given that a substantial proportion of boards of directors include at least one academic outside director, investigating the extent to which professor-directors affect corporate outcomes is worthwhile. Second, we investigated the association between a particular corporate governance characteristic (i.e., director structure) and corporate performance and value. Finally, our results suggested several possible ways for professors to contribute to the society outside of academia based on our finding that professor-directors positively impact firm performance and value in both the short- and long-run. This study was subject to some empirical caveats. First, our research model was not entirely free from endogeneity issues (e.g., reverse causality). For instance, our positive results may have been driven by high-performing firms seeking research-intensive professors to serve as outside directors. Second, using different proxies for professor-directors' expertise could yield contradictory results and interpretations. Because our proxies were mutually exclusive, incorporating an interaction term between the two proxies may have produced different results. Third, our research model may have benefited from more specifications (i.e., the adjusted R-squared value was low). Incorporating directors of other types, such as endogenously selected professor-directors or those outside CEO directors, may have improved the overall predictive ability of our model. Fourth, *Major_PROF* was not necessarily binary, as academic professors may be classified into several categories based on their research fields. Further, constructing and utilizing a composite indicator capturing the long-term performance of each professor rather than using *Research_PROF* would have improved the empirical analyses. This composite indicator should reflect a professor's number of papers and their quality (measured by impact factor, article influence score, or scientific journal ranking). Fifth, we were unable to include variables controlling for a professor's experience (i.e., age or previous board member experience) in the analysis. Finally, one may further examine the specific channels through which professor directors are incentivized to enhance or aggravate corporate performance and value. For example, it could be related to the interactions among executives as in Li [42], the agency perspective of board monitoring as in Coles et al. [43], and the compensation structures as in Li et al. [44] and Core and Guay [45]. We believe

that a professor director as one of outside directors should also interact with inside directors and other executives and have their own private incentives, which could restrict their dutiful behaviors. In addition, given that professor jobs in Korea are not generally a high-paid occupation, they are likely to be subject to compensation skim a firm offers. Hence, these aspects are likely to influence the relationship between professor director monitoring and firm performance/value. We leave these ideas for future research.

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