Article

Diversity Matters: A Study on the Relationship between Board Career Diversity and Firm Performance

Daniel Sungyeon Kim and Hong Kee Sul *

CAU Business School, Chung-Ang University, Seoul 06974, Korea; danskim@cau.ac.kr

* Correspondence: hksul@cau.ac.kr

Abstract: Are shareholders better off hiring directors with in-depth specialties in the company's core business or hiring directors with broader perspectives? This study addresses the question by investigating the relationship between directors' career diversity and firm performance. It employs Tobin's Q, total shareholder return, and return on equity as measures of firm performance. Accordingly, board career diversity has a significant and positive effect on firm performance. Moreover, we find that board directors with diverse industry experiences create value for firms via advisory (e.g., R&D and capital expenditures) and monitoring (e.g., equity compensation) roles. Given that diversity in career matters, corporations can seriously consider board composition and promote career diversity among board members.

Keywords: board of directors; diversity; industry experience; firm performance

Citation: Kim, D.S.; Sul, H.K. Diversity Matters: A Study on the Relationship between Board Career Diversity and Firm Performance. *Sustainability* **2021**, *13*, 9674. <https://doi.org/10.3390/su13179674>

Academic Editors: David K. Ding and Ștefan Cristian Gherghina

Received: 19 June 2021

Accepted: 20 August 2021

Published: 27 August 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

"Strength Lies in Differences, Not in Similarities."

—Stephen R. Covey

Board directors are central to modern corporations, serving as primary intermediaries between principals (shareholders) and agents (management). Thus, boards have long been subjects of industrial and academic interest regarding their optimal features and composition. The diversity of board directors, in particular, has garnered recent interest among academics and practitioners. For instance, among the essential elements to be improved in an organization, the California State Teachers' Retirement System (CalSTRS), one of the largest institutional investors, included board diversity as an important board structure. Arguably, directors with diverse backgrounds can contribute to firm performance by providing valuable advice from diverse perspectives and representing the interests of different stakeholders. Thus, CalSTRS has established the Diverse Director Datasource (3D), a resource to find and recruit director candidates with diverse backgrounds.

Accordingly, this study introduces and examines board diversity from a new perspective: the career diversity of board directors. Board directors sometimes nominate directors with diverse industry experience but without any experience in the industry of the nominating company. Thus, the following question emerges: are shareholders better off hiring directors with in-depth specialties in the company's core business or hiring directors with broader perspectives?

Directors with diverse industry experience can offer expertise and knowledge that existing managers do not possess. Such diversity may create a boardroom synergy, thereby inducing innovative and constructive managerial advice. Hence, Masulis, Wang, and Xie [1] find that having a board director with diverse industry experience induces better acquisitions.

However, directors from other industries may be detrimental to firm value. Board directors meet a limited number of times a year and lack access to daily organizational operations. Thus, a director with little or no experience in the focal industry may lack

adequate capacity to monitor and advise, leading to sub-optimal board actions, thereby suppressing firm value. Given such uncertainty, ascertaining how directors' career diversity influences firm value is of practical and academic interest.

Thus, this study aims to bridge the gap between the two contradictory predictions of board career diversity by identifying the channels through which such diversity affects firm value.

The study investigates diversity that differs from most board diversity measures. Career diversity is an acquired diversity. Most prior studies focus on the innate demographic diversities (e.g., gender or ethnicity) of directors. While such diversity can explain much of the differences in preferences and characteristics among individuals, it cannot explain every aspect of an individual. However, acquired diversity reflects the life-path diversity by virtue of life choices. It reflects an individuals' volition to learn and work in a specific field or industry, thus honing their talent or skills. Further, it evolves as an individual accumulates more career learning and experience.

We found that firms with more diversified career industry experience perform better than those with less experience. The association between career diversity and firm performance is statistically significant in all the three measures of firm performance which the study tested: Tobin's Q, total shareholder return (TSR), and return on equity (ROE). Furthermore, such out-performance is because of a higher return on research and development (R&D) spending and cutting of poor capital expenditures. The results suggest that boards with diversified industrial experiences provide better advisory services to managers.

However, there were mixed monitoring effects of boards with career diversity. The executive compensation analysis shows that boards with diversified industry experience utilize more equity-based compensation, which helps align managerial interests with that of shareholders. Even so, no evidence suggests that boards with diversified industry experience are associated with less income-increasing discretionary accruals. Thus, the study conjectures career-diverse boards as more effective advisers than monitors.

It also provides results on two related variables. Relative to industry diversity, we test whether directors having same-industry experience affects firm performance. Relative to acquired diversity, we test whether innate diversity, such as gender diversity, affects firm performance. The results suggest that directors having same-industry experience positively affects firm performance, albeit from a somewhat different angle than industry-diversified directors. However, in most of the analyses, gender diversity does not significantly explain firm performance, especially beyond what is explained by career diversity.

The study's contribution to the literature is two-fold. First, it primarily provides evidence of the positive impact of directors' career diversity on a firm's value. Many studies examine the influence of other board structure types on firm performance, such as CEO-chairman duality [2–5], board independence [6–8], board size [9–13], and board busyness [14,15]. However, this study is evidently the first to identify diversity in career experience. The results suggest that firms must consider career diversity in addition to gender and ethnic diversity when composing boards.

Second, it identifies potential channels through which boards with diversified career experiences positively affect firm performance. The study provides evidence that career-diversified boards improve CEO decisions in R&D activities, thus enhancing firm performance. These results suggest implications for managerial behavior. Prior studies find that executives may engage in real earnings management and reduce R&D investments to satisfy accounting performance benchmarks [16,17] or engage in pseudo-blank missing R&D [18], which could seriously threaten long-term performance and firm value. A career-diversified board can help address the issue by helping managers make better long-term investment decisions.

This study belongs to the stream of literature that examines the effectiveness of diversity in corporate boardrooms. Most prior studies on diversity focus on demographics such as gender, ethnicity, age, nationality, education, and profession [19]. For instance, gender diversity is most prevalent in the current literature; however, results on gender

diversity are mixed. Carter, Simkins, and Simpson [20] argue that female directors create value for firms, while Adams and Ferreira [21] posit that boards with female directors show more monitoring prowess, but the effect is negative on average. Hernández-Lara, Gonzales-Bustos, and Alarcón-Alarcón [22] and Wang [23] show that female directors' independence matters for firm performance. Ahern and Dittmar [24] find that a mandatory increase in female directors in Norway resulted in a loss in firm value, given the lack of experience of new female directors.

Bernile, Bhagwat, and Yonker [25] developed a diversity index using the most popular facets of diversity; however, career diversity is excluded. Coles, Daniel, and Naveen [26] find that groupthink, based on interactions between directors and a longer director tenure, negatively affects firms in challenging and dynamic industries. Their result is consistent with our finding, as diversity, in general, is an opposite concept of groupthink. However, they find that groupthink is positively associated with firm value, as the decision-making process is relatively more efficient.

Studies that are more relevant to this study examine how directors' past or current experience or expertise may affect firm value. Using small data from non-profit organizations, Siciliano [27] finds that fundraising is more successful when board members exhibit greater occupational diversity; however, gender diversity resulted in fewer raised funds. Similarly, Anderson et al. [19] argue that occupational diversity exhibits more positive effects on firm performance than social diversity. Hagendorff and Keasey [28] find that board directors with diverse occupational backgrounds in the US banking industry experience higher merger and acquisition (M&A) announcement returns, while gender diversity induces no such experience.

Regarding industry-level director experience, Wang, Xie, and Zhu [29] find that having directors with experience in the same two-digit SIC code industry influences firms positively in earnings management, CEO compensation, CEO turnover-performance sensitivity, and bidder's returns in M&A. Faleye, Hoitash, and Hoitash [30] find that industry-expert directors encourage corporate innovation through forced CEO turnovers and compensation structure but show no effect on acquisition performance. Meynerinck, Oesch, and Schmid [31] find that the death of industry-expert directors (especially the more experienced ones) exerts negative announcement returns. Masulis, Ruzzier, Xian, and Zhao [32] find that directors with experience in the same two-digit SIC code industry influence firm performance positively. However, such studies only focus on the intra-industry experience of directors. Evidently, this study is the first to incorporate directors' career-wide experiences from diverse industries, including the intra-industry experiences. It substantially differs from the common view of experience; the intra-industry experience serves as the proxy for specialization, while the diverse inter-industry experience serves as the proxy for diversity.

Other studies support our view by providing empirical evidence that director-level experience or skill sets may add value to the firm. Fahlenbrach, Minton, and Pan [33] find that successful CEOs are more likely to be appointed as directors after their retirement, and firms with former CEOs as directors perform better. Sisli-Ciamarra [34] finds that firms with bankers on the board may benefit from the association. Güner, Malmendier, and Tate [35] find that commercial and investment bankers on boards increase external debt financing without necessary improvements to the monitoring or advisory service quality. Moreover, Huang, Jiang, Lie, and Yang [36] claim that boards with investment banker directors improve firm value by making better acquisitions. Litov, Sepe, and Whitehead [37] argue that lawyers serving as directors significantly improve firm value. White, Woidtke, Black, and Schweitzer [38] find that academic directors with expertise in science or medicine positively affect firm value, while business professors do not seem to add value to the firm; apparently, administrative academics are detrimental to firm value. Francis, Hasan, and Wu [39] find that academic directors without administrative positions add value to the firm in many aspects. In contrast to our finding, Adams, Akyol, and Verwijmeren [40] find that director skill-set commonalities, as noted in firm disclosures,

improve firm performance. Giannetti and Zhao [41] looks at the board diversity from an interesting perspective. The authors suggest that board members' ancestral diversity may affect the decision making process of the board, and eventually the firm itself. More recently, Masulis et al. [42] document the effect of director age on board functioning and firm performance. As older directors may have more industry experience, this suggests a potential avenue for future research. It would be interesting to disentangle the interaction between experience from aging and the industry experience.

Finally, our study is in line with the strand of research focusing on how diversity in teams may help the performance of the organization. Fang and Hope [43] find that within-team diversity has a significant and positive effect on forecast accuracy. Results are pronounced for firms that are in a more opaque information environment, such as lower analyst coverage. Evans et al. [44] measure how heterogeneous or homogeneous the political beliefs are within a fund management team. The authors conclude that teams with diverse political views outperform the teams with homogeneous political views.

The remainder of the paper is organized as follows. Section 2 introduces the study data and methodology. Section 3 presents the main empirical results. Section 4 reports the potential channels of value creation and discusses the advisory and monitoring roles. Section 5 concludes the paper.

2. Data and Hypotheses

2.1. Sample

The study sample comprises publicly traded US firms from 2001 to 2019, covered in BoardEx, ExecuComp, and the Center for Research in Security Prices (CRSP) databases. BoardEx furnishes the baseline database for the study, offering information on executives and directors of public companies in the UK and US. We first restrict our sample to firms in the US by matching firms in BoardEx to the Compustat database, which includes financial data for publicly traded US firms. We further require firms to be matched to the CRSP database to ensure the availability of stock price information. We utilize the ExecuComp database for analysis requiring compensation data, which further reduces our sample size for such analysis since ExecuComp only covers firms in the S&P 1500 index. Our main analysis using board diversity excludes firms from the financial and utilities industries. The final sample comprises 28,752 firm-year observations from 2559 unique firms.

