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Board structure and role of outside directors in private firms

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Abstract

We examine the board composition and the role of outside directors in US private firms. We find that compared with public firms, private firms have a higher proportion of outside directors on the boards and select their outside directors in a more responsive way to their advisory and monitoring needs. We also find that private firms' CEO turnover–performance sensitivity, earnings quality, going-public likelihood, and IPO value increase with the proportion of outside directors. These results are consistent with the view that lack of external governance in private firms leads to a greater demand for board monitoring for private firms.

KEYWORDS
advisory role, earnings quality, external governance, information environment, monitoring role, outside director, private firms, public firms

JEL CLASSIFICATION
G32, G34, L22

1 | INTRODUCTION

While examining the effect of board composition on firm value and the role of outside directors has been the central theme in the literature on boards of directors (e.g., Adams & Ferreira, 2007;

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Fama & Jensen, 1983; Hermalin & Weisbach, 2003; Knyazeva, Knyazeva, & Masulis, 2013), the evidence on these issues is extremely thin for private firms relative to public firms. This lack of evidence on private firms makes it difficult to fully understand how corporate boards in the United States are structured and function, given that private firms account for over 60% of US production and comprise over 70% of US firms with more than 500 employees (Farre-Mensa, 2014).

In this paper we attempt to fill this gap by analyzing how the board composition (i.e., proportion of outside directors on the board) of private firms is different from that of public firms and whether outside directors in private firms perform a value-enhancing role in monitoring and advising the managers. Given the unique contracting environments of private firms compared with public firms (e.g., poor stock liquidity, high information opacity, little stock market regulation, etc.), our analysis is expected to shed new light on how firms design their optimal board structure in response to their different environment and governance systems.

Theories on board compositions have two competing predictions on private firms' board structure as opposed to public firms, which also has an important implication for the role of outside directors in private firms. On the one hand, Fama (1980) and Fama and Jensen (1983) argue that board structure is determined by the effectiveness of external governance mechanisms (e.g., hostile takeovers and stock market monitoring). Thus, firms facing weaker external governance need to have more outside directors on the boards to take greater responsibility in monitoring managerial discretion. The influence of external governance is arguably weaker in private firms than in public firms because private firms in which their shares are not publicly traded face little threat of hostile takeover or stock market monitoring. This argument predicts that private firms have more outside directors on their boards than public firms ('external governance' hypothesis) and outside directors in private firms play an important role in enhancing firm performance.

On the other hand, Adams and Ferreira (2007), Raheja (2005), and Maug (1998) argue that it is not optimal for firms with high information asymmetry to invite monitoring from outside directors because of high costs associated with transferring firm-specific information to outsiders. Previous studies show that, compared with public firms, private firms face a lower level of accounting information scrutiny by regulatory agencies and capital market participants and they are also less likely to be covered by news media and analysts, suggesting that private firms face greater information asymmetry and enjoy considerable latitude in setting accounting policy (Ball & Shivakumar, 2005; Burgstahler, Hail, & Leuz, 2006; De Franco, Gavious, Jin, & Richardson, 2011). Thus, this argument suggests that outside directors in private firms incur higher costs in collecting firm-specific information and performing their roles as monitors and advisors than those in public firms, predicting that private firms have fewer outside directors on the boards than public firms. The lack of information and high costs associated with collecting firm-specific soft information also suggest that outside directors in private firms are not active in performing value-enhancing roles. Moreover, due to the separation between ownership and control, public firms could be subject to more serious agency problems and thus demand a higher level of governance than private firms. This would also predict a larger proportion of outside directors in public firms than private firms ('information environment and ownership separation' hypothesis).

Using a large sample of 7,563 private and 23,790 public firm-year observations (4,099 matching private and public firm pairs) from 1999 to 2008, we find that consistent with the external governance hypothesis, private firms have a higher proportion of outside directors on their board than public firms. This finding is robust to controlling for various firm and CEO characteristics, including ownership structure and other internal governance mechanisms, and holds for the subsample of nonfamily firms.

To address the potential endogeneity of firms being publicly listed, we conduct several additional tests. First, to take into account the possibility that some unobservable firm characteristics drive our results, we examine within-firm variation in listing status. Using a sample of more than 300 IPO firms,

we find that after being listed on stock exchanges, firms significantly decrease the proportion of outside directors on the boards. Second, we apply a two-stage least squares (2SLS) regression approach using industry IPO volume as an instrumental variable. We find that the differences in the proportion of outside directors between public and private firms remain statistically and economically significant. Third, we use a propensity score matching approach to control for observable firm and CEO characteristics that may affect both a firm's listing status and board structure decisions. Our result does not change.

Next, to examine whether a higher proportion of outside directors in private firms than in public firms is related to their greater responsibility in advising and monitoring managers, we perform several tests. First, we examine the association between a firm's advisory and monitoring needs and the proportion of outside directors on the board and find that this association is stronger in private firms than in public firms. Second, we examine CEO turnover–performance sensitivity and earnings quality in private firms, going-public likelihood, and IPO valuation, and find that they increase with the proportion of outside directors on the board. These results suggest that outside directors in private firms perform important value-enhancing functions for shareholders, supporting the external governance hypothesis. Finally, we compare the personal backgrounds of outside directors between public and private firms. We find that outside directors in private firms are more likely to have MBA and elite school degrees than those in public firms. They also have greater financial expertise in banking and venture capital businesses. To the extent that directors' educational qualification is an important element of effective boards (Carpenter & Westphal, 2001) and their accounting and financial expertise helps them perform effective monitoring and advisory functions (Cohen, Krishnamoorthy, & Wright, 2010), these results suggest that directors' better qualification and greater financial expertise in private firms could be one potential source of private firms' better board functioning.

Our study contributes to the literature on boards of directors by examining how board composition in private firms is different from that in public firms. We find that private firms have a higher proportion of outside directors on the board than public firms, suggesting that lack of external governance in private firms, such as hostile takeovers and stock market monitoring, leads to a greater demand for board monitoring for private firms. We also examine whether outside directors in private firms perform important value-enhancing functions and show that they take greater responsibility in monitoring and advising managers than those in public firms. These findings suggest that firms set the optimal board structure on the basis of their governance-specific environment, and help improve our understanding of how corporate boards (in both private and public firms) in the United States are structured and function.

The paper is organized as follows. In section 2 we review the literature and develop our main empirical predictions. In section 3 we describe the data and sample characteristics. Section 4 presents results from the tests of our main hypotheses. In section 5 we present results from controlling for endogeneity bias of being publicly listed. In section 6 we examine the monitoring and advisory roles performed by outside directors in private firms, using CEO turnovers and IPOs as the events for our experiments. Finally, we present summary and concluding remarks in section 7.

2 | LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Fama and Jensen (1983) argue that the unrestricted alienability of public firms' shares makes public firms subject to external discipline, such as stock market monitoring and the threat of hostile takeover. For example, the stock market that specializes in pricing can exert influence on management to maximize shareholder wealth by making the stock prices a visible signal that summarizes the

implications of managerial decisions for current and future profitability. The takeover market can also serve as an important external monitoring mechanism because the competition for corporate control, such as proxy fights, direct purchase of shares, and the threat of hostile takeovers, can impose discipline on managers by reducing their discretionary power and the shareholder–manager conflicts.

To the extent that active monitoring by the stock market and the threat of hostile takeover reduce the managerial agency conflicts in public firms, these governance forces are likely to reduce public firms' needs for strong board oversight of the management. Consistent with this view, Ferreira, Ferreira, and Raposo (2011) show a negative association between stock price informativeness and board independence. They argue that the information revealed by stock prices allows external monitoring mechanisms to operate more efficiently. For example, when the stock price is informative, the price of a firm engaged in value-decreasing investments is more likely to fall, reflecting its true value and thus increasing the likelihood of the firm being a potential takeover target. Anticipating this price fall, managers who value control would avoid investing in value-destroying projects in the first place, which in turn reduces the demand for the monitoring from an independent board. These arguments suggest that public firm boards should be optimally composed of fewer outside directors than private firm boards.

In contrast, private firms face little monitoring from the stock market, are not subject to the threat of hostile takeover, and do not have informative stock prices, because their stocks are not publicly traded. Moreover, compared with public firm managers, private firm managers are less likely to be monitored by stock market regulators (e.g., Securities Exchange Commission (SEC)), further subjecting these managers to less external discipline. Thus, if board structure is determined by the effectiveness of external governance mechanisms (Fama, 1980; Fama & Jensen, 1983), private firms that face weak external governance should optimally demand for more independent boards than public firms do. These arguments lead to our first hypothesis:

External governance hypothesis Ceteris paribus, *private firms have a higher proportion of outside directors on their boards than public firms.*

To the extent that independent boards in private firms take greater responsibility in monitoring managerial discretion to overcome their weak external governance, the external governance hypothesis also implies that outside directors in private firms play an important monitoring and advisory role in enhancing firm performance.

However, the optimal board composition of insiders vs. outsiders can also depend on a firm's information environment. Outside directors are less informed about the firm's operation than inside directors and thus face higher costs of acquiring and processing information. Adams and Ferreira (2007) and Raheja (2005) model the trade-off between the costs and benefits of having outside directors. They argue that while an outsider-dominated board can reduce managerial agency problems through better monitoring, it also reduces the insiders' incentives to share information, which in turn prevents the board from making high-quality decisions. Their models suggest that the optimal board should be composed of fewer outside directors when there is greater information asymmetry between insiders and outsiders.

Compared with public firms, private firms are less likely to be required to disclose information. They are also less likely to be covered by financial media and analysts, making private firms less transparent than public firms (Ball & Shivakumar, 2005; Burgstahler et al., 2006; De Franco et al., 2011).

Moreover, another important difference between public and private firms is ownership separation. One of the costs of going public is the further separation between ownership and control, that is, the

deterioration of agency conflicts (Jensen & Meckling, 1976). All else being equal, public firms could be subject to more serious agency problems and thus demand a higher level of governance than private firms. This would also predict a larger proportion of outside directors in public firms than private firms. In summary, the difference in information environments and ownership separation between public and private firms leads to our second hypothesis:

> **Information environment and ownership separation hypothesis** Ceteris paribus, *private firms have a lower proportion of outside directors on their boards than public firms.*

Lack of information and high costs associated with collecting firm-specific soft information by private firms' outside directors also suggest that private firm boards are not active in performing value-enhancing roles, even though they consist of a high proportion of outside directors.

It is worth noting that board independence is also influenced by other factors which could be different across public and private firms, including firm complexity, CEO incentive, ownership structure, and other internal governance mechanisms (Boone, Field, Karpoff, & Raheja, 2007; Linck, Netter, & Yang, 2008). In the regression analysis, we control for a long list of these variables, so our empirical analysis is expected to clearly identify the relative importance of external governance and information environment in shaping corporate boards.

3 | SAMPLE AND SUMMARY STATISTICS

3.1 | Sample

Our primary data source for private and public firms is the Capital IQ (CIQ) database. CIQ is an affiliate of Standard & Poor's (S&P), and since the late 1990s has provided financial and director data on private US firms that file their financial statements to the SEC. Private firms are required to file their financial statements to the SEC if: (1) they have outstanding public debt; or (2) the value of their total assets is greater than $10 million and the number of their shareholders is more than 500. Thus, our sample consists of larger and more economically important private firms than the private firms used in previous studies, making the comparison of board composition between private and public firms more meaningful. However, our sample private firms still differ from typical public firms in that their stocks are not publicly traded and they are less likely to be covered by financial media outlets and analysts. The coverage of CIQ for private firms is comparable to the coverage of Compustat and ExecuComp for public firms.[1]

We start with all private and public US firms with non-missing values for total assets in CIQ, from 1999 to 2008. We require that public firms be traded on the NYSE, AMEX, or NASDAQ. We also require that both private and public firms have financial data as well as data on CEO and board characteristics. Private firms in our sample are those that are not listed on any stock exchange. Thus, firms that have shares traded in the over-the-counter market are excluded from the sample. CIQ classifies a firm as either public or private according to its most recent listing status. For example, Synnex Corp. (NYSE:SNX), a California-based IT supply chain services company, is classified as a

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[1]Since the late 1990s, CIQ provides data on accounting and director information for both private and public US firms, with a similar level of detail as provided by Compustat and ExecuComp for public firms. Unique to CIQ, for all firms covered in CIQ, it provides links to the company filings, so that users can easily check the original source data. Gao and Li (2015) and Gao, Harford, and Li (2013, 2017) also use CIQ for their studies of CEO compensation, cash policies, and CEO turnover of private firms, respectively.

public firm throughout its history in CIQ, even though it became public only in 2003. We search all the key dates for each firm in CIQ's IPO and delisting databases to help classify a firm's private (or public) status by backfilling. Returning to the Synnex example, given that its IPO was in November 2003, we classify Synnex as a private firm from 1999 to 2002 and then as a public firm from 2003 onward. To clearly capture any differences in board structure between public and private firms, in most of our analyses we omit the transitioning firm-year observation when a firm changes from being a private firm to a public firm or vice versa.

Our final sample consists of 7,563 private firm-year observations (2,712 unique private firms) and 23,790 public firm-year observations (3,991 unique public firms). A vast majority of the private firm-year observations in our sample (88.4%) come from Form 10-K and annual reports filed with the SEC; the remaining (11.6%) come from Form S-1 (and its supplemental Form 424B – less than 3% of the total sample) filed with the SEC due to public debt issuances or IPOs.

CEO ownership data on private firms are manually collected from the firms' annual reports and proxy statements. For public firms, we obtain CEO ownership data from ExecuComp, Corporate Library, and IRRC. When CEO ownership is not available in these sources, we obtain it by searching each firm's annual report and proxy statement. CEO ownership is measured as the firm's shares owned by the CEO normalized by the total number of shares outstanding.

Our private sample firms have a total of 30,828 directors on their boards. For about 57% (17,418 directors) of these directors, CIQ records the beginning and ending years of their directorship in the firms, which allows us to exactly estimate the length of time they served in each firm. For the remaining 43% of directors, we search firms' annual reports and proxy statements to determine the exact years in which they acted as directors. For public firms, we collect director information from BoardEx and IRRC. Following Coles, Daniel, and Naveen (2008) and Linck et al. (2008), we classify directors who are executives in the firm as inside directors, and directors who do not have any executive role in the firm as outside directors. Appendix A shows the composition of the directors on KMG America Corporation's board, one of our sample private firm boards, as of 2006, and their major affiliation prior to appointments to the board.

Table 1, Panel A presents the distribution and the proportion of outside directors of our sample of private and public firms by year. Prior to the passage of the Sarbanes–Oxley Act (SOX) in 2002, the proportion of outside directors on the board was significantly higher in private firms than in public firms (0.77 compared with 0.67). However, after 2002, there has been a clear, increasing trend in the proportion of outside directors in public firms, but the trend is reversed for private firms. These results suggest that, in order to meet the SOX requirement – which states that the majority of a public firm's board of directors must be independent – some public firms may have to compete with private firms in hiring outside directors, which results in the increasing (decreasing) trend in the fraction of outside directors in public (private) firms. For the full sample period, the average proportion of outside directors is significantly smaller in private firms than in public firms (p-value = 0.00).

Table 1, Panel B presents the distribution of our sample of private and public firms by industry (Fama and French (1997) 48 industries). Our sample firms have broad industry representation covering all 48 industries, with business services (11.46%), banking (11.28%), and utilities (6.1%) having the highest representation among private firms, while banking (11.54%), business services (11.17%), and electronic equipment (7.07%) have the highest representation among public firms.[2]

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[2]In untabulated tests, we re-estimate key regressions in the paper after excluding firms in either the financial services or utilities industries and obtain qualitatively similar results.

TABLE 1 Sample distribution by year and industry

This table reports the distribution of sample firms by year and by industry. The sample consists of 7,563 private firm-year observations and 23,790 public firm-year observations during the 1999–2008 period, obtained from the Capital IQ database. The proportion of outside directors is the number of directors without an executive role in the firm divided by total number of directors on the board. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Distribution of sample firms by year						
	Sample size		**Mean (median) proportion of outside directors**			
					Test of difference (1) − (2): *p*-value	
Year	**Private firms**	**Public firms**	**Private firms (1)**	**Public firms (2)**	***t*-test**	**Wilcoxon Z-test**
1999	615	991	0.75	0.69	0.00***	0.00***
			(0.83)	(0.78)		
2000	741	1,489	0.78	0.71	0.00***	0.00***
			(0.83)	(0.78)		
2001	832	1,603	0.78	0.76	0.00***	0.00***
			(0.86)	(0.80)		
2002	843	1,701	0.77	0.77	0.52	0.00***
			(0.83)	(0.81)		
2003	906	2,939	0.77	0.79	0.09*	0.00***
			(0.83)	(0.82)		
2004	859	3,125	0.77	0.80	0.00***	0.36
			(0.86)	(0.83)		
2005	746	3,420	0.75	0.81	0.00***	0.15
			(0.83)	(0.83)		
2006	738	3,134	0.74	0.81	0.00***	0.00***
			(0.83)	(0.85)		
2007	644	3,229	0.72	0.82	0.00***	0.01***
			(0.82)	(0.86)		
2008	639	2,159	0.69	0.80	0.00***	0.00***
			(0.80)	(0.83)		
Pre-SOX (1999–2001)	2,188	4,083	0.77	0.67	0.00***	0.00***
			(0.83)	(0.73)		
Post-SOX (2002–2008)	5,375	19,707	0.75	0.80	0.00***	0.00***
			(0.83)	(0.83)		
Total	7,563	23,790	0.75	0.78	0.00***	0.00***
			(0.83)	(0.83)		

Panel B: Distribution of sample firms by industry					
	Private firms		**Public firms**		
Fama–French (1997) 48 industries	**Sample size**	**%**	**Sample size**	**%**	**Total**
1. Agriculture	66	0.87	41	0.17	107
2. Food Products	161	2.13	301	1.27	462

(Continues)

TABLE 1 (Continued)

Panel B: Distribution of sample firms by industry					
	Private firms		**Public firms**		
Fama–French (1997) 48 industries	**Sample size**	**%**	**Sample size**	**%**	**Total**
3. Candy & Soda	21	0.28	92	0.39	113
4. Beer & Liquor	15	0.20	55	0.23	70
5. Tobacco Products	14	0.19	37	0.16	51
6. Recreation	60	0.79	129	0.54	189
7. Entertainment	205	2.71	195	0.82	400
8. Printing and Publishing	153	2.02	236	0.99	389
9. Consumer Goods	132	1.75	370	1.56	502
10. Apparel	50	0.66	308	1.29	358
11. Healthcare	147	1.94	419	1.76	566
12. Medical Equipment	175	2.31	786	3.30	961
13. Pharmaceutical Products	246	3.25	1,397	5.87	1,643
14. Chemicals	197	2.60	430	1.81	627
15. Rubber and Plastic Products	104	1.38	124	0.52	228
16. Textiles	56	0.74	68	0.29	124
17. Construction Materials	116	1.53	319	1.34	435
18. Construction	68	0.90	278	1.17	346
19. Steel Works etc.	53	0.70	332	1.40	385
20. Fabricated Products	27	0.36	48	0.20	75
21. Machinery	157	2.08	748	3.14	905
22. Electrical Equipment	79	1.04	357	1.50	436
23. Automobiles and Trucks	73	0.97	264	1.11	337
24. Aircraft	25	0.33	89	0.37	114
25. Shipbuilding, Railroad Equipment	4	0.05	46	0.19	50
26. Defense	11	0.15	48	0.20	59
27. Precious Metals	20	0.26	63	0.26	83
28. Non-metallic and Industrial Metal Mining	50	0.66	88	0.37	138
29. Coal	30	0.40	62	0.26	92
30. Petroleum and Natural Gas	156	2.06	868	3.65	1,024
31. Utilities	461	6.10	849	3.57	1,310
32. Communication	266	3.52	651	2.74	917
33. Personal Services	77	1.02	257	1.08	334
34. Business Services	867	11.46	2,658	11.17	3,525
35. Computers	195	2.58	851	3.58	1,046
36. Electronic Equipment	157	2.08	1,681	7.07	1,838
37. Measuring and Control Equipment	66	0.87	520	2.19	586
38. Business Supplies	96	1.27	226	0.95	322
39. Shipping Containers	16	0.21	61	0.26	77
40. Transportation	119	1.57	602	2.53	721
41. Wholesale	344	4.55	789	3.32	1,133
42. Retail	303	4.01	1,243	5.22	1,546
43. Restaurants, Hotels, Motels	284	3.76	450	1.89	734
44. Banking	853	11.28	2,745	11.54	3,598

(Continues)

TABLE 1 (Continued)

Panel B: Distribution of sample firms by industry

	Private firms		Public firms		
Fama–French (1997) 48 industries	Sample size	%	Sample size	%	Total
45. Insurance	210	2.78	869	3.65	1,079
46. Real Estate	160	2.12	83	0.35	243
47. Trading	292	3.86	489	2.06	781
48. Other	126	1.67	168	0.71	294
Total	7,563	100	23,790	100	31,353

3.2 | Summary statistics

In the first six columns of Table 2, we compare board-, firm-, and CEO-specific characteristics for the full sample of private firms with those for the full sample of public firms. We winsorize all continuous variables at the 1st and 99th percentiles and convert all dollar values to 2008 dollars. Detailed definitions of the variables used in Table 2 are presented in appendix B.

Not surprisingly, we find that private firms have a significantly smaller board size than public firms (6.69 compared with 8.81), possibly because public firms have to form various board committees consisting of a minimum number of outside directors required by the laws such as audit and compensation committees.

Turning to firm characteristics, we find that private firms are smaller and younger than public firms. In addition, private firms have poorer operating performance, higher leverage, higher R&D intensity, lower frequency of dividend payout, and fewer business segments.

We also find that compared with CEOs of public firms, those of private firms are more likely to be a founder of the firm, are younger, and are less likely to hold an MBA degree. They also have higher equity ownership (mean equity ownership of 14.84% in private firms compared with mean equity ownership of 4.76% in public firms).

The last six columns of Table 2 compare board-, firm-, and CEO-specific characteristics for matching samples of private and public firms, where the matching is conducted based on industry, size, and year. Specifically, for each private firm in our sample, we select a matching public firm in the same year that is in the same Fama and French (1997) 48 industry and closest in sales. To ensure that the matching public firm is truly comparable in size to its private peer, we require that the public firm's sales be within [90%, 110%] of the private firm's sales. We drop a private firm from the matching sample if it is too small (i.e., the private firm's sales are less than 90% of the sales of all public firms in the same industry), in which case no matching public firm is available. These procedures result in a final sample of 4,099 matched pairs of private and public firms.

As expected, the mean sales for private and public matching firms are almost identical at $1,205 million and $1,207 million, respectively. We also observe that the differences in other firm characteristics between private and public firms are much smaller based on the matching samples than on the full samples, albeit the differences in several variables are still statistically significant. Most importantly, supporting the external governance hypothesis, we find that the mean and median proportions of outside directors on the boards become significantly higher for private matching firms than for public matching firms.

To better understand the director nomination process in private firms, we check the proxy statements in our sample private firms and list two examples in appendix C. Based on these examples,

TABLE 2 Descriptive statistics

This table reports the descriptive statistics of the full sample and matching sample firms. The full sample consists of 7,563 private firm-year observations and 23,790 public firm-year observations during the 1999–2008 period, obtained from the Capital IQ database. The subsample of matching firms consists of 4,099 private and 4,099 public firm-year observations, where the matching is conducted based on industry, size, and year. Specifically, for each private firm in our sample, we select a matching public firm in the same year that is in the same Fama and French (1997) 48 industry and closest in sales. To ensure that the matching public firm is truly comparable in size to its private peer, we require that the public firm's sales be within [90%, 110%] of the private firm's sales. We drop private firms from the matching subsample that are too small (i.e., the private firm's sales are smaller than 90% of the sales of all public firms in the same industry), in which case there is no matching public firm available. Definitions of all variables are provided in appendix B. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Full sample of public and private firms | | | | | | Subsample of matching public and private firms | | | | | |
| | Private firms (1) | | Public firms (2) | | Test of difference (1) − (2): p-value | | Private firms (3) | | Public firms (4) | | Test of difference (3) − (4): p-value | |
	Mean	Median	Mean	Median	t-test	Wilcoxon Z-test	Mean	Median	Mean	Median	t-test	Wilcoxon Z-test
Proportion of outside directors	0.75	0.83	0.78	0.83	0.00***	0.00***	0.80	0.86	0.77	0.83	0.00***	0.00***
Board size	6.69	6	8.81	8	0.00***	0.00***	7.44	7	8.63	8	0.00***	0.00***
Sales (millions of dollars)	871	123	2,732	482	0.00***	0.00***	1,205	374	1,207	374	0.98	0.90
ROA	−7.10%	1.16%	2.86%	4.04%	0.00***	0.00***	1.82%	3.10%	2.53%	3.74%	0.00***	0.00***
Industry-adjusted ROA	−10.3%	−1.12%	−0.2%	0.25%	0.00***	0.00***	−1.50%	−0.30%	−0.80%	0.00%	0.00***	0.00***
Sales growth	24.18%	4.82%	17.76%	9.55%	0.00***	0.00***	21.40%	7.75%	18.35%	8.72%	0.01***	0.24
Leverage	40.85%	33.65%	18.31%	14.58%	0.00***	0.00***	40.62%	36.55%	20.27%	15.97%	0.00***	0.00***
Capex	4.17%	2.10%	4.14%	2.51%	0.77	0.00***	3.83%	2.40%	4.26%	2.57%	0.00***	0.00***
R&D	17.73%	0	10.04%	0	0.14	0.00***	12.99%	0	2.64%	0	0.04**	0.00***
Dividend (indicator)	0.17	0	0.45	0	0.00***	0.00***	0.21	0	0.45	0	0.00***	0.00***
Number of segments	1.50	1	2.15	2	0.00***	0.00***	1.67	1	2.11	2	0.00***	0.00***
Firm age (years)	29.39	14	46.12	29	0.00***	0.00***	37.39	20	44.49	27	0.00***	0.00***
Public bond (indicator)	0.222	0	0.322	0	0.00***	0.00***	0.314	0	0.281	0	0.00***	0.00***

(Continues)

TABLE 2 (Continued)

| | Full sample of public and private firms | | | | | | Subsample of matching public and private firms | | | | | |
| | Private firms (1) | | Public firms (2) | | Test of difference (1) − (2): p-value | | Private firms (3) | | Public firms (4) | | Test of difference (3) − (4): p-value | |
	Mean	Median	Mean	Median	t-test	Wilcoxon Z-test	Mean	Median	Mean	Median	t-test	Wilcoxon Z-test
CEO founder (indicator)	0.30	0	0.24	0	0.00***	0.00***	0.30	0	0.25	0	0.00***	0.00***
CEO ownership	14.84%	3.40%	4.76%	1.00%	0.00***	0.00***	11.36%	2.00%	5.53%	1.30%	0.00***	0.02**
CEO age (years)	51.73	52	53.93	54	0.00***	0.00***	52.55	53	53.77	54	0.00***	0.00***
MBA (indicator)	0.15	0	0.19	0	0.00***	0.00***	0.17	0	0.17	0	0.86	0.80

the nomination procedure in private firms seems more flexible than that in public firms. This is not surprising, considering that private firms are usually smaller and face less regulation.[3]

4 | COMPARISON OF BOARD STRUCTURES BETWEEN PRIVATE AND PUBLIC FIRMS

To better understand differences in the cross-sectional variation in board structures between private and public firms, this section presents estimates from multivariate regressions.