2.2. Proxy for Career Diversity

The BoardEx database provides the employment history of each individual in the database. While it collects executive and director information only after the year 2000 in the US, once a director is on the list, their entire publicly available employment history is recorded. That is, such employment history begins from the earliest known position the individual had in their career path, such as the entry-level position in a company; regardless of the first year, post-2000, the director is recognized as a director of the public company under consideration in this study. Since this study aims to identify whether board directors' diverse careers translate to better service to corporations, experiences in upper management or board director position are more relevant to our analysis than entry- or mid-level experiences. Thus, this study focuses on directors' upper management or board experiences.

For each director-firm combination, we collect all pre-election employment records where the title of the position is either CEO, CFO, COO, President, Vice President, Director, Chairman, Owner, Founder, or Non-Executive Director. In screening for past titles, we include divisional- and regional-level executive or director positions; experiences from such roles in multinational, multi-billion firms enhance one's capability as a board director. Once we collect all employment history of newly-elected directors, we classify their past employer based on the Fama-French 48 (FF 48) industry classification. Notably, while we exclude financial and utility firms in our analysis, we include experiences therein when we collect each director's past industry experience. We count the number of different

FF 48 industries in which a director has worked as upper management or board director until the year prior to being elected as a director of a firm. If the director worked in more than one FF 48 industry prior to being elected, we consider the director to have diverse industry experience. If the director worked in one or zero FF 48 industries until the previous year, the director does not have diverse industry experience. Some directors with experience in no FF 48 industry are those with prior experiences outside standard industries (e.g., academics, politicians, ex-military, ex-government officials, lawyers, and medical doctors). This study bases the classification of an industry-diverse director on the experience before joining a firm; future appointments will not affect the classification for the current position. For example, if a director worked in one FF 48 industry (Company A) before joining Company B as a director, where Company B belongs to another FF 48 industry, the director will be identified as having worked in only one FF 48 industry during his career at Company B (work experience only at Company A). Suppose the director is appointed to Company C two years later while still sitting on board of Company B. The director will still be classified as having worked in only one FF 48 industry (work experience only at Company A) in Company B but will be classified as having worked in two FF 48 industries (work experience in Company A and B) as a director of Company C. Once we identify which board directors of a firm-year have diverse industry experience, we calculate the proportion of these directors among all directors for each firm-year and designate the variable as industry-diversified directors (*IDD*), which is our main proxy for within-director career diversity on the board.

For robustness, we consider classifying industries based on the Fama-French 12 (FF 12) industry classification. Using a finer grid of industry classification, such as the FF 48 classification, makes it easier to identify diverse career experiences, especially in manufacturing industries. However, defining diverse industry experience based on the FF 12 industry classification is less subject to measurement error since working in two different FF 12 industries surely guarantees the person has experience in two different industries. However, using FF 12 industries to define diverse industry experience results in a much smaller number of directors with diverse industry experience. In addition, using FF 48 industries to define diverse industry experience works against finding any results consistent with our hypothesis. Thus, we employ the FF 48 industry classification for all the study analyses and perform the same analyses using the FF 12 industry classification to define work experience for robustness. The results are qualitatively similar when we use the FF 12 industry classification albeit with weaker statistical significance. Results using the FF 12 industry classification are not reported but available upon request.

Given that the data capture voluntary disclosure of past work experience of newly-elected directors, the information in the BoardEx database may be missing at least some prior work experience. Nonetheless, the data are adequate for our analysis because missing information on some directors' earlier careers works against our hypothesis, as we would be underestimating the diversity of directors.

Table 1 presents the sample descriptive statistics of directors' career experience. Panel A reports firm-director level statistics on prior experience before joining the board of a firm. We have 162,378 firm-director-year observations in our sample, of which 26,651 correspond to first-year firm-director observations. Accordingly, 28% of all newly-elected directors (including insiders) have prior work experience in the same FF 48 industry as the hiring company. Newly-elected directors have an average experience of 1.54 FF 48 industries other than that of the hiring firm, while the maximum number of FF 48 industry experience is 12. On average, newly-elected directors have prior experience in 1.82 FF 48 industries prior to being elected by a firm.

Table 1. Prior industry experience of directors on board.

Panel A. Prior FF 48 industry experience before joining a board (Director)									
Variables		Obs.		Mean	St dev	Min	Median	Max	
D (Experience in same industry)		26,651		0.278	0.448	0	0	1	
# of other industries with experience		26,651		1.539	1.259	0	1	12	
Total # of industries with experience		26,651		1.817	1.219	1	1	12	
Panel B. Distribution of the number of prior FF 48 industry experiences									
Number of industries with prior experience									
	1	2	3	4	5	6	7	8	9+
# of Director	8644	3336	1594	738	304	133	61	20	14
	58.23%	22.47%	10.74%	4.97%	2.05%	0.90%	0.41%	0.13%	0.09%
Panel C. Industries that hire directors with diverse industry experience									
Top	Industry		# of ind's	Bottom	Industry		# of ind's		
1	Entertainment		2.18	1	Fabricated products		1.52		
2	Real estate		2.09	2	Candy and soda		1.63		
3	Other		2.08	3	Apparel		1.66		
4	Printing and publishing		2.06	4	Pharmaceutical		1.67		
5	Communications		2.01	5	Banking		1.68		
Panel D. Industries that hire directors with experience in the same industry									
Top	Industry		% of new directors	Bottom	Industry		% of new directors		
1	Pharmaceutical		53.87%	1	Shipping containers		0.00%		
2	Petroleum and natural gas		44.03%	2	Textiles		0.00%		
3	Trading		42.80%	3	Beer and liquor		0.93%		
4	Business services		42.65%	4	Rubber and plastic		2.46%		
5	Electronic equipment		38.13%	5	Agriculture		3.45%		

Notes: This table presents descriptive statistics on the prior industry experience of directors during the sample period between 2001 to 2019. We use the Fama-French 48 (FF 48) industry classification and identify 26,651 firm-director observations for 14,844 unique directors and 2559 unique firms. Panel A presents the prior experience of directors before joining a board. *D (Experience in same industry)* is the percentage of new directors having worked in the same FF 48 industry, *# of other industries with experience* is the number of other industries in which a new director have worked, and *Total # of industries with experience* is the sum of the two. In Panel B, *# of Directors* is the distribution of the director-level number of industry experience. Panel C presents top and bottom five industries that hire directors with diverse industry experience, and Panel D reports top and bottom five industries that hire directors with same-industry experience.

Panel B presents the distribution of the number of FF 48 industries in which directors have prior experience. More than half (56%) of the firm-directors have prior experience in only one FF 48 industry; 23% have prior experience in two industries; 11% in three industries; and 10% in four or more FF 48 industries. These numbers are based on firm-year observations such that a director can be counted multiple times for each board the director newly joins. *Director* (by maximum) is the director-level maximum number of prior work experience in FF 48 industries before joining a board. The distribution is very similar to the firm-director distribution, where very few have work experience in more than four FF 48 industries.

Panel C presents the average number of FF 48 industries in which newly-elected directors have worked by industry. On average, newly-elected directors in entertainment, real estate, other, printing and publishing, and communication have prior work experience in two or more industries. Meanwhile, newly-elected directors in fabricated products, candy and soda, apparel, pharmaceutical, and banking have, on average, the lowest number of industry prior-experience.

In Panel D, companies in the pharmaceutical industry are most likely to elect directors with same-industry experience, followed by those with experience in petroleum and natural gas, trading, business services, and electronic equipment industries. However, companies in shipping containers, textiles, beer and liquor, rubber and plastic products, and agriculture industries do not seem to care whether a new director has same-industry experience.

Panels C and D show heterogeneity across industries regarding the prior work experience of newly-elected directors; however, untabulated results shows that the figures are relatively stable over time. We conjecture that this observation is because the demand for directors with specialized or diversified industry experience differs per industry. Moreover, because we define career diversity by industry, we utilize FF 48 industry fixed effects to control for unobserved heterogeneity across industries.

2.3. Other Key Variables

Just as there is a demand for directors with diverse experience, there is a demand for directors with specialized experience. We define directors with specialized experience by the proportion of board directors with experience from the same FF 48 industry prior to joining the board (*Same industry*). Even though this variable seems to be highly and negatively correlated with *IDD*, it is, in fact, not. The correlation between *IDD* and *Same industry* is significant but is only 0.0480. Thus, we also employ this variable to capture other director career dimensions.

Another important diversity variable other than *IDD* is *Female*, which is the proportion of female directors on board. While the focus of the diversity variable, *IDD*, is “acquired” diversity, we include *Female* to proxy for “innate” board diversity. Prior studies on diversity have focused on “innate” diversity, such as gender and ethnicity, among which gender diversity seems to positively affect performance [45]. Thus, we include *Female* to compare “acquired” and “innate” diversities. Hence, the key variables include two variables regarding director career (*IDD* and *Same industry*) and two variables regarding diversity (*IDD* and *Female*).

2.4. Performance Variables

We employ Tobin’s Q as the proxy for firm performance [13,46,47]. While Tobin’s Q should be calculated as the ratio of the market value of assets to replacement cost of assets, practically, it is not feasible to obtain them. Thus, we follow the convention in the literature and measure Tobin’s Q as the ratio of the market value of equities and liabilities to the book value of assets, where the former is obtained by subtracting the book value of equities from the total assets and adding the firm’s equity market capitalization. We employ TSR and ROE for the performance measure. TSR is the sum of annual stock price return and dividend yield, and ROE is the net income scaled by lagged total equity.

2.5. Control Variables

We control for most of the conventional control variables [48]. *Firm size* is the logarithmic transformation of total assets; *Market leverage* is the sum of long- and short-term debt, scaled by total assets; return on assets (*ROA*) is the net income scaled by lagged total assets; *Firm risk* is the standard deviation of monthly stock return; and *Intangible* is the intangible assets scaled by lagged total assets.

We further control for corporate governance variables. *Board size* is the number of board directors, *Independence* is the percentage of independent board directors, and *CEO ownership* is the equity ownership of CEOs in the firm.

We also employ other variables in subsequent analyses. *R&D* is the ratio of R&D expenditure to lagged total assets. Following the convention in the literature, we assume *R&D* is zero for observations with missing R&D expenditure in the Compustat database [49,50]. *Capital expenditure* is scaled by lagged total assets, *Equity-based compensation* is the proportion of stock and option-based compensation in the total compensation to CEOs in a given year, and *Discretionary accrual* is the residual from the modified Jones model [51]. We do not use total CEO equity sensitivity, as proposed by Core and Guay [52]; however, we use the proportion of equity compensation in total annual compensation packages. We study how industry-diversified directors attempts to improve performance by linking performance to equity-based annual incentive packages. However, CEO total wealth is the cumulative sum of all historical equity grants which may not necessarily be controlled by current board of directors.