4.1 | Baseline model

We begin our analysis by examining differences in the proportion of outside directors on the board between private and public firms. We estimate the following ordinary least squares (OLS) regression:

$$
\begin{aligned}
Proportion\ of\ outside\ directors = \alpha &+ \beta_1 Public + \beta_2 \ln(Board\ Size) + \beta_3 FirmSize \\
&+ \beta_4 Leverage + \beta_5 Number\ of\ Segments + \beta_6 R\&D \\
&+ \beta_7 Other\ Firm\ Characteristics + \beta_8 CEO\ Characteristics \\
&+ Industry\ FE + Year\ FE + \varepsilon.
\end{aligned} \tag{1}
$$

Table 3, Panel A reports the results. Our key independent variable of interest is *Public*, which is an indicator that takes the value of one if the firm is publicly traded in a given year and zero otherwise. Following Boone et al. (2007) and Coles et al. (2008), to control for firm complexity, firm-specific knowledge, and the monitoring needs of the firm, we include *Firm Size* (natural logarithm of sales), *Leverage* (ratio of total debt to total assets), *Number of Segments* (number of segments in the firm), and *R&D* (ratio of R&D expenditures to total assets).[4] The regression also includes the natural logarithm of board size and other firm and CEO characteristics used in Table 2 as additional control variables. Finally, we include industry fixed effects to control for unobservable industry-specific heterogeneity and year fixed effects to account for time trends. The coefficient estimate on *Public*, thus, measures the difference in the proportion of outside directors between public and private firms that cannot be explained by differences in firm and CEO characteristics, and industry and year effects.

Column (1) presents the results using the full samples of private and public firms over the entire sample period 1999–2008. The coefficient estimate on *Public* is negative and significant at the 1% level. The coefficient estimate of −0.072 on *Public* suggests that private firms have a 7.2% higher proportion of outside directors than pubic firms.

SOX requires that all US public firms have a majority of outside directors on the board, which significantly affects the firm's decision of appointing outside directors. To examine how this requirement has an effect on board structures of public and private firms, we divide our sample into two

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[3]A CEO is assumed to be involved in the nominating process if: (1) the board has a nominating committee and the committee includes the CEO; or (2) if the board does not have a nominating committee (Shivdasani & Yermack, 1999). Using a sample of 341 public firms from 1994 to 1996, Shivdasani and Yermack (1999) documented that 53% of the public firm CEOs in their sample are considered to be involved in the nominating process. Following the same empirical method, we employ a random sample of 300 private firms and find 44.8% of the private firms have a nominating committee and 55.2% of the private firms do not have one. This number is comparable to the one in public firms in Shivdasani and Yermack (1999).

[4]In untabulated tests we use as a measure of firm size the book value of total assets instead of sales and find almost identical results as those reported in Table 3.

TABLE 3 Differences in board structure (proportion of outside directors) between public and private firms

This table reports the results regarding the differences in proportion of outside directors between public and private firms. The full sample consists of 7,563 private and 23,790 public firm-year observations during the 1999–2008 period, obtained from the Capital IQ database. The subsample of matching firms consists of 4,099 private and 4,099 public firm-year observations, where the matching is conducted based on industry, size, and year. Specifically, for each private firm in our sample, we select a matching public firm in the same year that is in the same Fama–French (1997) 48 industry and closest in sales. To ensure that the matching public firm is truly comparable in size to its private peer, we require that the public firm's sales be within [90%, 110%] of the private firm's sales. We drop private firms from the matching subsample that are too small (i.e., the private firm's sales are smaller than 90% of the sales of all public firms in the same industry), in which case there is no matching public firm available. The dependent variable is the proportion of outside directors on the board. Regressions include indicator variables for each Fama–French (1997) 48 industry and year. In Panel B, non-owner CEO is the CEO who is not the firm's founder and holds less than 1% of the firm's stock. In Panel C, the sample consists of only nonfamily private and public firms. In Panel E, the sample consists of 3,807 private and 20,385 public firm-year observations during the 1999–2008 period (2,428 matching private and 2,428 matching public firm-year observations) in which information on bank debt, the identity of external auditing firms, CEO compensation, and equity ownership by the top five largest outside shareholders are available. In Panel F, we split the private firm sample into young and old private firms based on the median of private firm age. In Panel G, we compare non-survivor private firms and public firms. Non-survivor private firms refer to the private firms that disappear from our sample in the later stage. Definitions of all variables are provided in appendix B. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. p-values based on robust standard errors clustered at the firm level are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Baseline model						
	Full sample of public and private firms			Subsample of matching public and private firms		
	Full period (1999–2008) (1)	Pre-SOX (1999–2001) (2)	Post-SOX (2002–2008) (3)	Full period (1999–2008) (4)	Pre-SOX (1999–2001) (5)	Post-SOX (2002–2008) (6)
Public (indicator)	−0.072***	−0.241***	−0.023***	−0.065***	−0.219***	−0.028***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln(board size)	0.121***	0.127***	0.118***	0.118***	0.107***	0.121***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln(sales)	0.004**	0.014***	0.004***	0.005	0.001	0.005*
	[0.011]	[0.000]	[0.010]	[0.121]	[0.882]	[0.078]
ROA	0.024	0.01	0.034**	−0.057*	0.052	−0.076**
	[0.102]	[0.681]	[0.039]	[0.071]	[0.476]	[0.018]
Sales growth	0.003	0.019***	−0.004	−0.009**	0.006	−0.013***
	[0.186]	[0.000]	[0.140]	[0.030]	[0.547]	[0.005]
Leverage	−0.001	−0.014	0.01	0.015	0.013	0.020
	[0.884]	[0.414]	[0.312]	[0.293]	[0.616]	[0.182]
Capex	−0.042	0.086	−0.065*	−0.072	0.007	−0.078
	[0.240]	[0.212]	[0.084]	[0.262]	[0.963]	[0.244]
R&D	0.000	−0.000	0.000	0.001	0.002	0.001
	[0.858]	[0.739]	[0.733]	[0.266]	[0.135]	[0.318]

(Continues)

TABLE 3 (Continued)

Panel A: Baseline model

	Full sample of public and private firms			Subsample of matching public and private firms		
	Full period (1999–2008) (1)	Pre-SOX (1999–2001) (2)	Post-SOX (2002–2008) (3)	Full period (1999–2008) (4)	Pre-SOX (1999–2001) (5)	Post-SOX (2002–2008) (6)
Dividend (indicator)	−0.010***	0.003	−0.013***	−0.027***	−0.003	−0.032***
	[0.006]	[0.732]	[0.000]	[0.000]	[0.845]	[0.000]
Number of segments	0.000	0.001	0.000	0.003	−0.003	0.006**
	[0.845]	[0.651]	[0.929]	[0.239]	[0.571]	[0.044]
Ln(firm age)	−0.003	−0.009**	−0.001	−0.001	−0.001	−0.002
	[0.210]	[0.018]	[0.572]	[0.711]	[0.913]	[0.608]
Public bond (indicator)	0.006	0.025***	0.000	0.006	0.025	−0.006
	[0.216]	[0.004]	[0.967]	[0.520]	[0.132]	[0.564]
CEO founder (indicator)	−0.024***	−0.007	−0.023***	−0.028***	−0.015	−0.024***
	[0.000]	[0.373]	[0.000]	[0.001]	[0.315]	[0.004]
CEO ownership	−0.194***	−0.157***	−0.205***	−0.177***	−0.101**	−0.202***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.011]	[0.000]
Ln(CEO age)	−0.015	−0.006	−0.025**	0.021	−0.008	0.017
	[0.222]	[0.800]	[0.048]	[0.416]	[0.851]	[0.518]
MBA (indicator)	0.007*	0.008	0.006*	0.004	0.033*	0.002
	[0.078]	[0.376]	[0.083]	[0.677]	[0.055]	[0.841]
Year & industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.681***	0.651***	0.683***	0.533***	0.880***	0.518***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	30,547	6,110	24,437	7,957	1,529	6,428
Adjusted R^2	23%	29%	22%	18%	28%	20%

Panel B: Comparison of proportion of outside directors between private firms with non-owner CEOs and public firms

	Full sample (1)	Matched sample (2)
Public (indicator)	−0.060***	−0.027**
	[0.000]	[0.035]
Other controls	Same as column (1) of Panel A	Same as column (1) of Panel A
Observations	25,155	3,131
Adjusted R^2	30%	17%

TABLE 3 (Continued)

Panel C: Comparison of proportion of outside directors between private firms and public firms, excluding family firms		
	Firms in which founding family members do not sit on the board (1)	Firms in which founding family members do not sit on the board, are not in the management team, or do not have block ownership (2)
Public (indicator)	−0.119***	−0.144***
	[0.000]	[0.000]
Other controls	Same as column (1) of Panel A	Same as column (1) of Panel A
Observations	3,952	3,208
Adjusted R^2	24%	26%

Panel D: Comparison of proportion of outside directors between public firms with different external governance and private firms		
	Full sample (1)	Matched sample (2)
S&P 1500 public firms (indicator): (1)	−0.099***	−0.094***
	[0.000]	[0.000]
Non-S&P 1500 public firms (indicator): (2)	−0.055***	−0.048***
	[0.000]	[0.000]
Other controls	Same as column (1) of Panel A	Same as column (1) of Panel A
Observations	30,547	7,957
Adjusted R^2	24%	18%
Test-of-difference in coefficients between (1) and (2): F-statistic	99.10***	26.72***

Panel E: Comparison of proportion of outside directors between public firms and private firms after controlling for bank debt ratio, presence of Big Four auditing firms, CEO performance-based pay, and ownership concentration		
	Full sample (1)	Matched sample (2)
Public (indicator)	−0.052***	−0.058***
	[0.000]	[0.000]
Bank debt ratio	−0.009***	−0.011*
	[0.004]	[0.097]
Big Four auditors (indicator)	0.010**	0.008
	[0.025]	[0.461]
CEO performance-based pay	0.018***	0.028**
	[0.000]	[0.010]
Top 5 large shareholding	0.007	−0.002
	[0.541]	[0.899]
Other controls	Same as column (1) of Panel A	Same as column (1) of Panel A
Observations	23,881	4,774
Adjusted R^2	28%	28%

(Continues)

TABLE 3 (Continued)

Panel F: Comparison of proportion of outside directors between young/old private firms and public firms		
	Young private firm (1)	Old private firm (2)
Public (indicator)	−0.070***	−0.072***
	[0.000]	[0.000]
Other controls	Same as column (1) of Panel A	Same as column (1) of Panel A
Observations	26,842	27,037
Adjusted R^2	25%	27%

Panel G: Differences in board structure (proportion of outside directors) between public firms and non-survivor private firms		
	Non-survivor private and public firm	
	Full sample	Match sample
Public (indicator)	−0.084***	−0.099***
	[0.000]	[0.000]
Other controls	Same as column (1) of Panel A	Same as column (4) of Panel A
Observations	27,711	8,703
Adjusted R^2	24%	22%

subperiods: before and after SOX. The coefficient on *Public* is −0.241 in the pre-SOX period (column (2)) and −0.023 in the post-SOX period (column (3)), both of which are significant at the 1% level. Thus, private firms have a 24.1% (2.3%) higher proportion of outside directors than pubic firms in the pre-SOX (post-SOX) period, indicating that compared with public firms, private firms have a larger proportion of outside directors on the board in both pre- and post-SOX periods, but the difference becomes weaker in the post-SOX period than in the pre-SOX period. The results using the matched sample of private and public firms are qualitatively similar (columns (4)–(6)). Overall, these results are consistent with the external governance hypothesis.

4.2 | Analysis excluding private firms with family owner CEOs

When private firms' founders serve as CEOs, they may have greater power in selecting outside directors than non-owner CEOs of private firms and thus the role of the board of directors in the former type of private firms is likely to be different from other types of private and public firms. In this subsection we re-estimate regressions (1) and (4) of Table 3 excluding the subsample of private firms with owner CEOs to investigate whether our results are robust to excluding private firms in which the founders serve as CEOs. Specifically, we define a private firm CEO as a non-owner if the CEO is not the firm's founder and his stock ownership is less than 1% and obtain a total of 1,951 private firm-year observations (771 private firms) with non-owner CEOs. We then use the sample of public firms and the subsample of private firms with non-owner CEOs in re-estimating Equation 1.

The results are reported in Table 3, Panel B. Consistent with the results in Table 3, Panel A, we find that private firms have a higher proportion of outside directors than public firms.[5]

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[5]As an alternative definition, we used the sample median CEO ownership in private firms as the cutoff point in classifying private firm CEOs into non-owner CEOs and obtained almost identical results.

4.3 | Analysis excluding family firms

Although our analysis in the previous subsection shows that private firms with a founder CEO do not drive our key result that private firms have a higher proportion of outside directors than public firms, it is still possible that other founding family members in private firms who frequently sit on the boards or are in the top management influence the determination of board structure. To address this issue, we re-estimate Equation 1 by using only the subsample of firms in which the presence of founding family members is likely to be minimal.

Using CIQ, we are able to collect the information on founding family members for 6,479 public firm-year observations and 1,147 private firm-year observations. We first focus on the subsample of firms whose founding family members are not on the boards (3,418 public firm-year observations and 628 private firm-year observations) in estimating Equation 1. The results are reported in column (1) of Table 3, Panel C. We find that the coefficient on *Public* is −0.119, significant at the 1% level, indicating that private firms in which founding family members are not on the board have a 11.9% higher proportion of outside directors than the corresponding public firms.

Next, we use the subsample of firms whose founding family members do not sit on the board, are not in the top management, or do not own block ownership exceeding 5% (2,802 public firm-year observations and 480 private firm-year observations) in estimating Equation 1. By focusing on these firms, our analysis considers only nonfamily firms in testing our hypothesis.[6] The results are reported in column (2) of Panel C. We continue to find a negative and significant coefficient on *Public* (−0.144). This result indicates that, even in a sample of firms with no significant influence by family members, private firms still have a greater proportion of outside directors on the board than public firms.

4.4 | Cross-sectional heterogeneity across public firms

To further examine whether the differences in the proportion of outside directors between public and private firms documented in the previous sections are indeed due to the differences in their external governance effectiveness, we divide public firms into two subgroups, namely, public firms that resemble private firms in terms of external governance environment and other public firms. We then examine whether the differences in the proportion of outside directors between the former type of public firms and private firms are less pronounced than those in the proportion of outside directors between the latter type of public firms and private firms.