Table 2 presents the definitions of all control variables in the study. Unless otherwise stated, all independent variables are measured with a one-year lag relative to the performance variable in our regression models to allow adequate time for variables to influence performance and lessen potential reverse causality issues. All continuous variables not bound within [0, 1] are winsorized at the 1% level in both tails.

Table 2. Variable definitions.

Variables	Definition	Source
IDD	Percentage of directors who have experience from more than one FF 48 industries prior to joining the current firm	BoardEx
Same	Percentage of directors who have experience in the same FF 48 industry prior to joining the current firm	BoardEx
Female	Percentage of female directors	BoardEx
Tobin's Q	Book value of assets less book value of equity plus market value of equity divided by total assets	Compustat
TSR	Total shareholder return including dividend yield	CRSP
ROE	Net income scaled by lagged total equity	Compustat
Firm size	Log of total assets	Compustat
Market leverage	Long-term and short-term debt scaled by total assets	Compustat
ROA	Net income scaled by lagged total assets	Compustat
Firm risk	Standard deviation of monthly stock return	CRSP
Intangible asset	Intangible assets scaled by lagged total assets	Compustat
Board size	Number of director in the board	BoardEx
Independence	Ratio of independent directors in a board	BoardEx
CEO ownership	Equity ownership held by CEO	BoardEx
R&D	R&D expenditure scaled by lagged total assets. Missing value set as 0	Compustat
Capital expenditure	Capital expenditure scaled by total assets	Compustat
Equity-based compensation	Restricted stock and stock option grants scaled by total compensation	ExecuComp
Discretionary accrual	Residuals from modified Jones model	Compustat

Table 3 reports the summary statistics of the study variables. The total number of firm-years in the sample is 28,752, with 2559 unique firms from 2001 to 2019. Moreover, 28,752 firm-year observations have non-missing values for all variables needed for the main Tobin's Q analysis. However, for subsequent tables, the number of observations used may differ because of data availability. The mean (median) value of our key variable, *IDD*, is 0.510 (0.500), indicating that approximately 51% of directors in our sample have worked in at least two FF 48 industries prior to joining a firm as a board director. On average (at median), approximately 16% (10%) of directors have prior experience in the same FF 48 industry. During the sample period, only 13% (11%) of directors are female on average (at median).

We then present the statistics for our performance variables and firm and governance characteristics. Regarding the performance variables, mean (median) Tobin's Q is 1.870(1.484), mean (median) TSR is 0.129 (0.099), and mean (median) ROE is 0.116 (0.116). Regarding governance variables, there are 9.382 (9.000) board directors on average (at median), of which 78.9% (80%) are independent directors. Mean (median) *CEO ownership* is 1.6% (0.2%), and *Equity-based compensation* represents approximately 51.5% (52.7%) of the total compensation to CEOs on average (at median). Table 3 is generally consistent with Adams and Ferreira [21], Francis et al. [39], and Masulis, Wang, and Xie [53].

2.6. Hypothesis

2.6.1. Industry-Diversified Directors and Firm Performance

We first test whether directors with diverse prior industry experience positively influence the subsequent performance of the hiring firm. The benefits of hiring directors with diversified industry experience may come from at least three aspects. First, a board with diversified industry experience benefit from various viewpoints and complementary knowledge. Second, information asymmetry on the board will be reduced, as informed directors share industry-specific information with uninformed directors. Third, directors from different industries contribute diverse perspectives that facilitate the exchange of ideas and deter groupthink.

Table 3. Summary statistics.

Variables	N	Mean	St. Dev.	1Q	Median	3Q
<i>Key variables</i>						
IDD_{t-1}	28,752	0.51	0.249	0.333	0.5	0.7
$Same\ industry_{t-1}$	28,752	0.161	0.194	0	0.1	0.25
$Female_{t-1}$	28,752	0.126	0.106	0	0.111	0.2
<i>Performance variables</i>						
Tobin's Q_t	28,752	1.87	1.137	1.133	1.484	2.149
TSR_t	28,684	0.129	0.416	−0.12	0.099	0.323
ROE_t	27,952	0.116	0.264	0.046	0.116	0.195
<i>Firm characteristics</i>						
$Firm\ size_{t-1}$	28,752	7.812	1.698	6.583	7.704	8.925
$Market\ leverage_{t-1}$	28,752	0.161	0.151	0.036	0.126	0.246
ROA_{t-1}	28,752	0.047	0.096	0.012	0.045	0.091
$Firm\ risk_{t-1}$	28,752	0.104	0.06	0.062	0.088	0.127
$Intangible\ asset_{t-1}$	28,752	0.181	0.196	0.017	0.107	0.296
<i>Governance characteristics</i>						
$Board\ size_{t-1}$	28,752	9.382	2.431	8	9	11
$Independence_{t-1}$	28,752	0.789	0.097	0.727	0.8	0.875
$CEO\ Ownership_{t-1}$	28,752	0.016	0.04	0	0.002	0.013
<i>Other variables</i>						
$R\&D_t$	28,752	0.027	0.054	0	0	0.028
$Capital\ expenditure_t$	28,485	0.044	0.051	0.012	0.029	0.057
$Equity-based\ compensation_t$	28,124	0.515	0.345	0.313	0.527	0.687
$Discretionary\ accrual_t$	21,004	0.033	0.142	−0.038	0.019	0.093

Notes: This table presents summary statistics of all variables used in this study. We have 28,752 firm-year observations with non-missing values for all variables used in our main regression. IDD_{t-1} is the proportion of directors who have worked in more than one FF 48 industries, $Same\ industry_{t-1}$ is the proportion of directors with same-industry experience, and $Female_{t-1}$ is the proportion of female directors on a board. Tobin's Q_t is the book value of assets less book value of equity plus the market value of equity scaled by total assets, TSR_t is total shareholder return including dividend yield, and ROE_t is net income scaled by the lagged equity. $Firm\ size_{t-1}$ is the log of total assets, $Market\ leverage_{t-1}$ is the short- and long-term debt scaled by the market value of equity, ROA_{t-1} is net income scaled by lagged total assets, $Firm\ Risk_{t-1}$ is the standard deviation of monthly stock return, and $Intangible\ asset_{t-1}$ is intangible assets scaled by lagged total assets. $Board\ size_{t-1}$ is the number of directors on a board, $Independence_{t-1}$ is the proportion of independent directors, and $CEO\ Ownership_{t-1}$ is the equity ownership held by the CEO. $R\&D_t$ is research and development expenditure scaled by lagged total assets, $Capital\ expenditure_t$ is capital expenditure scaled by lagged total assets, $Equity-based\ compensation_t$ is restricted stock and stock option grants to CEOs scaled by total compensation, and $Discretionary\ accrual_t$ follows the modified Jones model. Table 2 provides variable definitions. All variables not bound within [0, 1] are winsorized at the 1% level in both tails.

However, a board with diversified career experiences may also negatively affect firm value. Directors from outside the industry may lack industry specialty; hence, they may be less capable of effectively monitoring the firm. Moreover, directors with different backgrounds may face communication challenges, thereby increasing the likelihood of conflicts among directors.

Thus, whether directors with diverse industry backgrounds influence future firm performance and whether such influence is positive must be empirically considered. Our null hypothesis is presented below.

Hypothesis 1 (H1). *Career diversity does not affect firm performance significantly.*

2.6.2. Variation across Industries

From the descriptive statistics, there is a wide variation in the tendency of firms to elect directors with diverse industry experience across industries. We conjecture that such variation is because of different benefit levels that firms can expect from electing directors with diverse relative to specialized industry experience. Thus, we investigate whether the relationship between Tobin's Q and director career diversity is stronger in certain industries.

Prior studies show that managerial decisions in competitive industries seem to be more efficient [1,54]. As Masulis et al. [1] note, “managers of firms operating in more competitive industries are less likely to shirk or put valuable corporate resources into

inefficient uses, since the margin for error is thin in these industries and any missteps can be quickly exploited by competitors, seriously jeopardizing firms' prospects for survival and managers' prospects for keeping their jobs." That is, managerial decisions in competitive industries seem to be more efficient because the marginal cost of inefficient decisions is an exceedingly large risk.

A directorial role is to advise management in making important managerial decisions. Given that the marginal cost of inefficient managerial decisions is larger in competitive industries, the need for directors who can provide better advice is accordingly larger in such industries. Thus, we hypothesize that the positive association between *IDD* and performance is stronger in more competitive industries.

Hypothesis 2 (H2). *Positive association between career diversity and firm performance is larger in competitive industries.*

We then investigate whether a director's career is important in industries with more growth opportunities. Specifically, high technology firms are those in industries such as computer engineering, nuclear physics, semiconductors, and aerospace. We hypothesize that high-technology-industry firms demand directors with specialized skills, while firms in non-high technology industries benefit more from directors with diverse industry backgrounds.

Hypothesis 3 (H3). *Positive association between career diversity and firm performance is smaller in industries with more growth opportunities.*

In a similar but different context, Coles et al. [48] show that complex firms require greater advisory roles from their boards, suggesting that career-diversity benefits are likely maximized in the complex operational environment.

Hypothesis 4 (H4). *Positive association of career diversity and firm performance is larger in complex firms.*

3. Main Findings

3.1. Industry-Diversified Directors and Firm Performance

First, we test whether directors with diverse prior industry experience positively influence the subsequent performance of the hiring firm. From our hypothesis H1 we test the following baseline model, a pooled OLS regression with year and industry fixed effects, to test whether directors with diverse industry backgrounds influence future firm performance:

$$Performance_{i,t} = \alpha + \beta_1 IDD_{i,t-1} + \Gamma_1 Controls_{i,t-1} + \Gamma_2 FE + \varepsilon_{i,t} \quad (1)$$

where *Firm size*, *Market leverage*, *ROA*, *Firm risk*, *Intangible*, *Board size*, *board independence*, and *CEO ownership* are the controls. *FE* is the FF 48 industry and fiscal-year fixed effects. Tobin's Q, TSR, and ROE are the performance measures. All standard errors are clustered at the firm level [55,56]. Tables 4 and 5 present results from the above model using Tobin's Q (Table 4) or TSR and ROE (Table 5) as performance variables.

Table 4. Board diversity and Tobin's Q.

	Dependent Variable: Tobin's Q					
	(1)	(2)	(3)	(4)	(5)	(6)
IDD _{t-1}	−0.041 (0.068)	0.354 *** (0.064)	0.372 *** (0.064)			0.352 *** (0.064)
Same industry _{t-1}				0.242 *** (0.085)		0.216 ** (0.085)
Females _{t-1}					0.231 * (0.133)	0.181 (0.132)
Firm size _{t-1}		−0.085 *** (0.012)	−0.086 *** (0.014)	−0.065 *** (0.013)	−0.066 *** (0.013)	−0.089 *** (0.014)
Market leverage _{t-1}		−1.750 *** (0.096)	−1.747 *** (0.096)	−1.762 *** (0.096)	−1.755 *** (0.096)	−1.744 *** (0.095)
ROA _{t-1}		3.162 *** (0.248)	3.163 *** (0.248)	3.168 *** (0.248)	3.133 *** (0.250)	3.190 *** (0.247)
Firm risk _{t-1}		0.507 *** (0.193)	0.505 *** (0.193)	0.518 *** (0.195)	0.552 *** (0.195)	0.478 ** (0.193)
Intangible asset _{t-1}		−0.310 *** (0.085)	−0.309 *** (0.085)	−0.293 *** (0.086)	−0.292 *** (0.086)	−0.305 *** (0.085)
Board size _{t-1}			0.004 (0.006)	0.005 (0.006)	0.003 (0.006)	0.005 (0.006)
Independence _{t-1}			−0.214 (0.143)	−0.034 (0.144)	−0.059 (0.143)	−0.234 (0.143)
CEO Ownerships _{t-1}			0.002 (0.387)	−0.151 (0.391)	−0.171 (0.391)	0.062 (0.391)
Constant	1.891 *** (0.039)	2.493 *** (0.091)	2.616 *** (0.134)	2.460 *** (0.135)	2.512 *** (0.133)	2.606 *** (0.135)
Industry and year FE	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	28,752	28,752	28,752	28,752	28,752	28,752
Adjusted R ²	0.195	0.350	0.350	0.347	0.346	0.351

Note: This table presents Tobin's Q regression results on diversity variables and other controls. Equations (1)–(3) use industry-diversified directors (IDD) as the diversity variable, Equation (4) uses the indicator on whether a director has prior experience in the same industry, Equation (5) uses the proportion of female directors as the diversity variable, and Equation (6) employs all three variables together. For the definition of the variables used in the model, please refer to Table 2. All independent variables are lagged one year relative to dependent variables. All variables not bound within [0, 1] are winsorized at the 1% level in both tails. Standard errors are clustered at the firm level and reported in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively. #: Number.

Equations (1)–(3) of Table 4 employ *IDD* as the key explanatory variable, Equation (4) employs *Same industry*, Equation (5) employs *Female*, and Equation (6) employs all three. In Equation (1), *IDD* is not significantly associated with Tobin's Q in the univariate regression. However, when firm characteristics are added as control variables (Column 2), *IDD* becomes highly significant. *IDD* is positively significant in explaining Tobin's Q at 1% significance. Economically, a standard deviation increase in *IDD* results in a 0.089 or 4.71% increase in Tobin's Q. *IDD* remains significant in explaining Tobin's Q when we further incorporate governance characteristics as controls (Column 3). Further, *Same industry* and *Female* positively and significantly explain Tobin's Q in Equations (4) and (5), respectively. Equation (6) employs the three variables as explanatory variables. *IDD* and *Same industry* remain positively significant in explaining Tobin's Q, while *Female* fails to explain Tobin's Q beyond *IDD* or *Same industry*. In Equation (6), a standard deviation increase in *IDD* (*Same industry*) increases Tobin's Q by 0.088 (0.042) or 4.69% (2.24%). Table 4 suggests that pursuing diversity in “acquired” characteristics may be better than pursuing diversity in “innate” diversity. It also suggests that diversity and specialty in director careers matter.

While all firm characteristic variables significantly explain variation in Tobin's Q as expected, governance variables do not explain firm performance in any of our specifications. Thus (and for brevity), we do not report firm and governance characteristics variables in the tables in most of the subsequent analyses.

Table 5. Board diversity, TSR, and ROE.

	Dependent Variable							
	TSR				ROE			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IDD _{t-1}	0.019 *			0.021 *				0.044 ***
Same industry _{t-1}	(0.011)	−0.030 **		(0.011)	0.044 ***	−0.032 ***		(0.009)
		(0.013)		−0.032 **	(0.009)			−0.034 ***
				(0.014)		(0.011)		(0.011)
Female _{t-1}			−0.008	−0.015			0.073 ***	0.062 ***
			(0.024)	(0.024)			(0.020)	(0.020)
Constant	0.175 ***	0.172 ***	0.168 ***	0.178 ***	−0.015	−0.027	−0.022	−0.004
	(0.025)	(0.025)	(0.025)	(0.025)	(0.019)	(0.018)	(0.019)	(0.019)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	28,684	28,684	28,684	28,684	27,952	27,952	27,952	27,952
Adjusted R ²	0.197	0.197	0.197	0.197	0.261	0.260	0.260	0.261

Note: This table presents the regression results of total shareholder return (TSR) and return on equity (ROE) on diversity variables and other controls. Equations (1)–(4) report results using TSR as the dependent variable. Moreover, Equations (5)–(8) present results using ROE as the dependent variable. For brevity, the table does not present estimates for control variables. For the definition of the variables used in the model, please refer to Table 2. All independent variables are lagged one year relative to dependent variables. All variables not bound within [0, 1] are winsorized at the 1% level in both tails. Standard errors are clustered at the firm level and reported in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively. #: Number.

Table 5 repeats the analyses in Table 4 using TSR (Columns 1 to 4) or ROE (Columns 5 to 8) as dependent variables. In Equations (1)–(4), *IDD* positively and significantly explains TSR at the 10% level, *Same industry* negatively and significantly explains TSR at 5% level, and *Female* does not significantly explain TSR. Economically, in Equation (4), a standard deviation increase in *IDD* (*Same industry*) increases (decreases) TSR by 0.52%P (0.62%P) or 4.05% (4.81%). In Equations (5)–(8), *IDD* and *Female* positively and significantly explain ROE at the 1% level, and *Same industry* negatively and significantly explains ROE at the 5% level. In Equation (8), a standard deviation increase in *IDD* (*Female*) increases ROE by 1.10%P (0.66%P) or 9.44% (5.67%). A standard deviation increase in *Same industry* decreases ROE by 0.66%P or 5.69%.

Notably, *IDD* and *Same industry* work in the opposite direction in explaining TSR and ROE while working in the same direction in explaining Tobin's Q. While the answer as to why is not yet clear, *IDD* positively influences Tobin's Q, TSR, and ROE beyond what *Female* explains. All subsequent analyses show only results using Tobin's Q as the performance measure; however, untabulated results show that using TSR or ROE yields qualitatively similar but statistically weaker results.

In an untabulated analysis, we orthogonalize *IDD* from innate diversity measures (gender and nationality diversity) by regressing industry diversity on gender and nationality diversity measures. We then take the residual and repeat our main analysis using the residual from the orthogonalization. The residuals are significantly and positively associated with all three firm performance measures, further strengthening our conclusion that board career diversity has incremental value in explaining firm performance in addition to the common diversity in gender or nationality.

The results in Tables 4 and 5 are consistent with that of Fang and Hope [43] and Evans et al. [44], in that diversity is helpful for performance.

3.2. Variation across Industries

Next, we investigate whether the relationship between Tobin's Q and director career diversity is stronger in certain industries. To analyze the relationship, we test our hypothesis H2 and present the results in Table 6, Equations (1)–(4). Following Masulis et al. [1], we capture the competitive structure of an industry using the Herfindahl index, calculated as the sum of squared market shares of all Compustat firms in each FF 48 industry. As a higher Herfindahl index indicates less industry competition, we expect career diversity to be more

effective in the sample with a lower Herfindahl index. Competitive industries are those in the bottom quartile of FF 48 industries regarding the Herfindahl index. Naturally, there will be more firms in industries that are more competitive. Thus, the number of firm-years in the bottom quartile is similar to the number of firm-years in the other three quartiles.

Table 6. Board diversity, Tobin's Q, and industry characteristics.

	Dependent Variable: Tobin's Q							
	Competitive		Unique		High Tech		New Economy	
	Yes (1)	No (2)	Yes (3)	No (4)	Yes (5)	No (6)	Yes (7)	No (8)
IDD_{t-1}	0.354 *** (0.081)	0.332 *** (0.089)	0.357 *** (0.132)	0.330 *** (0.065)	0.251 (0.169)	0.355 *** (0.068)	0.037 (0.227)	0.385 *** (0.064)
Same industry $_{t-1}$	0.320 *** (0.104)	0.092 (0.117)	0.588 *** (0.162)	−0.073 (0.076)	0.328 * (0.191)	0.162 * (0.092)	0.657 *** (0.229)	0.070 (0.087)
Female $_{t-1}$	0.310 * (0.178)	0.039 (0.176)	−0.050 (0.260)	0.293 ** (0.131)	0.186 (0.416)	0.190 (0.136)	0.696 (0.511)	0.110 (0.132)
Constant	2.581 *** (0.166)	2.628 *** (0.190)	2.980 *** (0.238)	2.340 *** (0.158)	2.544 *** (0.366)	2.617 *** (0.145)	2.485 *** (0.478)	2.658 *** (0.135)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	14,864	13,888	10,200	18,552	4725	24,027	3366	25,386
Adjusted R ²	0.374	0.330	0.330	0.354	0.267	0.369	0.287	0.372

Note: This table presents regression results by industry types. Equations (1) and (2) subsample observations based on industry competitiveness, where competitive industries are those with the Herfindahl index in the bottom quartile. Equations (3) and (4) subsample observations based on uniqueness, where unique industries are those with selling, general, and administrative (SG&A) expenses in the top quartile. Equations (5) and (6) subsample observations based on whether they belong to a high technology industry, and Equations (7) and (8) subsample observations based on whether they belong to a new economy industry. For brevity, the table does not present estimates for control variables. For the definition of the variables used in the model, please refer to Table 2. All variables not bound within [0, 1] are winsorized at the 1% level in both tails. Standard errors are clustered at the firm level and reported in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively. #: Number.

Equations (1) and (2) of Table 6 show that *IDD* is significantly and positively associated with Tobin's Q in competitive and non-competitive industries. The magnitude of the coefficient in the competitive industry is slightly larger but indistinguishable. However, *Same industry* statistically explains Tobin's Q only in competitive industries, suggesting that specialized director experience has a greater influence on Tobin's Q in competitive industries. That is, in non-competitive industries, diversified experience benefits dominate specialized experience benefits. *Female* also explains Tobin's Q in competitive industries better than in non-competitive industries. Further, we perform a seemingly unrelated estimation to test whether the *Same industry* and *Female* coefficients differ significantly between two subsamples [57]. In an untabulated analysis, the coefficient estimates are significantly different between the two subsamples. Following Masulis et al. [1], another way to measure industry competitiveness is via product uniqueness, measured by an industry's median ratio of selling, general, and administrative (SG&A) expenses to revenue. An industry is unique if its SG&A to sales is in the top quartile among FF 48 industries. Equations (3) and (4) present the Tobin's Q and key variables analysis results. The results are almost identical to those in Equations (1) and (2), except for *Female* positively explaining Tobin's Q in non-unique industries. Overall, Equations (1)–(4) suggest that directors with same-industry experience contribute more to Tobin's Q in industries with high competition.

We then extend our investigation to analyze whether a director's career is important in industries with more growth opportunities. We also present our analysis of hypothesis H3 in Table 6. In Equations (5) and (6), we provide the regression results regarding high technology and non-high technology industries. As is expected, *Same industry* is more significant in explaining Tobin's Q in high technology industries, while *IDD* is more significant in explaining Tobin's Q in non-high technology industries.