In Table 3, Panel D, we decompose the indicator *Public* into two indicators: an indicator for S&P 1500 firms and an indicator for other public firms. We then re-estimate Equation 1 by replacing *Public* with these two indicators. Previous studies show that compared with public firms that are not included in the S&P 1500 index, S&P 1500 firms have more informative stock prices and greater stock market and regulatory scrutiny (Cadman, Klasa, & Matsunaga, 2010). Thus, if the differences in board structures between public and private firms are mainly driven by the differences in their external governance environment, we expect these differences to be more pronounced for S&P 1500 firms than for non-S&P 1500 firms.

Supporting this prediction, we found that in both the full sample and matched sample, the coefficient estimates on the indicator for S&P 1500 firms are significantly more negative than those on

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[6]Previous studies on family firms use two criteria in identifying family firms: the presence of family members on the management team or the board and the fractional equity ownership of a founding family (Anderson & Reeb, 2003; Li & Srinivasan, 2011; Villalonga & Amit, 2006).

the indicator for non-S&P 1500 public firms. Specifically, in the full sample regression, the coefficient estimate on the indicator for S&P 1500 firms is a significant −0.099, while that on the indicator for non-S&P 1500 public firms is a significant −0.055. The difference in coefficient estimates between these two indicators is significant at the 1% level. Thus, although both S&P and non-S&P 1500 public firms have a smaller proportion of outside directors than private firms, the difference is particularly pronounced for public firms included in the S&P 1500 index. In the match sample regression, compared with private firms, S&P 1500 firms had a 9.4% lower proportion of outside directors while non-S&P 1500 public firms had a 4.8% lower proportion of outside directors. The difference in these two coefficient estimates is significant at the 1% level.

Overall, these results strongly support the external governance hypothesis that private firms have a higher proportion of outside directors on their boards than public firms.

4.5 | Controlling for other governance mechanisms

In addition to stock market monitoring and the threat of hostile takeovers, public and private firms may also differ in other governance mechanisms, including CEO compensation structure and ownership concentration (Gao & Li, 2015; Ke, Petroni, & Safieddine, 1999), monitoring by debtholders (Brav, 2009), and monitoring by external auditors (Hope, Thomas, & Vyas, 2013). Thus, it is possible that the differences in board structures between public and private firms documented in the previous sections are driven by these differences in governance mechanisms. To address this issue, we examine whether our results are robust to controlling for CEO compensation structure, large share ownership, bank relationships, and the presence of external auditors. As the measures of CEO compensation structure and large share ownership, we use the proportions of bonus, restricted stock, and option grants in the CEO's total compensation (*Performance-based pay*) and the percentage equity ownership by the top five largest outside shareholders (*Top 5 large shareholding*), respectively.[7] To measure the influence of banks and external auditors, we use the ratio of bank debt normalized by total assets and an indicator for having one of the Big Four auditors (Deloitte, PwC, Ernst & Young, and KPMG) as a firm's external auditor, respectively. Due to data limitation on these variables, our analysis is performed using a subsample of 3,807 private and 20,385 public firm-year observations during the 1999–2008 period (2,428 matching private and public firm-year pairs).[8]

The results are reported in Table 3, Panel E. We find that after controlling for these four governance mechanisms, private firms still have a higher proportion of outside directors than public firms. Thus, private firms have a more independent board than public firms, even after controlling for other dimensions of governance mechanisms.

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[7]The valuation method of restricted stock and option grants follows Gao and Li (2015). For restricted stock in both public and private firms, we take the value as reported by the firm. For stock options in public firms, we calculate the dollar value based on ExecuComp's modified Black–Scholes approach. For stock options in private firms, we apply the Black–Scholes approach under the following assumptions: (1) the volatility is the 60-month return volatility of a public firm in the same industry and year with the closest cash flow volatility; (2) the risk-free rate is the 7-year Treasury bond yield prevailing on the grant date; (3) the grant-date stock price is the exercise price (the option is granted at-the-money); (4) the dividend yield is the ratio of the dividend paid out in the last year to the exercise price; and (5) the time to maturity is 70% of the stated maturity.

[8]In untabulated tests, we find that, compared with public firms, private firms borrow more from banks, are less likely to have a Big Four auditor, have more concentrated ownership structure, and use fewer performance-based compensation contracts for their CEOs.

4.6 | Survivorship bias

Survivorship bias could be an issue if private firms with fewer external board members are less likely to survive. In this case, we may mistakenly find that private firms in our sample have more independent directors (because those private firms with fewer independent directors are dropped out of the sample). We conduct two tests to address this possibility. First, we divide our private sample into two subsamples based on the median firm ages of private firms. Private firms with larger firm age are likely to be the survivors, while young private firms are more likely to suffer from this survival bias.[9] We re-estimate Equation 1 to compare these two types of private firms to public firms. The results are reported in Table 3, Panel F. We find that, compared to public firms, both types of private firms have a higher proportion of outside directors (the economic magnitude is almost the same).

Second, we use a subsample of firms that disappear from our sample in the later stage. This set of firms is likely to be non-survivors. We re-estimate Equation 1 to compare this set of private firms with public firms. The results are reported in Table 3, Panel G. We continue to find a higher proportion of outside directors in private firms than in public firms. These findings also suggest that our results are not likely to be driven by the survivorship bias.

5 | ENDOGENEITY ISSUES

Thus far, we have not explicitly taken into account the endogeneity of a firm's listing status and board structure. However, it is possible that some unobservable firm characteristics simultaneously affect both a firm's listing decision and its board's structure. In this section we perform several tests to mitigate this potential endogeneity concern.

5.1 | Analysis of changes in board structure around IPOs

As a first test to address the endogeneity bias, we examine changes in board structure for the subset of our sample firms that transition from private to public status (i.e., IPOs) using a difference-in-differences approach. Specifically, using a sample of 324 firms (1,358 firm-year observations) that go public, we examine how their proportion of outside directors changes from the pre-IPO period to the post-IPO period. Although the IPO event is not entirely exogenous in the sense that firms adopt a well-planned exit strategy long before they go public, it can nevertheless serve as an important setting to test the prediction that the differences in external governance mechanisms between private and public firms affect the differences in their board composition. Moreover, examining the transition from private to public status provides corroborating evidence on the cross-sectional patterns documented in our previous analyses. It also allows us to exploit within-firm variation in listing status and to control for unobservable, time-invariant firm characteristics that might have an effect on board composition.[10]

For each IPO firm, we select a control private firm that is in the same industry and has the closest sales prior to IPO. We also require that the control firm does not change its private status during the sample period. Our key variable of interest is the indicator *Post-IPO*, which takes the value of one for

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[9]As pointed out by Cumming, Werth, and Zhang (2017), private firms that have just started could be less likely to have outside board members and outside board members are perhaps not quite as common in earlier stage entrepreneurial firms.

[10]Although examining the cases in which firms transition from public to private status is an alternative way to address the potential endogeneity of listing status, as Leslie and Oyer (2009) and Asker, Farre-Mensa, and Ljungqvist (2014) discussed, governance data on firms that go private are extremely difficult to obtain in the United States.

an IPO firm in the post-IPO year, and zero otherwise. We include year fixed effects to account for the variation over time associated with market conditions that may influence IPO timing. We also include firm fixed effects in order to control for within-firm variation associated with the public/private status. Thus, *Post-IPO* captures the change in board structure for private firms around the IPO (a difference-in-differences approach).[11] We include those used in Equation 1 as control variables.

Table 4 presents the results. In column (1), we only control for board size, firm size, and year and firm fixed effects. The coefficient estimate on *Post-IPO* is −0.066, significant at the 1% level, indicating that the proportion of outside directors decreases by around 7% after IPOs. Further controlling for other firm and CEO characteristics in columns (2) and (3), we find similar results. This result is consistent with those from the cross-sectional analysis reported in Table 3.

Overall, the results in Table 4 indicate a significant shift in the proportion of outside directors as firms transition from private to public status in ways that corroborate our findings from the cross-sectional analyses.

5.2 | 2SLS regressions

Although going-public events serve as a good experiment to mitigate the potential endogeneity problems inherent in tests of the differences in board structures between private and public firms, in this subsection we further address the endogeneity concerns using a 2SLS regression approach. In the first stage, we run a probit regression to predict the firm's *Public* status. In the second-stage regression, we estimate regressions of the proportion of outside directors on the predicted value of *Public* from the first stage and the other control variables used in Equation 1. For the purpose of identification, we need instrumental variables (IVs) that affect a firm's propensity of being public, but do not affect its board structure directly other than through the effect of being public.

Lowry (2003) argues that IPO volume reflects the aggregate capital demand of private firms, which is an important consideration for a firm's going-public decision. Therefore, we use industry IPO volume (the number of IPO deals in a given industry normalized by the total number of IPO deals in the same year) as the IV for *Public*. To the extent that a firm is more likely to go public after observing a higher frequency of IPO deals in its industry, our IV is expected to be positively correlated with the likelihood of firms going public. However, given its exogenous nature with respect to an individual firm, industry IPO volume is unlikely to have any direct impact on a firm's board characteristics other than through the effect of being public.

The results using a pooled sample of 7,563 private and 23,790 public firm-year observations are reported in Table 5. As expected, the coefficient estimate on industry IPO volume is positive and significant at the 1% level in the first-stage regression (column (1)). The F-statistic on the test that industry IPO volume is equal to zero is 56.28, which rules out the weak instrument concern (Staiger & Stock, 1997).

Column (2) shows the results from the second-stage regression in which the proportion of outside directors is used as the dependent variable. We find that the coefficient estimate on the predicted variable for Public is negative and significant at the 1% level. The magnitude of its coefficient (−0.163) suggests that all else being equal, private firm boards have, on average, a 16.3% higher proportion of outside directors than public firm boards. These results further support the external governance hypothesis that weak external governance from the stock market makes private firms rely more on the monitoring by independent boards.

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[11]Chemmanur, He, and Nandy (2010) use a similar approach to study the change in total factor productivity around IPOs.

TABLE 4 Changes in proportion of outside directors around the IPOs

This table reports the results regarding the changes in proportion of outside directors around the IPOs. The sample consists of 324 IPO firms (1,358 firm-year observations) and 324 control non-IPO private firms during the 1999–2008 period. For each IPO firm, we select a control private firm that is in the same industry and has the closest sales prior to IPO. We require that the control firm does not change its private status during the sample period. The dependent variable is the proportion of outside directors on the board. The *Post-IPO* indicator takes the value of one for the IPO firm in the post-IPO period and zero otherwise. Regressions include year and firm fixed effects. Definitions of all variables are provided in appendix B. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values based on robust standard errors clustered at the firm level are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Post-IPO (indicator)	−0.066***	−0.070***	−0.071***
	[0.000]	[0.000]	[0.000]
Ln(board size)	0.055**	0.055***	0.054***
	[0.011]	[0.008]	[0.010]
Ln(sales)	0.002	0.003	0.002
	[0.797]	[0.573]	[0.705]
ROA		−0.026	−0.021
		[0.497]	[0.590]
Sales growth		−0.003	−0.003
		[0.238]	[0.268]
Leverage		−0.026	−0.023
		[0.264]	[0.318]
Capex		−0.012	−0.010
		[0.846]	[0.871]
R&D		−0.008	−0.008
		[0.751]	[0.777]
Dividend (indicator)		0.004	0.002
		[0.728]	[0.836]
Number of segments		0.004	0.004
		[0.306]	[0.363]
Ln(firm age)		−0.008	−0.010
		[0.704]	[0.636]
Public bond (indicator)		0.008	0.009
		[0.665]	[0.656]
CEO founder (indicator)			−0.000
			[0.985]
CEO ownership			−0.022
			[0.735]
Ln(CEO age)			0.043
			[0.227]

(Continues)

TABLE 4 (Continued)

	(1)	**(2)**	**(3)**
MBA (indicator)			0.014
			[0.316]
Year & firm fixed effects	Yes	Yes	Yes
Constant	0.731***	0.742	0.588***
	[0.000]	[0.596]	[0.000]
Observations	2,720	2,710	2,656
Adjusted R^2/pseudo R^2	11%	12%	12%

5.3 | Propensity scores matching

To further address the potential sample selection concern in tests of the differences in board structures between private and public firms, in this subsection we follow Michaely and Roberts (2012) and use a propensity score matching approach. Although this approach cannot address the endogeneity bias caused by omitted unobservable firm and industry characteristics, it allows us to control for observable firm and industry characteristics that may affect a firm's listing status and board structure decisions.

We first estimate the propensity scores using a probit model in which the dependent variable is an indicator that takes the value of one for a public firm and zero for a private firm. To find optimal matches, we separately use three different matching techniques: nearest neighborhood, Gaussian kernel, and local linear regression. All matchings are conducted with replacement. The set of firm and CEO characteristics that we use to calculate the propensity score includes ln(board size), ln(sales), ROA, sales growth, leverage, the ratio of capital expenditures to total assets, the ratio of R&D expenditures to total assets, a dividend payment indicator, number of segments, ln(firm age), public bond indicator, founder CEO indicator, CEO ownership, ln(CEO age), and CEO MBA degree indicator. In addition to these firm and CEO characteristics, we use industry (Fama and French (1997) 48 industries) and year as additional matching criteria. We then use the predicted probabilities (i.e., propensity scores) from the probit regression to match each public firm-year observation to the private firm-year observation that minimizes the absolute value of the difference between the propensity scores. We use bootstrapped standard errors, based on 50 replications, to conduct statistical inferences. We also calculate bias-corrected 95% confidence intervals.

Table 6 reports the differences in the proportion of outside directors between our sample of private firms and matching public firms. Consistent with the results in Table 3, we find that, on average, compared with matching public firms, private firms have a significantly higher proportion of outside directors.[12]

Overall, our key findings in previous sections appear to be robust to controlling for potential endogeneity concerns, further supporting the external governance hypothesis.

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[12]In untabulated tests, for a smaller subsample of private firms in the 1999–2008 period, we also include the ratio of bank debt to total assets, the indicator for Big Four auditors, CEO performance-based pay, and the equity ownership of the top five largest outside shareholders as four additional independent variables in the first step of propensity score matching. We still find that private firms have a larger proportion of outside directors than their matching public firms.