As per Ittner, Lambert, and Larcker [58], computer, software, internet, telecommunication, and networking industries are new economy industries. Similar to high technology industries, we hypothesize that firms in new economy industries benefit from directors with same-industry experience, while in non-new economy industries, directors with diversified experiences contribute more. Consistent with the results from high technology industries, *Same industry* significantly explains Tobin's Q in new economy firms but not in other industries. However, *IDD* only positively impacts Tobin's Q in non-new economy industries. *Female* does not explain Tobin's Q in any high technology or new economy subsamples.

Overall, Table 6 suggests that the association between director career and firms' Tobin's Q depends on industry characteristics. Companies facing fierce competition or in industries with fast growth need directors with specialized industry experience. Otherwise, they are better off seeking directors with diverse industry backgrounds

Next, we test whether the positive association between career diversity and firm performance is larger in complex firms. To test our hypothesis H4, we first proxy for complex firms by constructing the firm complexity factor, following Coles et al. [48]. The firm complexity factor is the linear combination of firm size, leverage, and the number of business segments. Table 7 presents our results using the firm complexity factor. Equations (1)–(3) use *IDD*, *Same industry*, and *Female* as respective key explanatory variables, respectively; Equation (4) includes all three.

Table 7. Board diversity, Tobin's Q, and firm complexity.

	Dependent Variable: Tobin's Q			
	(1)	(2)	(3)	(4)
IDD_{t-1}	0.278 *** (0.082)			0.248 *** (0.083)
$Same\ industry_{t-1}$		0.319 *** (0.113)		0.334 *** (0.114)
$Females_{t-1}$			0.058 (0.175)	0.085 (0.177)
$IDD_{t-1} \times Complexity_{t-1}$	0.223 *** (0.049)			0.245 *** (0.054)
$Same\ industry_{t-1} \times Complexity_{t-1}$		−0.226 *** (0.087)		−0.273 *** (0.088)
$Female_{t-1} \times Complexity_{t-1}$			0.290 ** (0.132)	0.082 (0.140)
$Complexity_{t-1}$	−0.323 *** (0.030)	−0.180 *** (0.023)	−0.237 *** (0.024)	−0.313 *** (0.031)
Constant	2.455 *** (0.149)	2.210 *** (0.148)	2.314 *** (0.147)	2.424 *** (0.151)
Controls	Yes	Yes	Yes	Yes
Industry and year FE	Yes	Yes	Yes	Yes
# of observations	26,594	26,594	26,594	26,594
Adjusted R^2	0.342	0.339	0.337	0.345

Note: This table investigates the influence of board diversity and firm complexity on Tobin's Q. Firm complexity is the principal factor extracted from firm size, market leverage, and the number of product segments based on the Fama-French 48 (FF 48) industry classification. Equation (1) employs industry-diversified directors and their interaction with complexity. Equation (2) employed a fraction of directors with prior experience from the same industry and their interaction with complexity. Equation (3) employs a fraction of female directors and their interaction with complexity. Equation (4) employs all the above-mentioned variables. For brevity, the table does not present estimates for control variables. For the definition of the variables used in the model, please refer to Table 2. All variables not bound within [0, 1] are winsorized at the 1% level in both tails. Standard errors are clustered at the firm level and reported in parentheses. Significance at the 5% and 1% levels are indicated by **, ***, respectively. #: Number.

The coefficient estimate of *IDD* is positive and significant, as in previous tables. However, the firm complexity factor by itself is negatively associated with firm performance, likely because of the inherent challenge in running a complex firm. Even so, the factor loading on the interaction of career diversity and firm complexity is positive and significant,

suggesting that firms with career-diversified boards can cope with complex business issues and dynamic operating environments better than firms without such diversity.

Moreover, *Same industry* is positively and significantly associated with Tobin's Q in Equations (2) and (4). However, its interaction with *Complexity* is negative and significant, implying that the negative impact of *Complexity* on Tobin's Q is even larger with more directors with same-industry experience. This result suggests that having experience in various other industries helps improve the performance of complex firms.

Gender diversity is not significantly associated with Tobin's Q by itself; however, when we interact *Female* with *Complexity*, the interaction term is positive and significant. Board diversity, as measured by the proportion of female directors, helps improve performance in complex firms. However, in Equation (4), the *Female* and *Complexity* interaction loses significance, again supporting the previous finding that gender diversity has weak explanatory power beyond career diversity.

4. The Channel

4.1. Advisory Role

Boards of directors that can collectively bring a variety of competencies and judgments are important resources for managers, especially in complex industry environments. A potential benefit of a board with diversified career experiences is that they provide knowledge, skill sets, and insights into various industries and help firms make more informed investments. Furthermore, the industrial organization literature explains the advisory role of boards. Specifically, Sah and Stiglitz [59] find that managers are more likely to reject bad projects if they rely on board advice. Thus, we investigate whether CEOs of firms with industry-diversified directors make better corporate decisions. We choose two of the main CEO decisions that may affect long-term firm performance: R&D activity and capital expenditure.

Accounting rules (SFAS No. 2) require most R&D spending to be expensed when incurred since it is challenging to assess the potential benefits, costs, and likelihood of R&D activity success. The US GAAP provides detailed guidelines for classifying expenses as R&D; however, these guidelines leave room for managerial discretion, suggesting the potential for a disclosure bias in reported corporate R&D expenses. Prior studies found that managers engage in real earnings management and intentionally reduce R&D activities to meet accounting performance benchmarks [16,60] or engage in pseudo-blank missing R&D [18], which could seriously threaten the long-term performance and firm value.

Second, CEOs may differ in risk attitude toward undertaking value-increasing net present value projects with high risks, adversely affecting long-run performance. However, boards with diversified industry experiences could help reduce myopic actions and facilitate capital investment and innovation. Boards mainly identify opportunities and risks firms potentially face, evaluate CEO performance, and serve as informed advisers for major strategies and corporate directions. Boards with diversified industry experiences can contribute to identifying innovation and investment opportunities, thus reducing the career concerns of CEOs and encouraging value creation investments. We expect boards with diversified industry experiences to improve the return of R&D activities and increase the likelihood of successful capital investment. Therefore we hypothesize that career diversity positively affects firm performance by increasing R&D and capital expenditures.

To investigate how *IDD* improve Tobin's Q via investments, we adopt a two-step procedure. In the first step, we estimate the following models:

$$Investment_t = \alpha_1 + \Gamma_1 Controls_{t-1} + \varepsilon_1 \quad (2)$$

$$Investment_t = \alpha_2 + \beta_2 Career/Diversity_{t-1} + \Gamma_2 Controls_{t-1} + \varepsilon_2 \quad (3)$$

where *Investment* is either *R&D* or *Capital expenditure*; *Career/Diversity* is either *IDD*, *Same industry*, or *Female*; and *Controls* include all the control variables. The predicted value from Equation (2), $Investment_t^{RAW}$, is the value predicted using all control values only.

The predicted value from Equation (3), $\hat{Investment}_t^{Career/Diversity}$, includes the incremental prediction by *Career/Diversity* and Equation (2). Thus, we obtain incremental *Investment* by *Career/Diversity*, as below:

$$\Delta \hat{Investment}_t^{Career/Diversity} = \hat{Investment}_t^{Career/Diversity} - \hat{Investment}_t^{RAW} \quad (4)$$

We then regress Tobin's Q on $\Delta \hat{Investment}_t^{Career/Diversity}$ to investigate how much *Career/Diversity* improves Tobin's Q via *Investment* by estimating:

$$Tobin's\ Q_t = \alpha_3 + \beta_3 \Delta \hat{Investment}_t^{Career/Diversity} + \Gamma_2 Controls_{t-1} + \varepsilon_3. \quad (5)$$

Table 8 presents the results from the above R&D regressions. Equation (1) presents an estimation of Equation (2), and Equations (2), (4), and (6) presents estimations of Equation (3) for *IDD*, *Same industry*, and *Female*, respectively. Accordingly, *IDD* and *Same industry* significantly increase R&D; however, *Female* does not seem to affect the R&D level. A standard deviation increase in *IDD* (*Same industry*) increases R&D by 0.0027 (0.0078). The increase in R&D expenditure may indicate that directors with diversified and specialized experiences can effectively advise management to invest in long-term growth. Equations (3), (5), and (7) present results from Equation (5) estimations using *IDD*, *Same industry*, and *Female*, respectively. $\Delta R\&D_t^{Female}$ becomes significant in Equation (7), but because *Female* was insignificant in Equation (6), we focus on *IDD* and *Same industry*. $\Delta R\&D_t^{IDD}$ and $\Delta R\&D_t^{Same}$ are highly significant. A standard deviation increase in *IDD* (*Same industry*) increases Tobin's Q via R&D by 0.089 (0.047), suggesting that *IDD* and *Same industry* can help managers increase R&D, successfully improving performance.

Table 8. Board diversity, R&D, and Tobin's Q.

1st Stage Dependent Variable: R&D, 2nd Stage Dependent Variable: Tobin's Q							
	1st (1)	IDD 1st (2)	2nd (3)	Same 1st (4)	2nd (5)	Female 1st (6)	2nd (7)
IDD _{t-1}		0.011 *** (0.003)					
$\Delta R\&D_t^{IDD}$			32.358 *** (5.604)	0.040 *** (0.005)			
$\Delta R\&D_t^{Same}$					6.049 *** (2.123)	0.003 (0.007)	
Females _{t-1}							88.529 * (50.994)
$\Delta R\&D_t^{Female}$							2.486 *** (0.133)
Constant	0.053 *** (0.006)	0.057 *** (0.006)	2.486 *** (0.132)	0.049 *** (0.006)	2.486 *** (0.134)	0.053 *** (0.006)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	28,752	28,752	28,752	28,752	28,752	28,752	28,752
Adjusted R ²	0.501	0.503	0.350	0.516	0.347	0.501	0.346

Note: This table investigates the influence of board diversity on R&D and Tobin's Q. First, we obtain the predicted value, $R\&D_t^{RAW}$, by estimating $R\&D_t = \alpha + \Gamma Controls_{t-1} + \varepsilon$ only with control variables. We then estimate $R\&D_t = \alpha + \beta Career/Diversity_{t-1} + \Gamma Controls_{t-1} + \varepsilon$, and obtain its predicted value, $R\&D_t^{Career/Diversity}$. We take the difference of the predicted values, $\Delta R\&D_t^{Career/Diversity} = R\&D_t^{Career/Diversity} - R\&D_t^{RAW}$ as the incremental R&D predicted by *Career/Diversity*. We then estimate the second-stage model, $Tobin's\ Q_t = \alpha + \beta \Delta R\&D_t^{Career/Diversity} + \Gamma Controls_{t-1} + \varepsilon$. Equation (1) is the first stage regression without diversity variables. Equations (2) and (3) use industry-diversified directors. Equations (4) and (5) use a fraction of directors with experience in the same industry, and Equations (6) and (7) use the fraction of female directors. For brevity, the table does not present estimates for control variables. All variable definitions are provided in Table 2. All variables not bound within [0, 1] are winsorized at the 1% level in both tails. Standard errors are clustered at the firm level and reported in parentheses. Significance at the 10% and 1% levels are indicated by *, ***, respectively. #: Number.