TABLE 5 Controlling for endogeneity bias: instrumental variables approach (2SLS)

This table reports the 2SLS regression results to control for endogeneity bias. The sample consists of 7,563 private firm-year observations and 23,790 public firm-year observations during the 1999–2008 period, obtained from the Capital IQ database. Column (1) reports the first-stage probit regression of the likelihood of a firm being publicly listed, where we use as explanatory variables *Industry IPO volume* (instrumental variable) and the other variables used in Table 3. *Industry IPO volume* is the ratio of the number of IPO deals in a certain industry to the total number of IPO deals in the same year. Column (2) reports the estimates from the second-stage regressions with the dependent variable being the proportion of outside directors. Regressions include indicator variables for each Fama–French (1997) 48 industry and year. Definitions of all variables are provided in appendix B. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values based on robust standard errors clustered at the firm level are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	First stage Being a public firm: probit (1)	Second stage Proportion of outside directors: OLS (2)
Public (indicator)		−0.163***
		[0.000]
Industry IPO volume	1.048***	
	[0.000]	
Ln(board size)	0.537***	0.132***
	[0.000]	[0.000]
Ln(sales)	0.110***	0.006***
	[0.000]	[0.000]
ROA	0.298***	0.025*
	[0.000]	[0.088]
Sales growth	0.013	0.004*
	[0.434]	[0.083]
Leverage	−2.036***	−0.048***
	[0.000]	[0.010]
Capex	1.534***	−0.005
	[0.000]	[0.891]
R&D	−0.002	0.000
	[0.294]	[0.911]
Dividend	0.275***	−0.009**
	[0.000]	[0.047]
Number of segments	0.092***	0.001
	[0.000]	[0.369]
Ln(firm age)	0.143***	−0.000
	[0.000]	[0.988]
Public bond (indicator)	0.04	0.004
	[0.131]	[0.398]
CEO founder (indicator)	0.104***	−0.021***
	[0.000]	[0.000]
CEO ownership	−1.283***	−0.229***
	[0.000]	[0.000]

(Continues)

TABLE 5 (Continued)

	First stage Being a public firm: probit (1)	Second stage Proportion of outside directors: OLS (2)
Ln(CEO age)	0.192***	−0.011
	[0.002]	[0.391]
MBA (indicator)	0.060**	0.009**
	[0.017]	[0.023]
Year fixed effects	Yes	Yes
Industry fixed effects	No	Yes
Constant	−1.874***	0.712***
	[0.000]	[0.000]
Observations	30,547	30,547
Adjusted R^2	31%	22%
Test of industry IPO volume = 0: *F-statistic* 56.28***		

TABLE 6 Propensity score matching

This table reports the propensity score matching results regarding the differences in proportion of outside directors between public and private firms. The sample consists of 7,563 private firm-year observations and 23,790 public firm-year observations during the 1999–2008 period, obtained from the Capital IQ database. We match each private firm with a public firm using the nearest neighborhood, a Gaussian kernel, and local linear regression matching approaches. The variables we use in matching are ln(board size), ln(sales), ROA, sales growth, leverage, the ratio of capital expenditures to total assets, the ratio of R&D expenditures to total assets, a dividend payment indicator, number of segments, ln(firm age), public bond indicator, ln(CEO age), CEO ownership, founder CEO indicator, CEO MBA degree indicator, industry (Fama–French (1997) 48 industries) indicators, and year indicators. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Bootstrapped standard errors are based on 50 replications with replacement. *p*-values are reported in parentheses. Bias-corrected 95% confidence intervals are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	Nearest neighborhood	Gaussian kernel	Local linear regression
Proportion of outside directors	0.028***	0.030***	0.030***
(private firm − matched public firm)	(0.000)	(0.004)	(0.000)
	[0.013, 0.043]	[0.010, 0.050]	[0.017, 0.044]

6 | ADVISORY AND MONITORING ROLES OF OUTSIDE DIRECTORS IN PRIVATE FIRMS

Prior literature shows that outside directors perform two primary functions: monitoring and advising management. In this section, to further provide evidence on the external governance hypothesis, we examine how private firms design their board structure based on their monitoring and advising needs,[13] and whether they are more responsive to these needs than public firms.

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[13]Coles et al. (2008) investigate how public firms' board structures differ depending on their advising and monitoring needs.

6.1 | Advisory and monitoring needs and outside directors

Prior literature shows that firms' advising needs can be measured in several different ways. For example, Hermalin and Weisbach (1988) suggest that CEOs of diversified firms need more advice. Klein (1998) argues that the CEOs' advisory needs increase with the extent to which the firm depends on the environment for resources, suggesting that larger firms need more advice. Besides, firms with high project verification costs (e.g., R&D-intensive firms) or firms with better investment opportunities (e.g., high capital expenditure firms) are also likely to need more advice. To capture firms' advisory needs, we computed a variable *Advising Need*, which is a factor score based on the number of segments, ln(sales), the ratio of R&D expenditures to total assets, and the ratio of capital expenditures to total assets. The factor score for a firm-year observation is a linear combination of the transformed (to standard normal) values of these variables.

Similarly, some firms may have more monitoring needs than others. For example, when the firm has less outstanding debt (Jensen, 1986), when it pays less dividend (Easterbrook, 1984), when it grows rapidly (Jensen, 1986), when the CEO of the firm is not the founder (Villalonga & Amit, 2006), or when the CEO holds little ownership of the firm (Jensen & Meckling, 1976), there are likely to be more agency problems, and thus, these firms may need better monitoring. We construct a variable *Monitoring Need* to capture shareholders' need to monitor the management. *Monitoring Need* is a linear combination of the transformed (to standard normal) values of the following five variables: non-debt ratio (1 − leverage ratio), sales growth, indicator for no dividend payout, non-founder CEO indicator, and equity ownership by non-CEOs (1 − CEO ownership).

Although both public and private firms with more advisory and monitoring needs should have more outsiders on the board for their better advisory and monitoring services (Agrawal & Knoeber, 2001; Hermalin & Weisbach, 1988), the external governance hypothesis suggests that this relation is stronger in private firms than in public firms because board functions are more important in private firms due to lack of external governance. To test this prediction, we estimate the following OLS regression:

$$
\begin{aligned}
Proportion\ of\ outside\ directors = {}& \alpha + \beta_1 Public + \beta_2 Advising\ Need + \beta_3 Monitoring\ Need \\
& + \beta_4 Advising\ Need \times Public + \beta_5 Monitoring\ Need \\
& \times Public + \beta_6 Other\ Firm\ Characteristics \\
& + \beta_7 CEO\ Characteristics + Industry\ FE + Year\ FE + \varepsilon.\quad (2)
\end{aligned}
$$

Firm and CEO characteristics used in Equation 2 are the same as those used in the Table 3 regressions, except for ln(sales), sales growth, leverage, Capex, R&D, dividend indicator, number of segments, CEO founder indicator, and CEO ownership. These variables are not included in estimating the regressions because they are already used in the construction of the *Advising Need* and *Monitoring Need* variables. The external governance hypothesis predicts β_4 and β_5 to be negative and significant (i.e., the appointment of outside directors is more responsive to monitoring and advisory needs in private firms than in public firms).

Table 7, Panel A presents the results. Column (1) shows that in a pooled sample of public and private firms, the proportion of outside directors on the board increases significantly with firms' advising and monitoring needs. In columns (2) and (3), we add as independent variables the interaction terms of *Advising Need* and *Monitoring Need* with *Public*, respectively. We find that the coefficient estimates on both interaction terms are significantly negative at the 1% level, indicating that the sensitivity of the positive relation between firms' advising (monitoring) needs and the proportion of outside directors on the board is stronger in private firms than in public firms. More specifically, when the value of advising (monitoring) needs increases by one unit, the proportion of outside directors on

TABLE 7 Outside directors and advisory and monitoring needs

This table reports the results regarding outside directors and advisory and monitoring needs of the sample firms. The sample consists of 7,563 private firm-year observations and 23,790 public firm-year observations during the 1999–2008 period. *Advising need* is a linear combination of the transformed (to standard normal) values of ln(sales), the ratio of R&D expenditures to total assets, the number of segments, and the ratio of capital expenditures to total assets. *Monitoring need* is a linear combination of the transformed (to standard normal) values of non-debt ratio (1 − leverage ratio), sales growth, indicator for no dividend payout, non-founder CEO indicator, and equity ownership by non-CEOs (1 − CEO ownership). Other control variables, including ln(board size), ROA, ln(firm age), public bond (indicator), ln(CEO age), and MBA (indicator), are included but not reported for the sake of brevity. In Panel A, the dependent variable is the proportion of outside directors on the board. In Panel B, the dependent variable is ln(number of outside directors). Regressions include indicator variables for each Fama–French (1997) 48 industry and year. Definitions of all variables are provided in appendix B. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values based on robust standard errors clustered at the firm level are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Dependent variable = proportion of outside directors				
	(1)	**(2)**	**(3)**	**(4)**
Public (indicator)	−0.073***	−0.078***	−0.063***	−0.067***
	[0.000]	[0.000]	[0.000]	[0.000]
Advising need	0.001*	0.010***	0.001	0.010***
	[0.100]	[0.000]	[0.111]	[0.000]
Monitoring need	0.012***	0.012***	0.016***	0.016***
	[0.000]	[0.000]	[0.000]	[0.000]
Public × Advising need		−0.011***		−0.012***
		[0.000]		[0.000]
Public × Monitoring need			−0.008***	−0.009***
			[0.000]	[0.000]
Other controls	Yes	Yes	Yes	Yes
Year & industry fixed effects	Yes	Yes	Yes	Yes
Observations	30,547	30,547	30,547	30,547
Adjusted R^2	22%	22%	22%	22%
Panel B: Dependent variable = ln(number of outside directors)				
	(1)	**(2)**	**(3)**	**(4)**
Public (indicator)	−0.080***	−0.083***	−0.070***	−0.073***
	[0.000]	[0.000]	[0.000]	[0.000]
Advising need	0.004***	0.009***	0.004***	0.009***
	[0.002]	[0.001]	[0.002]	[0.001]
Monitoring need	0.013***	0.013***	0.017***	0.017***
	[0.000]	[0.000]	[0.000]	[0.000]
Public × Advising need		−0.007**		−0.007**
		[0.022]		[0.015]
Public × Monitoring need			−0.009***	−0.009***
			[0.006]	[0.004]

(Continues)

TABLE 7 (Continued)

Panel B: Dependent variable = ln(number of outside directors)				
	(1)	**(2)**	**(3)**	**(4)**
Other controls	Yes	Yes	Yes	Yes
Year & industry fixed effects	Yes	Yes	Yes	Yes
Observations	30,547	30,547	30,547	30,547
Adjusted R^2	80%	80%	80%	80%

the board increases by 1.1% (0.8%) more in private firms than in public firms. When we include both interaction terms in the same regression (column (4)), the coefficient estimates on *Advising Need*, *Monitoring Need*, and their interaction terms with *Public* remain significant.

Coles et al. (2008) argue that firms with greater advising needs require more outside directors and use the number of outsiders as the dependent variable in their regressions. Therefore, in Table 7, Panel B, we replace the proportion of outside directors with ln(number of outside directors) as the dependent variable and re-estimate the regressions in Panel A. We find that the results do not change.

These results suggest that both private and public firms tend to design their board structure based on their advisory and monitoring needs, but private firms are more responsive to these needs than public firms, supporting the external governance hypothesis.[14]

6.2 | Likelihood of CEO turnover in private firms

In this subsection we examine whether outside directors in private firms perform monitoring roles. To the extent that prior literature on monitoring roles of outside directors is limited to public firms, examining such roles in private firms not only cross-validates existing evidence on the roles of corporate boards, it also provides a new perspective on these roles when firms have weak external governance mechanisms. Thus, the analysis in this subsection helps provide additional evidence on the external governance hypothesis.

To investigate whether outside directors in private firms play an active monitoring role, we examine the likelihood of CEO turnover. To the extent that outside directors play an instrumental role in internal governance and the board structure in private firms is designed to empower directors to do what is good for shareholders, we expect that outside directors in private firms play an important role in disciplining top executives when firm performance is poor. To examine the likelihood of CEO turnover, we perform logit regressions in which the dependent variable equals one if a CEO turnover event occurs in a given year and zero otherwise.[15] Our key variable of interest is the interaction term between industry-adjusted ROA and the proportion of outside directors on the board. The regressions also include control variables used in Table 3. To compute the marginal effect of the interaction term, we follow the approach developed by Ai and Norton (2003).

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[14]In an untabulated analysis we find that the association between the proportion of outside directors and monitoring needs is stronger in private firms run by non-owner CEOs than in private firms run by owner CEOs, consistent with the view that the board's monitoring role is more important when the CEO has more severe agency problems.

[15]We obtain information on CEO turnover from CIQ. Because CIQ provides detailed information on CEO turnover starting from 2001, our tests in this section are conducted over a slightly smaller sample of private firms corresponding to the 2001–2008 period. Of the 4,383 private firm-year observations for which we have data during this period, we find 469 CEO turnover events.

Table 8, Panel A reports the results using only the full sample of private firms. Column (1) shows that the coefficient estimate on the proportion of outside directors is positive and significant at the 1% level, suggesting that outside directors in private firms play an important role in CEO turnover decisions. Not surprisingly, the coefficient estimate on past industry-adjusted ROA is negative and significant at the 5% level, indicating that poorly performing private firms are more likely to change their CEOs.

In column (2), we add the interaction term between the proportion of outside directors and past industry-adjusted ROA. We find that the coefficient estimate on this interaction term is negative and significant at the 5% level, suggesting that private firms with a higher proportion of outside directors are more likely to change CEOs in response to poor operating performance.

The management changes that we identify with CIQ include both forced and voluntary CEO turnovers. To the extent that voluntary CEO turnovers occur due to nongovernance- or nonperformance-related reasons, they may add noise to the turnover regressions above. Thus, to focus on CEO turnover events that are more likely due to nonroutine reasons, we classify the following three types of CEO changes as normal, if: (1) the departing CEO is at least 65 years old; (2) the departing CEO is at least 60 years old; or (3) the departing CEO is a founder. We then delete firms that experience each type of these CEO changes from the full sample, respectively, and re-estimate regression (2) separately for each of these subsamples.

The results are reported in columns (3)–(5) of Table 8, Panel A. We find that, across all regressions, the coefficient estimates on the interaction term between the proportion of outside directors and past industry-adjusted ROA are negative and significant at or lower than the 10% level. These results suggest that outside directors in private firms indeed play a significant monitoring role in CEO turnover.

In Table 8, Panel B, we pool public and private firms with negative industry-adjusted ROA and test whether the association between the likelihood of CEO turnover and the proportion of outside directors is different between poorly performing public and private firms. Our key variable of interest is the interaction term between the *Public* indicator and the proportion of outside directors. Given that we focus on only the subsample of firms with poor performance, the coefficient on this interaction term shows how the roles of outside directors in dismissing poorly performing CEOs are different between public and private firms. In column (1), we find that the coefficient estimate on the proportion of outside directors is positive and significant at the 1% level, suggesting that outside directors in private and public firms play an important role in CEO turnover decisions. Further, we find that the coefficient estimate on the interaction term of the proportion of outside directors with *Public* is negative and significant at the 1% level, indicating that when the operating performance is poor, outside directors in private firms are more likely to change CEOs than those in public firms. In columns (2)–(4), we focus on CEO turnover events that are more likely due to nonroutine reasons. Again, we find that across all regressions, the coefficient estimates on the interaction term are negative and significant at the 1% level. These results suggest that outside directors in private firms play a more active monitoring role in CEO turnover than those in public firms, further supporting the view that lack of external governance makes private firms rely more on board monitoring.

6.3 | Earnings quality in private firms

Previous studies show that managers have an incentive to manage earnings to influence investors' perception on firm performance (Beasley, 1996; Bushman & Smith, 2001). As one of the important corporate governance mechanisms, an independent board is expected to play an active role in curbing such an incentive, thus improving the quality of financial reporting. However, prior studies typically

TABLE 8 Outside directors and the likelihood of CEO turnover in private firms

This table reports the results regarding outside directors and the likelihood of CEO turnover in private firms. In Panel A, the sample consists of 4,383 private firm-year observations during the 2001–2008 period, obtained from the Capital IQ database (CIQ). Data on CEO turnover is obtained from the CIQ. There are a total of 469 CEO turnover events during the sample period. In Panel B, the sample consists of 3,662 private firm-year observations and 9,688 public firm-year observations whose industry-adjusted ROA are negative. The dependent variable is an indicator that takes the value of one if a CEO turnover event occurs in a given year and zero otherwise. The coefficients reported are estimates of the marginal effect on the probability when all of the independent variables are at their mean value. Regressions include indicator variables for each Fama–French (1997) 48 industry and year. Definitions of all variables are provided in appendix B. All continuous variables are winsorized at the 1st and 99th percentiles and all independent variables are measured in the year prior to the CEO turnover. p-values based on robust standard errors clustered at the firm level are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Private firms only					
	Full sample of private firms		**Subsample of private firms**		
			Excluding CEOs whose age ≥ 65:	**Excluding CEOs whose age ≥ 60:**	**Excluding founder CEO:**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Proportion of outside directors: (a)	0.135***	0.131***	0.131***	0.113***	0.133***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Industry-adjusted ROA: (b)	−0.001**	−0.001*	−0.001*	−0.001**	−0.001*
	[0.048]	[0.072]	[0.067]	[0.046]	[0.069]
(a) × (b)		−0.150**	−0.150*	−0.145**	−0.145*
		[0.043]	[0.053]	[0.049]	[0.076]
Ln(sales)	0.002	0.003*	0.003	0.002	0.002
	[0.263]	[0.095]	[0.138]	[0.308]	[0.338]
Sales growth	−0.052***	−0.053***	−0.048***	−0.054***	−0.053***
	[0.001]	[0.001]	[0.004]	[0.001]	[0.003]
Leverage	−0.017	−0.017	−0.016	−0.010	−0.017
	[0.231]	[0.228]	[0.273]	[0.466]	[0.260]
Capex	0.131	0.150	0.146	0.028	0.160
	[0.152]	[0.101]	[0.124]	[0.765]	[0.113]
R&D	0.056	0.035	0.032	0.002	0.062
	[0.264]	[0.496]	[0.541]	[0.969]	[0.287]
Dividend (indicator)	−0.023***	−0.021***	−0.021***	−0.019**	−0.022***
	[0.002]	[0.004]	[0.007]	[0.015]	[0.006]
Number of segments	0.002	0.002	0.002	0.002	0.003
	[0.407]	[0.496]	[0.402]	[0.443]	[0.286]
Ln(firm age)	−0.001	−0.001	−0.001	−0.002	−0.001
	[0.817]	[0.810]	[0.837]	[0.440]	[0.819]

(Continues)

TABLE 8 (Continued)

Panel A: Private firms only

	Full sample of private firms		Subsample of private firms		
			Excluding CEOs whose age ≥ 65:	Excluding CEOs whose age ≥ 60:	Excluding founder CEO:
	(1)	(2)	(3)	(4)	(5)
Public bond (indicator)	0.004	0.005	0.005	0.005	0.004
	[0.621]	[0.512]	[0.568]	[0.542]	[0.641]
CEO founder (indicator)	−0.003	−0.004	−0.003	0.005	
	[0.833]	[0.775]	[0.857]	[0.752]	
CEO ownership	−0.132***	−0.133***	−0.132***	−0.149***	−0.150***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln(CEO age)	0.066***	0.069***	0.055**	−0.036	0.066**
	[0.008]	[0.005]	[0.045]	[0.205]	[0.016]
MBA (indicator)	0.015	0.014	0.015	0.017*	0.014
	[0.105]	[0.127]	[0.127]	[0.077]	[0.160]
Year & industry fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	4,383	4,383	4,109	3,653	3,981
Pseudo R^2	10%	10%	9%	10%	9%

Panel B: Pooled sample of public and private firms with negative industry-adjusted ROA

	All firms with negative industry-adjusted ROA (1)	Excluding firms with CEOs age ≥ 65 (2)	Excluding firms with CEOs age ≥ 60 (3)	Excluding firms with founder CEO (4)
Industry-adjusted ROA	−0.080***	−0.067***	−0.060***	−0.084***
	[0.000]	[0.002]	[0.006]	[0.000]
Public: (a)	0.115***	0.108***	0.101***	0.111***
	[0.000]	[0.000]	[0.000]	[0.000]
Proportion of outside director: (b)	0.167***	0.154***	0.140***	0.155***
	[0.000]	[0.000]	[0.000]	[0.000]
(a) × (b)	−0.174***	−0.161***	−0.148***	−0.165***
	[0.000]	[0.000]	[0.000]	[0.000]
Other controls	Same as column (2) of Panel A	Same as column (3) of Panel A	Same as column (4) of Panel A	Same as column (5) of Panel A
Year & industry fixed effects	Yes	Yes	Yes	Yes
Observations	13,350	12,393	10,708	11,824
Pseudo R^2	5%	5%	4%	5%

use public firms to examine the effect of board independence on earnings management and show mixed evidence. For example, Klein (2002) finds a negative association between board independence and earnings management, while Vafeas (2005) and Bowen, Rajgopal, and Venkatachalam (2008) document insignificant and positive associations, respectively.

In this subsection, we examine how board independence is related to earnings quality in private firms. We use the discretionary accruals as a measure of earnings quality. Discretionary accruals are estimated based on the modified cross-sectional Jones model (Dechow, Sloan, & Sweeney, 1995; Jones, 1991). Specifically, we first estimate the parameters of the following equation every year for each industry:

$$Accrual = \alpha + \beta_1 \frac{1}{Total\,Assets} + \beta_2 \Delta REV + \beta_3 PPE + \varepsilon \qquad (3)$$

where *Accrual* is earnings before extraordinary items minus operating cash flows scaled by total assets, ΔREV is change in revenues scaled by total assets, and *PPE* is net property, plant, and equipment scaled by total assets.

Next, for each firm-year observation, we calculate the expected accruals using the following equation:

$$Expected\,Accrual = \widehat{\beta_1} \frac{1}{Total\,Assets} + \widehat{\beta_2}(\Delta REV - \Delta AR) + \widehat{\beta_3} PPE + \varepsilon \qquad (4)$$

where $\widehat{\beta_1}$, $\widehat{\beta_2}$, and $\widehat{\beta_3}$ are the fitted coefficients from Equation 3, and ΔAR is the change in accounting receivables scaled by total assets.

Finally, we measure discretionary accrual as the absolute value of the difference between the firm's actual accrual and expected accrual. We use the absolute value because earnings management can involve either income-increasing or income-decreasing accruals to meet earnings targets (Klein, 2002; Reynolds & Francis, 2000; Warfield, Wild, & Wild, 1995).

Table 9 shows the results. In the first two columns, the dependent variable is the discretionary accrual and the key independent variable of interest is the proportion of outside directors on the board. We find a negative and significant coefficient on the proportion of outside directors in the sample of private firms (column (1)), indicating that private firms are less likely to engage in earnings management when their boards consist of more outside directors. On the other hand, consistent with Vafeas (2005), we find no significant relation between board independence and discretionary accruals in the sample of public firms (column (2)). Estimating the regressions using a 2SLS approach does not change the results (columns (3) and (4)).

Overall, these results suggest that outside directors in private firms play a more active monitoring role in curbing earnings manipulation than those in public firms, further supporting the view that lack of external governance makes private firms rely more on board monitoring.

6.4 | Likelihood of going public and IPO valuation

IPOs are one of the most important exit strategies that allow private firm shareholders to diversify their holdings and/or to cash out some of their investment. Thus, IPOs can be considered one of the key financial decisions that a private firm's board has to make to maximize shareholder wealth. If outside directors in private firms play an important role in facilitating these exit transactions, we expect that the probability of a private firm going public increases with the proportion of outside directors on the board. To test this prediction, we estimate logit regressions in which the dependent variable is an

TABLE 9 Outside directors and earnings quality in private firms

This table reports the results regarding outside directors and earnings quality in private firms. The sample consists of 7,563 private firm-year observations and 23,790 public firm-year observations during the 1999–2008 period, obtained from the Capital IQ database. The dependent variable is discretionary accruals. Columns (1) and (2) report the results from the OLS regression and columns (3) and (4) report the results from the second stage of the two-stage least squares (2SLS) regression. Predicted proportion of outside directors is estimated from the first stage of the 2SLS regression, in which we regress the proportion of a firm's outside directors on two instruments for board composition, namely, state- and industry-level average proportions of outside directors, and firm and CEO characteristics used in this table. Regressions include indicators for each Fama–French (1997) 48 industry and year. Definitions of all variables are provided in appendix B. All continuous variables are winsorized at the 1st and 99th percentiles. p-values based on robust standard errors clustered at the firm level are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	OLS		2SLS: second stage	
	Private firms	**Public firms**	**Private firms**	**Public firms**
	(1)	**(2)**	**(3)**	**(4)**
Proportion of outside directors	−0.093***	−0.005		
	[0.000]	[0.460]		
Predicted proportion of outside directors			−0.158***	−0.025
			[0.009]	[0.572]
Ln(sales)	−0.023***	0.003***	−0.020***	0.003***
	[0.000]	[0.001]	[0.000]	[0.001]
ROA	−0.711***	−0.388***	−0.716***	−0.378***
	[0.000]	[0.000]	[0.000]	[0.000]
Sales growth	−0.033***	−0.004	−0.032***	−0.005
	[0.000]	[0.206]	[0.000]	[0.118]
Leverage	0.211***	0.015*	0.211***	0.017**
	[0.000]	[0.068]	[0.000]	[0.050]
Capex	0.239**	0.265***	0.237**	0.265***
	[0.026]	[0.000]	[0.029]	[0.000]
R&D	−0.001	0.000	−0.001	0.000
	[0.782]	[0.501]	[0.792]	[0.494]
Dividend (indicator)	0.007	−0.014***	0.006	−0.014***
	[0.350]	[0.000]	[0.439]	[0.000]
Number of segments	0.000	−0.002***	0.001	−0.002***
	[0.845]	[0.000]	[0.714]	[0.000]
Ln(firm age)	0.002	−0.005***	0.002	−0.005***
	[0.560]	[0.000]	[0.675]	[0.000]
Public bond (indicator)	−0.033***	−0.008***	−0.034***	−0.008***
	[0.000]	[0.002]	[0.000]	[0.004]
CEO founder (indicator)	−0.006	−0.006*	−0.006	−0.007**
	[0.703]	[0.075]	[0.720]	[0.043]

(Continues)

TABLE 9 (Continued)

	OLS		2SLS: second stage	
	Private firms	**Public firms**	**Private firms**	**Public firms**
	(1)	**(2)**	**(3)**	**(4)**
CEO ownership	−0.001	0.028***	−0.014	0.024*
	[0.974]	[0.001]	[0.577]	[0.064]
Ln(CEO age)	−0.010	−0.025***	−0.013	−0.026***
	[0.755]	[0.001]	[0.688]	[0.000]
MBA (indicator)	−0.001	0.002	0.000	0.002
	[0.935]	[0.389]	[0.975]	[0.419]
Year & industry fixed effects	Yes	Yes	Yes	Yes
Constant	0.314**	0.204***	0.352***	0.226***
	[0.013]	[0.000]	[0.008]	[0.000]
Observations	7,215	23,332	7,215	23,332
Adjusted R^2	48%	19%	48%	18%

indicator that equals one if the private firm goes public in a given year during our sample period and zero otherwise. We use as explanatory variables identical ones to those used in the Table 3 regressions. In addition, we control for an indicator for venture-backed firms (Barry, Muscarella, Peavy, & Vetsuypens, 1990). Out of 2,712 private firms, we find that 324 go public during our sample period.

The results are presented in the first three columns of Table 10, Panel A. The coefficient estimates on the proportion of outside directors are positive and significant in all three regressions, indicating that outside directors help private firm shareholders exit via IPOs.