Table 9 reports the results from using *Capital expenditure* as the channel. While incremental predicted values of *Capital expenditure* by *Same industry* and *Female* is significant in explaining Tobin's Q in Equations (5) and (7), because *Same industry* and *Female* do not significantly explain *Capital expenditure* in Equations (4) and (6), we focus only on *IDD* for Table 9. In Equation (2), *IDD* significantly and negatively affects capital expenditure. A

standard deviation increase in *IDD* decreases the *Capital expenditure* by 0.0015, implying that industry-diversified directors, on average, cut off investment in physical assets or acquisitions. In Equation (3), the incremental predicted value of *Capital expenditure* significantly decreases Tobin's *Q*. Given that an increase in *IDD* decreases *Capital expenditure*, which negatively affects Tobin's *Q*, an increase in *IDD* increases Tobin's *Q*. A standard deviation increase in *IDD* increases Tobin's *Q* by 0.093. Table 9 suggests that *IDD* adds value to firms by affecting important managerial decisions, likely providing better advice to improve Tobin's *Q*. The results accord with Sah and Stiglitz [59], who find that managers equipped with advice from an industry-diversified board are more likely to reject poor projects. As per Custódio and Metzger [61], CEO experience positively affects M&A decisions. We argue that CEO experience and career diversity of directors are beneficial.

Table 9. Board diversity, capital expenditure, and Tobin's *Q*.

	1st Stage Dependent Variable: Capex		2nd Stage Dependent Variable: Tobin's Q			
	1st (1)	1st (2)	1st (3)	1st (4)	1st (5)	1st (6)
<i>IDD</i> _{<i>t</i>-1}		−0.006 *** (0.003)				
$\Delta Capex_t^{IDD}$			−62.175 *** (10.767)	0.142 *** (0.003)		
Same industry _{<i>t</i>-1}					−217.561 *** (76.341)	−0.000 (0.005)
$\Delta Capex_t^{Same}$						
Female _{<i>t</i>-1}						
$\Delta Capex_t^{Female}$						−991.855 * (571.321)
Constant	0.067 *** (0.005)	0.065 *** (0.005)	2.489 *** (0.132)	0.067 *** (0.005)	2.487 *** (0.134)	0.067 *** (0.005)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry and year FE	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	28,485	28,485	28,485	28,485	28,485	28,485
Adjusted <i>R</i> ²	0.466	0.467	0.350	0.466	0.347	0.466

Note: This table investigates the influence of board diversity on capital expenditure and Tobin's *Q*. First, we obtain the predicted value, $\hat{Capex}_t^{RAW}$, by estimating $Capex_t = \alpha + \Gamma Controls_{t-1} + \varepsilon$ only with control variables. We then estimate $Capex_t = \alpha + \beta Career/Diversity_{t-1} + \Gamma Controls_{t-1} + \varepsilon$, and obtain its predicted value, $\hat{Capex}_t^{Career/Diversity}$. We take the difference of the predicted values, $\Delta Capex_t^{Career/Diversity} = \hat{Capex}_t^{Career/Diversity} - \hat{Capex}_t^{RAW}$ as the incremental capital expenditure predicted by a diversity variable. We then estimate $Tobin's Q_t = \alpha + \beta \Delta Capex_t^{Career/Diversity} + \Gamma Controls_{t-1} + \varepsilon$. Column (1) is the first stage regression without diversity variables. Columns (2) and (3) use industry-diversified directors. Columns (4) and (5) use a fraction of directors with experience in the same industry. Columns (6) and (7) use a fraction of female directors. For brevity, the table does not present estimates for control variables. All variable definitions are provided in Table 2. All variables not bound within [0, 1] are winsorized at the 1% level in both tails. Standard errors are clustered at the firm level and reported in parentheses. Significance at the 10% and 1% levels are indicated by *, ***, respectively. #: Number.

4.2. Monitoring Role

Regarding the monitoring role of board directors, many studies use executive compensation, earnings management, or board meeting attendance as a proxy for board effectiveness. This study employs executive compensation and earnings management as the proxy for effective board monitoring.

One of the most effective and acceptable ways of aligning shareholder interests with that of managers is to provide a more equity-based compensation package. When manager compensation is predominantly linked to the company stock price, CEOs have more incentive to increase the price, creating value for shareholders. Thus, a properly functioning board closely monitors the link between performance and CEO pay to design compensation packages that predominantly link compensation with firm performance. We use CEO equity compensation to proxy for board monitoring on executive compensation. CEO equity compensation includes an ex ante grant of restricted stocks and stock options.

We also test whether board diversity is associated with fewer earnings management activities. As earnings management behavior signals manipulated information to the market about the current fiscal period performance (subsequently reversed in later fiscal periods), it is detrimental to the firm value in the long run. If career-diversified boards act as effective monitors, we expect to observe fewer earnings management behavior in firms having directors with diverse industry experiences. However, if the diversified board

acts as an ineffective monitor, earnings management may be more prevalent in such firms. Therefore, we hypothesize that career diversity positively affects firm performance by increasing equity-based compensation and decreasing discretionary accruals.

We adopt the method in Tables 8 and 9 to investigate the board's monitoring role and board diversity. We replace *Investment* with *Monitoring* in Equations (2)–(5) and estimate the models, where *Monitoring* is *Equity-based compensation* or *Discretionary accruals*.

Table 10 presents the first results on the monitoring role of the board with diversified industry experiences. We use the proportion of *Equity-based compensation* in the total compensation package as the proxy for how well the board is monitoring management. We use restricted stocks, performance shares, and stock options as the *Equity-based compensation* and the sum of salary, cash bonus, restricted stock, performance shares, and stock options as the total compensation package. In Equation (6), *Female* does not significantly explain the proportion of *Equity-based compensation*; thus, we focus on *IDD* and *Same industry*. In Equations (2) and (4), a standard deviation increase in *IDD* (*Same industry*) increases *Equity-based compensation* by 3.23%P (2.76%P). It suggests that both directors with diversified and specialized experiences effectively align managerial interests with those of shareholders. In Equations (3) and (5), a standard deviation increase in *IDD* (*Same industry*) increases Tobin's Q by 0.093 (0.047).

Table 10. Board diversity, equity compensation, and Tobin's Q.

		1st Stage Dependent Variable: Equity, 2nd Stage Dependent Variable: Tobin's Q					
		IDD		Same		Female	
	1st (1)	1st (2)	2nd (3)	1st (4)	2nd (5)	1st (6)	2nd (7)
IDD _{t-1}		0.130 *** (0.017)					
$\Delta Equity_t^{IDD}$			2.870 *** (0.497)	0.142*** (0.020)			
Same industry _{t-1}					1.699 *** (0.596)	0.032 (0.036)	
$\Delta Equity_t^{Same}$							7.295 * (4.202)
Female _{t-1}							2.486 *** (0.133)
$\Delta Equity_t^{Female}$	0.026 (0.034)	0.072 ** (0.033)	2.485 *** (0.132)	0.010 (0.033)	2.487 *** (0.134)	0.030 (0.033)	
Constant							
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	28,124	28,124	28,752	28,124	28,752	28,124	28,752
Adjusted R ²	0.132	0.138	0.350	0.137	0.347	0.132	0.346

Note: This table investigates the influence of board diversity on equity compensation, *Equity*, and Tobin's Q. First, we obtain the predicted value, $\hat{Equity}_t^{RAW}$, by estimating $Equity_t = \alpha + \Gamma Controls_{t-1} + \varepsilon$ only with control variables. We then estimate $Equity_t = \alpha + \beta Diversity_{t-1} + \Gamma Controls_{t-1} + \varepsilon$, and obtain its predicted value, $\hat{Equity}_t^{Career/Diversity}$. We take the difference of the predicted values, $\Delta Equity_t^{Career/Diversity} = \hat{Equity}_t^{Career/Diversity} - \hat{Equity}_t^{RAW}$ as the incremental equity compensation predicted by Career/Diversity. We then estimate Tobin's Q_t = $\alpha + \beta \Delta Equity_t^{Career/Diversity} + \Gamma Controls_{t-1} + \varepsilon$. Equation (1) is the first stage regression without diversity variables. Equations (2) and (3) use industry-diversified directors. Equations (4) and (5) use a fraction of directors with experience in the same industry. Equations (6) and (7) use the fraction of female directors. For brevity, the table does not present estimates for control variables. All variable definitions are provided in Table 2. All variables not bound within [0, 1] are winsorized at the 1% level in both tails. Standard errors are clustered at the firm level and reported in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively. #: Number.

We then test the board's monitoring role via earnings management. As per Dechow et al. [51], we implement the modified Jones model to extract the earnings management behavior. *Discretionary accruals* are the residual of the following regression model:

$$\frac{Total\ Accruals}{Total\ Assets} = \beta_0 \frac{1}{Total\ Asset} + \beta_1 \frac{\Delta Rev - \Delta Rec}{Total\ Asset} + \beta_2 \frac{PP\&E}{Total\ Asset} + \beta_3 ROA + \varepsilon \quad (6)$$

where *Rev* is revenue, *Rec* is account receivables, and *PP&E* is the gross plant, property, and equipment. Table 11 presents the results after applying the discretionary accrual from Equations (2)–(6). In Equations (2), (4), and (6), only *Same industry* and *Female* explain changes in *Discretionary accruals*, suggesting that *IDD* do not necessarily improve monitoring in detecting earnings management. Thus, we focus on *Same industry* and *Female* only for this table. A one standard deviation increase in *Same industry* (*Female*) decreases (increases) *Discretionary accrual* by 0.0029 (0.0021). In Equations (5) and (7), incremental predicted values of *Discretionary accruals* are significant in explaining Tobin's Q. A standard deviation increase in *Same industry* (*Female*) improves Tobin's Q by 0.466 (0.025). Notably, *Same industry* and *Female* work in opposite directions but eventually improve Tobin's Q. Directors with same-industry experience reduce *Discretionary accruals* while female directors tend to increase *Discretionary accruals*.

Table 11. Board diversity, discretionary accruals, and Tobin's Q.