One concern with the logit regressions above is that they do not explicitly take into account the endogeneity problem in firms' board composition. To address the concern that the appointments of outside directors may be endogenously determined, we perform 2SLS regressions. In the first stage, we regress the proportion of a firm's outside directors on two instruments for board composition, namely, state- and industry-level average proportions of outside directors, and the firm and CEO characteristics used in column (3). To the extent that the proportion of a firm's outside directors is influenced by board composition policies of peer firms in the same area (Knyazeva et al., 2013), we expect firms located in a state in which geographically proximate firms have outsider-dominated boards to have more outside directors on their boards. Similarly, we expect firms operating in the same industry in which peer firms have outsider-dominated boards to have more outside directors on their boards. Thus, both of our instruments are likely to be highly correlated with a selection variable (i.e., the proportion of outside directors), but due to their exogenous nature they are unlikely to be directly related to outcome variables (i.e., firm's IPO decision).

In the second stage, we estimate a logit regression of the likelihood of going public using the predicted value of the proportion of outside directors from the first stage as explanatory variables, and the other control variables used in column (3) of Table 10, Panel A. For brevity, we only report the results from the second stage in column (4).[16] The coefficient estimate on the predicted value of the

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[16]In the first stage, we find that both state- and industry-level average proportions of outside directors have positive and significant coefficients. The test of the joint significance of the two instruments results in an F-statistic of 100, which rules out the weak instrument concerns of our instruments (Staiger & Stock, 1997).

TABLE 10 Likelihood of going public and IPO valuation: role of outside directors in private firms

This table reports the results regarding the role of private firms' outside directors on the likelihood of going public and IPO valuation. The sample consists of 7,563 private firm-year observations during the 1999–2008 period, obtained from the Capital IQ database. In Panel A, the dependent variable is an indicator that takes the value of one if the firm goes public in a given year during the sample period (324 cases) and zero otherwise. The coefficients reported are estimates of the marginal effect on the probability when all of the independent variables are at their mean value. In Panel B, the dependent variable is the ratio of market capitalization on the first trading date (first-trading-day stock price multiplied by total shares outstanding) to sales prior to the IPO. Predicted proportion of outside directors is estimated from the first stage of the two-stage least squares (2SLS) regression, in which we regress the proportion of a firm's outside directors on two instruments for board composition, namely, state- and industry-level average proportions of outside directors, and firm and CEO characteristics used in column (3) of this table. Regressions include indicators for each Fama–French (1997) 48 industry and year. Definitions of all variables are provided in appendix B. All continuous variables are winsorized at the 1st and 99th percentiles and all independent variables are measured in the year prior to the IPO. p-values based on robust standard errors clustered at the firm level are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Likelihood of going public					
	Logit			**2SLS: Second stage**	**2SLS: Second stage**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Proportion of outside directors	0.005***	0.003**	0.002*		
	[0.003]	[0.040]	[0.074]		
Predicted proportion of outside directors				0.017***	
				[0.004]	
Predicted proportion of outside directors in 1999					0.020***
					[0.003]
Ln(sales)	0.001***	0.001***	0.001***	0.001***	0.001***
	[0.000]	[0.000]	[0.000]	[0.010]	[0.002]
ROA		0.002	0.001	0.000	0.000
		[0.222]	[0.460]	[0.813]	[0.729]
Sales growth		0.002***	0.001***	0.001***	0.001***
		[0.000]	[0.000]	[0.001]	[0.001]
Leverage		−0.006***	−0.003**	−0.003**	−0.003*
		[0.001]	[0.030]	[0.034]	[0.097]
Capex		0.062***	0.044***	0.045***	0.049***
		[0.000]	[0.000]	[0.000]	[0.000]
R&D		0.000	0.000	0.000	0.000
		[0.459]	[0.181]	[0.420]	[0.628]
Dividend (indicator)		−0.003***	−0.002***	−0.003***	−0.003***
		[0.000]	[0.001]	[0.003]	[0.004]
Number of segments		0.000	0.000	0.000	−0.000
		[0.576]	[0.649]	[0.949]	[0.939]

(Continues)

TABLE 10 (Continued)

Panel A: Likelihood of going public

	Logit			2SLS: Second stage	2SLS: Second stage
	(1)	(2)	(3)	(4)	(5)
Ln(firm age)		−0.000	−0.000	−0.000	−0.000
		[0.141]	[0.646]	[0.665]	[0.407]
Public bond (indicator)		−0.004***	−0.003***	−0.003***	−0.003***
		[0.000]	[0.000]	[0.000]	[0.001]
Venture-backed firm (indicator)		0.021***	0.017***	0.016***	0.017***
		[0.000]	[0.000]	[0.001]	[0.000]
CEO founder (indicator)			0.007***	0.008***	0.008***
			[0.000]	[0.000]	[0.000]
CEO ownership			−0.010**	0.002	0.006
			[0.030]	[0.783]	[0.439]
Ln(CEO age)			−0.010***	−0.011***	−0.010***
			[0.000]	[0.000]	[0.000]
MBA (indicator)			0.002	0.001	0.001
			[0.116]	[0.199]	[0.169]
Year & industry fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,563	7,369	7,215	7,215	7,215
Pseudo R^2	18%	25%	28%	28%	28%

Panel B: First-trading-day IPO valuation

	OLS			2SLS: Second stage	2SLS: Second stage
	(1)	(2)	(3)	(4)	(5)
Proportion of outside directors	44.080**	29.234*	32.611*		
	[0.011]	[0.093]	[0.094]		
Predicted proportion of outside directors				68.368**	
				[0.022]	
Predicted proportion of outside directors in 1999					73.037**
					[0.037]
Ln(sales)	−8.996***	−8.822***	−8.978***	−10.432***	−10.450***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
ROA		−66.108***	−62.203***	−62.647**	−62.041***
		[0.000]	[0.001]	[0.032]	[0.006]
Sales growth		−6.184***	−6.211**	−6.123**	−6.110**
		[0.009]	[0.012]	[0.019]	[0.046]
Capex		−22.537	−21.05	−26.998	−24.258
		[0.580]	[0.622]	[0.313]	[0.483]

(Continues)

TABLE 10 (Continued)

Panel B: First-trading-day IPO valuation

	OLS			2SLS: Second stage	2SLS: Second stage
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
R&D		−33.214	−31.181	−28.122	−27.936
		[0.157]	[0.197]	[0.283]	[0.409]
Dividend (indicator)		1.88	2.531	3.013	2.606
		[0.812]	[0.757]	[0.634]	[0.339]
Number of segments		0.995	0.289	−0.012	0.078
		[0.707]	[0.921]	[0.988]	[0.970]
Ln(firm age)		−2.112	−2.757	−3.590***	−4.025*
		[0.439]	[0.356]	[0.003]	[0.079]
Public bond (indicator)		1.548	−0.27	−2.486	−2.128
		[0.869]	[0.978]	[0.624]	[0.665]
Venture-backed firm (indicator)		5.846	5.174	3.498	5.423
		[0.347]	[0.427]	[0.340]	[0.220]
Reputable underwriter (indicator)		6.13	7.327	7.251	7.239***
		[0.252]	[0.188]	[0.292]	[0.009]
Ln(IPO proceeds)		3.822**	4.192**	3.957***	3.971***
		[0.016]	[0.011]	[0.000]	[0.010]
CEO founder (indicator)			−8.896	−9.427	−8.441*
			[0.138]	[0.245]	[0.093]
CEO ownership			−0.139	18.701	22.337
			[0.995]	[0.571]	[0.451]
Ln(CEO age)			−11.279	−5.054	−3.291
			[0.502]	[0.735]	[0.862]
MBA (indicator)			−5.087	−5.877*	−5.909
			[0.383]	[0.082]	[0.345]
Year & industry fixed effects	Yes	Yes	Yes	Yes	Yes
Constant	12.22	10.365	63.848	25.989	13.808
	[0.730]	[0.775]	[0.363]	[0.740]	[0.854]
Observations	312	307	309	309	309
Adjusted R^2	26%	32%	33%	32%	33%

proportion of outside directors is significant at the 1% level, indicating that outside directors in private firms play a valuable role in facilitating IPO activities, even after correcting for potential endogeneity bias.[17]

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[17]In untabulated tests, we also use a 2SLS regression method in estimating CEO turnover regressions in Table 8, Panel A. We find that our results do not change.

However, these results are also consistent with an alternative explanation that private firms planning to go public hire more outside directors prior to their IPOs, to meet board composition requirements as imposed by SOX. To address this concern, in column (5) we use a firm's proportion of outside directors in 1999 (the earliest year in our sample) to predict the likelihood of going public during the entire sample period and find that a higher proportion of outside directors increases the probability of going public. Moreover, in untabulated tests we re-estimate the regressions using only the pre-SOX period and obtain similar results as those reported in the table. Thus, our results are unlikely to be driven by board composition requirements imposed by SOX.

To further test the role of outside directors in private firms, we examine whether a private firm value around IPOs is related to the proportion of outside directors on the board. If outside directors' monitoring and advisory functions help private firms receive higher values at the IPOs, we expect IPO valuations to be greater for private firms with a higher proportion of outside directors than those with a lower proportion of outside directors. To address this issue, we estimate OLS regressions in which the dependent variable is the ratio of IPO valuation to sales (IPO firm's market capitalization on the first trading date, calculated as first-trading-day stock price multiplied by total shares outstanding, over sales prior to the IPO) and the explanatory variables are those used in Panel A regressions. We include *Reputable Underwriter* (indicator that equals one if the lead underwriter has a ranking of 9 on a 9-point scale based on Jay Ritter's underwriter rankings and zero otherwise) and ln(*IPO Proceeds*) as additional control variables (Schenone, 2004).

The estimates from the OLS regressions are reported in the first three columns of Table 10, Panel B. We use a sample of 324 private firms that go public to estimate the regressions. We find that the coefficient estimates on the proportion of outside directors are positive and significant in all three regressions. Correcting for an endogeneity bias in column (4) and using the proportion of outside directors in 1999 as the independent variable in column (5) do not change the results. Thus, IPOs of firms with a higher proportion of outside directors are greeted more positively by investors than those of firms with a lower proportion of outside directors.

Overall, these results provide strong evidence that outside directors in private firms play an important value-enhancing role in helping shareholders receive high transaction prices from firms' exit strategies, which further supports the view that outside directors in private firms play important value-enhancing roles.

6.5 | Personal background of outside directors

An important question arising from the results above is whether personal backgrounds of directors are different between private and public firms, which may potentially affect their difference in monitoring and advisory roles. To address this question, we collect detailed biographic information on outside directors in our sample from CIQ and compare the personal backgrounds of outside directors between private and public firms. We are able to collect these data for 11,223 unique outside directors in private firms and 27,799 unique outside directors in public firms.

Table 11 presents the results. Several results are noteworthy. First, compared with public firm outside directors, private firm outside directors are more likely to hold an MBA degree and graduate from Ivy League schools while they are less likely to hold a JD or a PhD degree. Thus, outside directors in private firms seem to have better business-related practical training and education from elite schools than those in public firms.

Second, outside directors in private firms are slightly younger than their counterparts in public firms, as the average outside director in private (public) firms is born in 1950 (1948). Female directors

TABLE 11 Personal backgrounds of outside directors

This table reports the differences in personal backgrounds of outside directors between public and private firms. The sample consists of 11,223 unique outside directors in private firms and 27,799 unique outside directors in public firms during the 1999–2008 period, obtained from the Capital IQ database. *MBA*, *JD*, and *PhD* indicators take the value of one if the outside director holds an MBA degree, a JD degree, and a PhD degree, respectively, and zero otherwise. *Ivy League* indicator takes the value of one if the director graduated from one of the Ivy League universities, and zero otherwise. *Year born* is the year in which the director is born. *Female* indicator takes the value of one if the director is a female, and zero otherwise. *Venture Capitalist* indicator takes the value of one if the director has worked in a venture capitalist firm, and zero otherwise. *Banker* indicator takes the value of one if the director has worked in either a commercial bank or an investment bank, and zero otherwise. The last column reports the *p*-value of the *t*-test comparing the characteristics of outside directors between public and private firms. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

Background	Private firm outside director (mean)	Public firm outside director (mean)	*t*-test: *p*-value
MBA (indicator)	0.271	0.256	0.00***
JD (indicator)	0.063	0.067	0.08*
PhD (indicator)	0.062	0.080	0.00***
Ivy League (indicator)	0.176	0.153	0.00***
Year born	1950	1948	0.00***
Female (indicator)	0.063	0.093	0.00***
Venture Capitalist (indicator)	0.053	0.034	0.00***
Banker (indicator)	0.037	0.027	0.00***

account for 6% of outside directorships in private firms and 9% of outside directorships in public firms, indicating that public firms are more likely to have female directors on the board.

Third, directors with venture capital experience account for, respectively, 5.3% and 3.4% of private and public firm directors in the sample. The difference is significant at the 1% level. Prior literature shows that the experience as venture capitalists helps directors not only provide advice and support to entrepreneurial start-ups (Gompers, 1995) but also play a role in the professionalization of start-up firms (Hellmann & Puri, 2002). Even in large mature public firms, directors with venture capitalist experience can help promote innovation and increase firm performance (Celikyurt, Sevilir, & Shivdasani, 2014).

Finally, outside directors in private firms have significantly more banking experience than those in public firms (3.7% compared with 2.7%). To the extent that private firms reply more on bank financing than public firms, this result suggests that bankers on the private firm board facilitate firms' financing activities by providing a valuable advisory service (Guner, Malmendier, & Tate, 2008).

Overall, the results in this subsection show that compared with public firm boards, private firm boards tend to have more outside directors with an MBA degree, an elite school degree, venture capital experience, or banking experience, suggesting that directors' expertise in private firms helps them provide effective monitoring and advisory services to the management.