		1st Stage Dependent Variable: DA, 2nd Stage Dependent Variable: Tobin's Q					
		IDD		Same		Female	
	1st (1)	1st (2)	2nd (3)	1st (4)	2nd (5)	1st (6)	2nd (7)
IDD _{t−1}		−0.004 (0.017)					
ΔDA ^{Same}			−83.889 *** (14.528)	−0.015 *** (0.006)			
Same industry _{t−1}					−15.993 *** (5.612)	0.020 * (0.012)	
ΔDA ^{Same}							
Female _{t−1}							11.832 * (6.815)
ΔDA ^{Female}							2.486 *** (0.133)
Constant	0.055 *** (0.010)	0.054 ** (0.010)	2.511*** (0.132)	0.057 *** (0.010)	2.489 *** (0.134)	0.057 (0.010)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	20,849	20,849	28,752	28,752	28,752	28,849	28,752
Adjusted R ²	0.073	0.073	0.350	0.073	0.347	0.073	0.346

Note: This table investigates the influence of board diversity on discretionary accruals, *DA*, based on the modified Jones model and Tobin's Q. First, we obtain the predicted value, $\hat{DA}_t^{RAW}$, by estimating $DA_t = \alpha + \Gamma Controls_{t-1} + \varepsilon$ only with control variables. We then estimate $DA_t = \alpha + \beta Diversity_{t-1} + \Gamma Controls_{t-1} + \varepsilon$, and obtain its predicted value, $\hat{DA}_t^{Career/Diversity}$. We take the difference of the predicted values, $\Delta DA_t^{Career/Diversity} = \hat{DA}_t^{Career/Diversity} - \hat{DA}_t^{RAW}$, as the incremental discretionary accruals predicted by a diversity variable. We then estimate the second-stage model, $Tobin's\ Q_t = \alpha + \beta \Delta DA_t^{Career/Diversity} + \Gamma Controls_{t-1} + \varepsilon$. Equation (1) is the first stage regression without diversity variables. Equations (2) and (3) use industry-diversified directors. Equations (4) and (5) use a fraction of directors with experience in the same industry. Equations (6) and (7) use a fraction of female directors. For brevity, the table does not present estimates for control variables. All variable definitions are provided in Table 2. All variables not bound within [0, 1] are winsorized at the 1% level in both tails. Standard errors are clustered at the firm level and reported in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively. #: Number.

Overall, the results in this section suggest that board career diversity affects Tobin's Q through advisory and monitoring roles. We identify three operating channels: better R&D activity, better control of capital expenditure, and alignment of managerial interest with shareholder interest. Same-industry experience directors affect Tobin's Q via better R&D activity, better control of capital expenditure, and smaller discretionary accrual.

5. Robustness Checks

This section conducts and discusses several robustness checks. A key concern for any analysis of board directors in corporate governance is the endogeneity of director appointment decisions [62]. For instance, firms with higher growth opportunities and firm value may search for directors with diverse industry experience. Meanwhile, such directors may help improve the firm performance. Alternatively, given that directors can opportunistically choose which firms and boards they join, industry-diversified directors

choose firms whose performance they can most improve. This situation inevitably affects the causality of our findings. Moreover, potential omitted variables may trigger endogenous relations. Hence, to address the endogeneity concerns, we employ two approaches. First, we employ lagged values for all independent variables. Even though the methodology is not perfect, it weakly addresses reverse causality and simultaneity concerns.

Second, we use the instrumental variable (IV) methodology to address endogeneity concerns. In the first stage, we use the industry diversity of the county-level employment as the instrumental variable. We collect county-level employment data by industry and year from the Bureau of Labor Statistics (BLS) for each FIPS code. The county-level industry diversity measure is based on employment data of 11 non-agricultural sectors in private ownership from the BLS. These sectors include: (1) natural resources and mining; (2) construction; (3) manufacturing; (4) trade, transportation, and utilities; (5) information; (6) financial activities; (7) professional and business services; (8) education and health services; (9) leisure and hospitality; (10) public administration; and (11) others. Greater industry diversity in the local job market provides a larger and more diverse candidate pool for board directors [17,63].

We then match the data with the Compustat data using corporate headquarter ZIP codes in the sample, which are matched to FIPS codes with the County Cross Reference File (FIPS/ZIP4) from CDC WONDER. For unmatched ZIP codes, we collect FIPS manually. We use the Herfindahl index to measure the industry concentration of employment in each county, using the North America Industry Classification Standard for industry classification. We take (1—Herfindahl index) as the county-level industry diversity where higher value refers to higher diversity. In the first stage, we estimate the following:

$$IDD = \alpha + \beta_1 \text{County diversity} + \Gamma_1 \text{Controls} + \varepsilon_1 \quad (7)$$

where *County diversity* is the county-level employment diversity index, and *Controls* include all the control variables in previous models and year and industry fixed effects. The second stage regression is mostly similar to Equation (1) except for career diversity being the predicted value from the first stage, as shown below:

$$\text{Tobin's } Q = \alpha + \beta_2 \hat{IDD} + \Gamma_2 \text{Controls}_{i,t-1} + \varepsilon \quad (8)$$

We believe our instrumental variable addresses potential endogeneity issues. If the local labor market were diversified per industry, it would affect the potential composition of board directors of a company in the region (relevance condition). However, county-level industry composition should not impact the performance of the multinational or nation-wide corporations we consider in our study (exclusion condition).

Table 12 presents the results from the 2SLS regression. Equation (1) presents the first stage results using county-level industry diversity as the main variable. As expected, the county-level industry diversity is significantly and positively associated with *IDD*, ensuring that the county-level industry diversification passes the initial test for being an eligible instrument variable. The industry-diverse local labor market positively influences the diverse industry experience of board directors. Using the instrumented *IDD* from the first stage regression as the main variable, Equation (2) presents results consistent with the previous tables. The instrumented *IDD* is positively and significantly associated with Tobin's *Q*; thus, the main result is robust to endogeneity concerns from the local labor market.

Table 12. Main regression with instrumental variable.

	Dependent Variable:	
	IDD, t	Tobin's Q
	(1)	(2)
County diversity _{t-1}	0.696 *** (0.083)	
IDD _{t-1}		1.517 *** (0.553)
Same industry _{t-1}	0.075 *** (0.008)	0.137 ** (0.060)
Female _{t-1}	0.200 *** (0.015)	−0.033 (0.129)
Firm size _{t-1}	0.058 *** (0.001)	−0.150 *** (0.032)
Market leverage _{t-1}	−0.031 *** (0.011)	−1.751 *** (0.048)
ROA _{t-1}	−0.048 *** (0.016)	3.222 *** (0.124)
Firm risk _{t-1}	0.151 *** (0.029)	0.324 * (0.170)
Intangible asset _{t-1}	0.036 *** (0.008)	−0.364 *** (0.044)
Board size _{t-1}	−0.001 * (0.001)	0.004 (0.003)
Independence _{t-1}	0.476 *** (0.015)	−0.764 *** (0.273)
CEO Ownership _{t-1}	−0.488 *** (0.035)	0.569 * (0.332)
Constant	−1.058 *** (0.074)	3.490 *** (0.283)
Industry and year FE	Yes	Yes
# of observations	25,520	25,520
Adjusted R ²		0.312

Note: This table repeats the main regression of Tobin's Q by instrumenting the industry-diversified director to address endogeneity concerns. We use industry diversity regarding a county-level job market as the instrumental variable. In the first stage, we regress industry-diversified directors on county-level job market industry diversity and other control variables. In the second stage, we regress Tobin's Q on predicted IDD_{t-1} and other control variables. All variable definitions are provided in Table 2. All variables not bound within [0, 1] are winsorized at the 1% level in both tails. Heteroskedasticity-robust standard errors are reported in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively. #: Number.

Second, we defined industry-diversified directors in several ways, such as using the FF 12 industry classification. We also used indicator variables that are equal to one if industry diversity is above the sample median and zero otherwise. Furthermore, we employed the total number of industries with prior experience to proxy for industry diversity. This method resulted in many different combinations of the industry diversity index. While the current measure provides the best results, given its consistency with the hypothesis, other measures resulted in a qualitatively similar albeit weaker statistical significance.

We also tested an alternative and more conventional method to analyze the channels through which *Career/Diversity* affect Tobin's Q. We specify the model below:

$$\text{Tobin's } Q_{i,t} = \alpha + \beta_1 \text{IDD}_{i,t-1} + \beta_2 \text{Channel}_{i,t-1} + \beta_3 \text{IDD}_{i,t-1} \times \text{Channel}_{i,t-1} + \Gamma_1 \text{Controls}_{i,t-1} + \varepsilon_{i,t} \quad (9)$$

where Channel is either R&D, Capital expenditure, Equity-based compensation, or Discretionary accruals. The above equation can be rearranged as follows:

$$\text{Tobin's } Q_{i,t} = \alpha + \beta_1 \text{IDD}_{i,t-1} + (\beta_2 + \beta_3 \text{IDD}_{i,t-1}) \text{Channel}_{i,t-1} + \Gamma_1 \text{Controls}_{i,t-1} + \varepsilon_{i,t} \quad (10)$$

where we can identify the mediation effect of *Career/Diversity*. In untabulated results, the previous findings are robust to using different model to identify the channels.

6. Conclusions

Diverse industry experiences do matter in corporate governance. Having a broad range of collective attributes enables boards to maintain good corporate governance standards and provide good strategic oversight.

This study investigates how directors' career-wide industry experience can affect firm performance. Accordingly, as measured by Tobin's Q, TSR, and ROE, boards with diversified careers induce higher firm performance. This positive relationship is stronger in competitive, non-high technology, non-new economy, and more complex firms.

We further identify the value creation channel of career-diversified boards. Regarding their advisory role, career diversity increases firm value via two channels: (1) increased R&D activity and (2) decreased capital expenditure. Regarding their monitoring role, career-diversified boards are associated with more equity-based compensation but do not affect earnings management behavior. However, directors with same-industry experience improve Tobin's Q by reducing the level of *Discretionary accruals*.

This study strengthens recent arguments from academia and industry practitioners that board diversity is desired and favored. Given that career diversity matters, in addition to gender, ethnicity, education, and other diversity aspects, we encourage corporations to consider board composition seriously and promote board career diversity.

Author Contributions: Conceptualization, D.S.K.; methodology, D.S.K.; formal analysis, D.S.K.; resources, H.K.S.; writing—original draft preparation, D.S.K.; writing—review and editing, H.K.S.; supervision, D.S.K.; funding acquisition, D.S.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research was supported by the Chung-Ang University Research Grants in 2020.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data are available upon the request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

References

1. Masulis, R.W.; Wang, C.; Xie, F. Corporate governance and acquirer returns. *J. Financ.* **2007**, *62*, 1851–1889. [CrossRef]
2. Brickley, J.A.; Coles, J.L.; Jarrell, G. Leadership structure: Separating the ceo and chairman of the board. *J. Corp. Financ.* **1997**, *3*, 189–220. [CrossRef]
3. Dahya, J.; McConnell, J.J.; Travlos, N.G. The cadbury committee, corporate performance, and top management turnover. *J. Financ.* **2002**, *57*, 461–483. [CrossRef]
4. Jayaraman, N.; Nanda, V.K.; Ryan, H.E. Does Combining the Ceo and Chair Roles Cause Poor Firm Performance. 2015. Unpublished Working Paper. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2690281 (accessed on 26 May 2021).
5. Yang, T.; Zhao, S. Ceo duality and firm performance: Evidence from an exogenous shock to the competitive environment. *J. Bank. Financ.* **2014**, *49*, 534–552. [CrossRef]
6. Adams, R.B.; Ferreira, D. A theory of friendly boards. *J. Financ.* **2007**, *62*, 217–250. [CrossRef]
7. Arthurs, J.D.; Hoskisson, R.E.; Busenitz, L.W.; Johnson, R.A. Managerial agents watching other agents: Multiple agency conflicts regarding underpricing in ipo firms. *Acad. Manag. J.* **2008**, *51*, 277–294. [CrossRef]
8. Becht, M.; Bolton, P.; Röell, A. Corporate Governance and Control. In *Handbook of the Economics of Finance*; Constantinides, G.M., Harris, M., Stulz, R.M., Eds.; Elsevier: Amsterdam, The Netherlands, 2003; Volume 1, pp. 1–109.
9. Dalton, D.R.; Daily, C.M.; Johnson, J.L.; Ellstrand, A.E. Number of directors and financial performance: A meta-analysis. *Acad. Manag. J.* **1999**, *42*, 674–686.
10. Gales, L.M.; Kesner, I.F. An analysis of board of director size and composition in bankrupt organizations. *J. Bus. Res.* **1994**, *30*, 271–282. [CrossRef]

11. Gertner, R.H.; Kaplan, S.N. The Value-Maximizing Board. 1996. Unpublished Working Paper. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=10975 (accessed on 26 May 2021).
12. Hermalin, B.E.; Weisbach, M.S. Boards of directors as an endogenously determined institution: A survey of the economic literature. *FRBNY Econ. Policy Rev.* **2003**, *9*, 7–26.
13. Yermack, D. Higher market valuation of companies with a small board of directors. *J. Financ. Econ.* **1996**, *40*, 185–211. [[CrossRef](#)]
14. Ferris, S.P.; Jagannathan, M.; Pritchard, A.C. Too busy to mind the business? Monitoring by directors with multiple board appointments. *J. Financ.* **2003**, *58*, 1087–1111. [[CrossRef](#)]
15. Fich, E.M.; Shivdasani, A. Are busy boards effective monitors? *J. Financ.* **2006**, *61*, 689–724. [[CrossRef](#)]
16. Gunny, K.A. The relation between earnings management using real activities manipulation and future performance: Evidence from meeting earnings benchmarks. *Contemp. Account. Res.* **2010**, *27*, 855–888. [[CrossRef](#)]
17. Pirinsky, C.; Wang, Q. Does corporate headquarters location matter for stock returns? *J. Financ.* **2006**, *61*, 1991–2015. [[CrossRef](#)]
18. Koh, P.S.; Reeb, D.M. Missing R&D. *J. Account. Econ.* **2015**, *60*, 73–94.
19. Anderson, R.C.; Reeb, D.M.; Upadhyay, A.; Zhao, W. The economics of director heterogeneity. *Financ. Manag.* **2011**, *40*, 5–38. [[CrossRef](#)]
20. Carter, D.A.; Simkins, B.J.; Simpson, W.G. Corporate governance, board diversity, and firm value. *Financ. Rev.* **2003**, *38*, 33–53. [[CrossRef](#)]
21. Adams, R.B.; Ferreira, D. Women in the boardroom and their impact on governance and performance. *J. Financ. Econ.* **2009**, *94*, 291–309. [[CrossRef](#)]
22. Hernández-Lara, A.B.; Gonzales-Bustos, J.P.; Alarcón-Alarcón, A. Social sustainability on corporate boards: The effects of female family members on r&d. *Sustainability* **2021**, *13*, 1982.
23. Wang, Y.H. Does board gender diversity bring better financial and governance performances? An empirical investigation of cases in Taiwan. *Sustainability* **2020**, *12*, 3205. [[CrossRef](#)]
24. Ahern, K.R.; Dittmar, A.K. The changing of the boards: The impact on firm valuation of mandated female board representation. *Q. J. Econ.* **2012**, *127*, 137–197. [[CrossRef](#)]
25. Bernile, G.; Bhagwat, V.; Yonker, S. Board diversity, firm risk, and corporate policies. *J. Financ. Econ.* **2018**, *127*, 588–612. [[CrossRef](#)]
26. Coles, J.L.; Daniel, N.D.; Naveen, L. Director overlap: Groupthink Versus Team-Work. 2020. Unpublished Working Paper. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3650609 (accessed on 26 May 2021).
27. Siciliano, J.I. The relationship of board member diversity to organizational performance. *J. Bus. Ethics* **1996**, *15*, 1313–1320. [[CrossRef](#)]
28. Hagendorff, J.; Keasey, K. The value of board diversity in banking: Evidence from the market for corporate control. *Eur. J. Financ.* **2012**, *18*, 41–58. [[CrossRef](#)]
29. Wang, C.; Xie, F.; Zhu, M. Industry expertise of independent directors and board monitoring. *J. Financ. Quant. Anal.* **2015**, *50*, 929–962. [[CrossRef](#)]
30. Faleye, O.; Hoitash, R.; Hoitash, U. Industry expertise on corporate boards. *Rev. Quant. Financ. Account.* **2018**, *50*, 441–479. [[CrossRef](#)]
31. Meyerinck, F.; Oesch, D.; Schmid, M.M. Is director industry experience valuable? *Financ. Manag.* **2015**, *45*, 207–237. [[CrossRef](#)]
32. Masulis, R.W.; Ruzzier, C.; Xiao, S.; Zhao, S. Do Independent Expert Directors Matter. Unpublished Working Paper. Available online: https://mpra.ub.uni-muenchen.de/68200/1/MPRA_paper_68200.pdf (accessed on 26 May 2021).
33. Fahlenbrach, R.; Minton, B.A.; Pan, C.H. Former ceo directors: Lingering ceos or valuable resources? *Rev. Financ. Stud.* **2011**, *24*, 3486–3518. [[CrossRef](#)]
34. Sislí-Ciamarra, E. Monitoring by affiliated bankers on board of directors: Evidence from corporate financing outcomes. *Financ. Manag.* **2012**, *41*, 665–702. [[CrossRef](#)]
35. Güner, A.B.; Malmendier, U.; Tate, G. Financial expertise of directors. *J. Financ. Econ.* **2008**, *88*, 323–354. [[CrossRef](#)]
36. Huang, Q.; Jiang, F.; Lie, E.; Yang, K. The role of investment banker directors in m&a. *J. Financ. Econ.* **2014**, *112*, 269–286.
37. Litov, L.P.; Sepe, S.M.; Whitehead, C.K. Lawyers and fools: Lawyer-directors in public corporations. *Georget. Law J.* **2014**, *102*, 413. [[CrossRef](#)]
38. White, J.T.; Woitdtke, T.; Black, H.A.; Schweitzer, R.L. Appointments of academic directors. *J. Corp. Financ.* **2014**, *28*, 135–151. [[CrossRef](#)]
39. Francis, B.; Hasan, I.; Wu, Q. Professors in the boardroom and their impact on corporate governance and firm performance. *Financ. Manag.* **2015**, *44*, 547–581. [[CrossRef](#)]
40. Adams, R.B.; Akyol, A.C.; Verwijmeren, P. Director skill sets. *J. Financ. Econ.* **2018**, *130*, 641–662. [[CrossRef](#)]
41. Giannetti, M.; Zhao, M. Board Ancestral Diversity and Firm-Performance Volatility. *J. Financ. Quant. Anal.* **2019**, *54*, 1117–1155. [[CrossRef](#)]
42. Masulis, R.W.; Wang, C.; Xie, F.; Zhang, S. Directors: Older and Wiser, or Too old to Govern? Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3284874 (accessed on 26 May 2021).
43. Fang, B.; Hope, O.K. Analyst Teams. *Rev. Account. Stud.* **2021**, *26*, 425–467. [[CrossRef](#)]
44. Evans, R.B.; Prado MP Rizzo, A.E.; Zambrana, R. Identity, Diversity, and Team Performance: Evidence from U.S. Mutual Funds. 2021. Unpublished Working Paper. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3505619 (accessed on 26 May 2021).

45. Abbott, L.J.; Parker, S.; Presley, T.J. Female board presence and the likelihood of financial restatement. *Account. Horiz.* **2012**, *26*, 607–629. [[CrossRef](#)]
46. Hermalin, B.E.; Weisbach, M.S. The effects of board composition and direct incentives on firm performance. *Financ. Manag.* **1991**, *20*, 101–112. [[CrossRef](#)]
47. McConnell, J.J.; Servaes, H. Additional evidence on equity ownership and corporate value. *J. Financ. Econ.* **1990**, *27*, 595–612. [[CrossRef](#)]
48. Coles, J.L.; Daniel, N.D.; Naveen, L. Boards: Does one size fit all? *J. Financ. Econ.* **2008**, *87*, 329–356. [[CrossRef](#)]
49. Bebchuk, L.A.; Cohen, A. The costs of entrenched boards. *J. Financ. Econ.* **2005**, *78*, 409–433. [[CrossRef](#)]
50. Devos, E.; Prevost, A.; Puthenpurackal, J. Are interlocked directors effective monitors? *Financ. Manag.* **2009**, *38*, 861–887. [[CrossRef](#)]
51. Dechow, P.M.; Sloan, R.G.; Sweeney, A.P. Detecting earnings management. *Account. Rev.* **1995**, *70*, 193–225.
52. Core, J.; Guay, W. Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. *J. Account. Res.* **2002**, *40*, 613–630. [[CrossRef](#)]
53. Masulis, R.W.; Wang, C.; Xie, F. Globalizing the boardroom—the effects of foreign directors on corporate governance and firm performance. *J. Account. Econ.* **2012**, *53*, 527–554. [[CrossRef](#)]
54. Giroud, X.; Mueller, H.M. Does corporate governance matter in competitive industries? *J. Financ. Econ.* **2010**, *95*, 312–331. [[CrossRef](#)]
55. Petersen, M.A. Estimating standard errors in finance panel data sets: Comparing approaches. *Rev. Financ. Stud.* **2009**, *22*, 435–480. [[CrossRef](#)]
56. White, H. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity. *Econometrica* **1980**, *48*, 817–838. [[CrossRef](#)]
57. Zellner, A. An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. *J. Am. Stat. Assoc.* **1962**, *57*, 348–368. [[CrossRef](#)]
58. Ittner, C.D.; Lambert, R.A.; Larcker, D.F. The structure and performance consequences of equity grants to employees of new economy firms. *J. Account. Econ.* **2003**, *34*, 89–127. [[CrossRef](#)]
59. Sah, R.K.; Stiglitz, J.E. The quality of managers in centralized versus decentralized organizations. *Q. J. Econ.* **1991**, *106*, 289–295. [[CrossRef](#)]
60. Roychowdhury, S. Earnings management through real activities manipulation. *J. Account. Econ.* **2006**, *42*, 335–370. [[CrossRef](#)]
61. Custódio, C.; Metzger, D. How do ceos matter? The effect of industry expertise on acquisition returns. *Rev. Financ. Stud.* **2013**, *26*, 2008–2047. [[CrossRef](#)]
62. Adams, R.B.; Hermalin, B.E.; Weisbach, M.S. The role of boards of directors in corporate governance: A conceptual framework and survey. *J. Econ. Lit.* **2010**, *48*, 58–107. [[CrossRef](#)]
63. Davis, J.C.; Henderson, J.V. The agglomeration of headquarters. *Reg. Sci. Urban Econ.* **2008**, *38*, 445–460. [[CrossRef](#)]