6.6 | Expertise of outside directors and IPO valuation

The value of outside directors may depend on their characteristics and experience. In Table 12, we examine how directors' experiences influence a firm's valuation in IPO. We focus on IPO events

TABLE 12 Expertise of outside directors in private firms and IPO valuation

This table reports the results regarding the expertise of outside directors in private firms and IPO valuation. The sample consists of 324 IPO firms during the 1999–2008 period, obtained from the Capital IQ database. The dependent variable is the logarithm of ratio of market capitalization on the first trading date (first-trading-day stock price multiplied by total shares outstanding) to sales prior to the IPO. *% investment banker*, *% venture capitalist*, and *% public firm CEO* are the proportion of outside directors with investment banker, venture capitalist, and public firm CEO employment experience, respectively. *% female director* is the proportion of female directors on board. Regressions include indicators for each year. Definitions of all variables are provided in appendix B. All continuous variables are winsorized at the 1st and 99th percentiles and all independent variables are measured in the year prior to the IPO. *p*-values based on robust standard errors clustered at the firm level are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
% investment banker	1.741***			
	[0.006]			
% venture capitalist		0.165		
		[0.699]		
% public firm CEO			1.540***	
			[0.005]	
% female director				0.403
				[0.540]
Ln(sales)	−0.876***	−1.229***	−1.091***	−0.563***
	[0.000]	[0.000]	[0.000]	[0.000]
ROA	−1.593***	−1.504***	−1.404***	−1.304***
	[0.000]	[0.003]	[0.000]	[0.001]
Sales growth	−0.182**	−0.168*	−0.064	0.035
	[0.043]	[0.072]	[0.386]	[0.616]
Capex	−1.621	−1.886	−1.336	1.009
	[0.323]	[0.312]	[0.334]	[0.251]
R&D	−0.253	−0.047	−0.045	0.636
	[0.464]	[0.860]	[0.805]	[0.322]
Dividend (indicator)	0.152	0.097	0.037	−0.006
	[0.394]	[0.595]	[0.801]	[0.975]
Number of segments	−0.003	−0.069	−0.030	0.009
	[0.951]	[0.258]	[0.547]	[0.883]
Ln(firm age)	−0.107*	−0.111	−0.095	−0.055
	[0.085]	[0.165]	[0.101]	[0.385]
Public bond (indicator)	−0.146	−0.206	−0.211*	−0.230
	[0.242]	[0.204]	[0.092]	[0.264]
Venture-backed firm (indicator)	0.088	0.230	0.104	0.194
	[0.559]	[0.255]	[0.466]	[0.252]
Reputable underwriter (indicator)	−0.229	0.058	−0.031	0.217*
	[0.203]	[0.748]	[0.840]	[0.083]

(Continues)

TABLE 12 (Continued)

	(1)	**(2)**	**(3)**	**(4)**
Log(proceeds)	0.725***	1.078***	0.987***	0.161***
	[0.000]	[0.000]	[0.000]	[0.000]
CEO founder (indicator)	0.052	−0.048	0.035	−0.027
	[0.706]	[0.799]	[0.775]	[0.866]
CEO ownership	1.178	0.980	0.901	−0.883
	[0.138]	[0.473]	[0.287]	[0.130]
Ln(CEO age)	−0.294	−0.512	−0.396	−0.028
	[0.517]	[0.302]	[0.274]	[0.946]
MBA (indicator)	0.017	−0.115	−0.096	0.042
	[0.912]	[0.474]	[0.463]	[0.737]
Year fixed effects	Yes	Yes	Yes	Yes
Constant	1.918	2.923	2.146	7.168***
	[0.287]	[0.176]	[0.167]	[0.000]
Observations	205	205	205	309
Adjusted R^2	77%	80%	86%	64%

largely because we can capture a private firm's valuation in such events. We obtain directors' expertise information from their CV in proxy statements (S-1, S-1/A filings) prior to the offer date available in the SEC's Edgar online database. We manually collect information on each director's name, age, gender, position, and past employment records. We sort the past experience of directors into the following categories: (1) investment banker; (2) venture capitalist; and (3) CEO of other public firms; we also distinguish female directors vs. male directors. We then test whether this board expertise could help increase firms' IPO value. Following Aggarwal, Bhagat, and Rangan (2009), we measure IPO valuation as the logarithm of the ratio of IPO valuation to sales.

The results are reported in Table 12. We find that director experiences as investment banker and public firm CEO are value-enhancing for private firms. Specifically, we find the coefficient estimate on *% investment banker* in column (1) to be 1.741 and significant at the 1% level, indicating that a 1% increase in the proportion of investment bankers on the board is associated with a 1.76% ($e^{0.01741} − 1$) increase in IPO valuation. Similarly, we find a positive coefficient on *% public firm CEO* and it is significant at the 1% level (column (3)), indicating public firm CEOs on private board is also associated with higher IPO valuation. However, we do not find any significant relationship between the venture capitalists or female directors on private firms' board and IPO valuation.

Although we find a positive association between certain director expertise and IPO valuation, one needs to be cautious to interpret the results. If certain board expertise could be correlated with other unobservable factors that influence a firm's valuation. For example, if some of the board members are VCs, they bring about changes by other means such as other financial contracting arrangements (Cumming, 2008; Cumming & Zambelli, 2017). Also, there could be matching issues (treatment vs. selection) through improved due diligence with external board members. Although these are interesting topics, they are not the main focus of this paper and we leave them for future research.

7 | SUMMARY AND CONCLUSION

This paper examines the board composition and the role of outside directors in US private firms. Theories on board composition provide two opposite predictions on the board structure in private firms as compared with public firms. On the one hand, private firms do not face stock market monitoring (e.g., no stock market regulatory requirements, no informative stock price, and no hostile takeover threat) since their stocks are not listed on stock exchanges. To overcome this lack of external governance, private firms are likely to demand greater monitoring from outside directors by having a more independent board (external governance hypothesis). On the other hand, the great information opacity in private firms increases the costs for outsiders to acquire firm-specific information, and prevents outside directors performing value-enhancing roles. The separation between ownership and control in public firms make public firms subject to more serious agency problems and thus demand a higher level of governance than private firms. These could result in fewer outsider directors in private firms than in public firms (information environment and ownership separation hypothesis).

We find that our results are largely consistent with the external governance hypothesis. More specifically, we find that compared with public firms of similar characteristics, private firms have a board with a higher proportion of outside directors. In addition, we find that this difference in board structure is more pronounced between private firms and S&P 1500 firms than between private firms and non-S&P 1500 public firms. Our results hold when we use a subsample of private firms with non-owner CEOs and a subsample of nonfamily firms, are robust to controlling for other internal governance mechanisms, including CEO compensation contracts, large share ownership, bank ties, and the presence of the Big Four auditors, and are robust to the survivorship bias. Moreover, private firms select their outside directors in a more responsive way to their advisory and monitoring needs, and their outside directors perform important value-enhancing functions: CEO turnover–performance sensitivity, earnings quality, and the likelihood of private firms going public increase with the proportion of outside directors on the board, and IPO valuation on the first trading date is greater for private firms with a high proportion of outside directors than those with a low proportion of outside directors. An analysis of personal backgrounds of outside directors further suggests that compared with outside directors in public firms, outside directors in private firms are more likely to have MBA and elite school degrees and financial expertise in banking and venture capital businesses, which may help them perform an important role in enhancing firm performance. Further tests using director background data confirm that director experiences as investment banker and public firm CEO are value-enhancing for private firms that go IPO.

Robustness tests that correct for the endogeneity of a firm's listing status and board structure further confirm the above results. We find that for firms that transition from private to public status, there is a significant change in board structure as they go public: after being listed on the stock exchanges, firms decrease the proportion of outside directors on their board. We also use the IVs and propensity matching approaches to correct for endogeneity bias and find that the results do not change. Thus, our results for the differences in the proportion of outside directors between private and public firms are robust to controlling for potential endogeneity.

Overall, these results suggest that a firm's board structure is an efficient response to the firm's contracting environment; thus, private firms facing weaker external governance appoint more outside directors on their boards to take greater responsibility in monitoring managerial discretion, supporting the external governance hypothesis.

Although we show that large private firms employ a higher proportion of outside directors than public firms after controlling for a long list of factors, it is not necessarily a general principal that a typical private firm uses more outside directors. Many small private firms may not even have a formal

board, as the ownership and control are often very well aligned and there are no serious agency conflicts in these firms. The private firms in our sample are not typical private firms, but large private firms that are more comparable to public firms. The readers should be aware of this possible limitation when deciding how our findings might be generalized.

Finally, as we discuss in the paper, outside directors provide monitoring as well as advisory services. It could well be true that the relative importance of these two functions is different across the two types of firms: directors in private firms are more expected to perform advisory services and directors in public firms are most needed for their monitoring function. However, one needs data to accurately classify a director's job into advisory service vs. monitoring service. This could be an interesting area for future research.

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APPENDIX A KMG America Corporation's board composition as of 2006

This table reports the composition of the directors on KMG America's board as of 2006 and their major affiliation prior to their appointment to the board. KMG America is a privately held company that provides group and voluntary employee benefit insurance solutions and third-party health claims administrative services. The company was founded in 2004 and is based in Minnetonka, Minnesota. In 2006, there were seven board members.

Name	Primary job functions	Inside or outside directors
Kuk, Kenneth	CEO, President, Chairman of the Board	Inside
Johnson, Stanley	President and CEO of Kanawha Insurance Company, a subsidiary of KMG America Corp.	Inside
DeLong III, Scott	CFO	Inside
Flittie, John	Actuarial Consultant	Outside
Laszewski, Robert	President of Health Policy and Strategy Associates, Inc.	Outside
Mathisen, Dennis	CEO of Marshall Bankfirst Corp.	Outside
Ritchie, James	CFO of FAC, the Intermediate Holding of White Mountains Insurance Group Ltd	Outside

APPENDIX B Variable definitions

This appendix presents a detailed description of the construction of all the variables used in the tables.

Variable	Definition
Advising need	Linear combination of the transformed (to standard normal) values of ln(sales), the ratio of R&D expenditures to total assets, the number of segments, and the ratio of capital expenditures to total assets.
Bank debt ratio	Bank debt normalized by book value of total assets.
Big Four auditors	Indicator that equals one if the firm's auditor is one of the Big Four auditing firms (Deloitte, PwC, Ernst & Young, KPMG) and zero otherwise.
Board size	Number of directors on the board.
Capex	Capital expenditure normalized by book value of total assets.
CEO age	CEO's age.
CEO ownership	Firm's shares owned by the CEO normalized by the total number of shares outstanding.
CEO performance-based pay	The proportion of bonus, restricted stock, and option grants in the CEO's total compensation.
CEO turnover	Indicator that equals one if a CEO turnover event occurs in a given year and zero otherwise.
Dividend	Indicator that equals one if the firm pays a dividend and zero otherwise.
Firm age	Number of years since the firm's incorporation.
Founder	Indicator that equals one if the CEO is the founder or a member of the group that founded the company and zero otherwise.

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(Continued)

Variable	Definition
Industry-adjusted ROA	Industry-median-adjusted ROA.
Industry IPO volume	Number of IPO deals in an industry in a given year normalized by the total number of IPO deals in that year.
IPO proceeds	Number of shares issued in the IPO times the offer price (in $millions).
Leverage	Total debt normalized by book value of total assets.
MBA	Indicator that equals one if the CEO holds an MBA degree and zero otherwise.
Monitoring need	Linear combination of the transformed (to standard normal) values of non-debt ratio (1 − leverage ratio), sales growth, indicator for no dividend payout, non-founder CEO indicator, and equity ownership by non-CEOs (1 − CEO ownership).
Non-S&P 1500 public firms	Indicator that equals one if the firm is publicly listed but not in the S&P 1500 index and zero otherwise.
Number of segments	Number of segments a firm has.
Post-IPO	Indicator that equals one for the IPO firm in the post-IPO period and zero otherwise.
Proportion of outside directors	Proportion of outside directors on the board. Outside directors are directors who do not have any executive role in the firm.
Public	Indicator that equals one if the firm is publicly listed and zero otherwise.
Public bond	Indicator that equals one if the firm has public bond outstanding and zero otherwise.
Reputable underwriter	Indicator that equals one if the lead underwriter has a ranking of 9 on a 9-point scale based on Jay Ritter's underwriter rankings and zero otherwise.
ROA	Operational income normalized by book value of total assets.
R&D	R&D expenditures normalized by book value of total assets.
Sales growth	Sales (t)/Sales(t−1) − 1.
S&P 1500 public firms	Indicator that equals one if the firm is in the S&P 1500 index and zero otherwise.
Top 5 large shareholding	Firm's shares owned by the top five largest outside shareholders normalized by the total number of shares outstanding.
Venture-backed firm	Indicator that equals one if the venture capitalist holds at least 10% of the firm's stock and zero otherwise.

APPENDIX C

Two Examples of Board Nomination Procedure in Private Firms

Example 1. Countrywide Financial Corp.

'The Nominating Committee considers and recommends to the Board proposals to be presented for action by the Company's stockholders, and considers and reviews issues relating to the Company's proxy and the annual meeting of stockholders, including the consideration of nominations to the Board of Directors submitted by stockholders. Stockholders wishing to nominate directors must comply with Section 12 of the Company's Bylaws, which requires certain information to be provided in connection with the submission of stockholder nominations and sets forth certain timing requirements with respect

thereto. Messrs. Enis (chairman), Cunningham and Heller are members of this committee which met three times during fiscal 1999.'

Example 2. Pliant Corp.

'The Board of Directors has not established a nominating committee primarily because it believes that the current composition and size of the Board permit candid and open discussion regarding potential new candidates for director. The entire Board of Directors currently operates as our nominating committee, and all directors participate in the consideration of director nominees. There is no formal process or policy that governs the manner in which we identify potential candidates for director and the Board of Directors has not adopted any specific, minimum qualifications that must be met to be nominated to serve as a director. Historically, however, the Board of Directors has considered several factors in evaluating candidates for nomination to the Board, including the candidate's knowledge of our business and the candidate's business experience and credentials. We do not have a formal policy with respect to our consideration of director nominees recommended by our stockholders because the Board of Directors believes that it has been able to give appropriate consideration to candidates recommended by stockholders in prior years on a case-by-case basis.'