ACCOUNTING & FINANCE

afaanz

Accounting and Finance

The diversity of expertise on corporate boards in Australia

Stephen Gray[a] and John Nowland[b]

[a]*UQ Business School, University of Queensland, St. Lucia, QLD, Australia*
[b]*College of Business, Illinois State University, Normal, IL, USA*

Abstract

Expertise diversity is expected to enhance the monitoring and advising functions of boards of directors. Yet, little is known about the expertise that actually exists on corporate boards. In this study, we examine the diversity of professional expertise on corporate boards in Australia and implications for shareholder value. We categorise directors by 11 types of professional expertise and find the most common types of expertise are business executives, accountants, bankers, scientists, lawyers and engineers. We find that expertise diversity is primarily related to board size, industry and location. Our analysis also suggests that shareholders benefit when boards diversify their expertise within a subset of specialist business expertise (lawyers, accountants, consultants, bankers and outside CEOs). Further diversity beyond this subset of expertise is associated with lower firm value and performance.

Key words: Board of directors; Director appointments; Diversity; Firm value; Professional expertise

JEL classification: G30, G34, J44

doi: 10.1111/acfi.12146

We would like to thank the editor, two anonymous reviewers, Daniel Smith, Peter Verhoeven, Mark Doolan, John Chen, Robert Bianchi, Jenny Stewart, Petko Kalev and other seminar/conference participants at Queensland University of Technology, Griffith University, University of South Australia, Hong Kong Shue Yan University and the British Accounting and Finance Conference 2014 for helpful comments, and Jieyang Chong, Rachel Fogelman, Chris Lee and Alan McCrystal for their assistance with data collection.

Received 8 May 2014; accepted 28 April 2015 by Gary Monroe (Editor).

1. Introduction

In recent years, there has been an increased push for greater diversity on corporate boards.[1] Advocates of diversity argue that directors from different business and socio-economic backgrounds bring a greater range of perspectives to the board's monitoring and advising duties. Yet, the focus of much of the push for diversity has been the gender or ethnic composition of the board. The diversity of expertise on the board has received little attention and if guidance is provided, it simply states that boards are expected to '*comprise directors possessing an appropriate range of skills and expertise*' (ASX, 2010, p. 19).[2]

We argue that the professional expertise of directors is a vital component for boards to effectively perform their monitoring and advising functions. A board with greater expertise diversity will apply more viewpoints and varied talents to board oversight (Anderson *et al*., 2011). Directors with different professional backgrounds will also bring a broader base of knowledge, a greater range of perspectives and a larger collection of problem-solving abilities to their advising duties (Jensen, 1993; Klein, 1998; Williams and O'Reilly, 1998).

Prior studies of director expertise have generally focused on the existence of a particular type of expertise. In Australia, studies have examined the accounting expertise and political experience of directors (Christensen *et al*., 2010; Aldamen *et al*., 2012; Gray *et al*., 2014).[3] International studies have also investigated the existence of legal and banking expertise and experience as an outside CEO (Agrawal and Knoeber, 2001; Fich, 2005; Guner *et al*., 2008).

Anderson *et al*. (2011) is the first study that examines multiple types of expertise in the same setting. Their measures of professional heterogeneity include the existence of lawyers, consultants, accountants, bankers and outside CEOs on the board. However, as firms operate in a wide range of industries (mining, pharmaceutical, electronics, banking, energy, utilities and so on), there are likely to be a range of different types of expertise on their boards, which have not yet been investigated.

This study extends the existing literature by investigating the professional background of every director on the board, rather than a subset of directors,

[1] For example, Norway introduced a mandatory gender quota for company boards in 2008. Australia introduced a board diversity reporting regime in 2011. The National Association of Corporate Directors in the United States issued a Blue Ribbon Commission report promoting board diversity in 2012.

[2] One exception is the requirement of at least one financial expert on audit committees in the United States and other jurisdictions.

[3] Australian studies have also examined the independence, gender, experience and interlocking directorships of corporate directors (Cotter and Silvester, 2003; Balatbat *et al*., 2004; Kiel and Nicholson, 2006; Wang and Oliver, 2009; Adams *et al*., 2011; Gray and Nowland, 2013; Chapple and Humphey, 2014).

thereby comprehensively analysing the diversity of professional expertise on corporate boards. We categorise corporate directors into 11 professional expertise groups – academics, accountants, bankers, consultants, doctors, engineers, executives, lawyers, other CEOs, politicians and scientists. Using these 11 types of professional expertise, we examine factors related to the diversity of expertise on corporate boards and investigate whether greater expertise diversity is in the best interests of shareholders.

This analysis is timely as policy-makers are starting to focus more of their attention on the diversity of skills and expertise that exist on corporate boards. For example, the third edition of the Australian Stock Exchange (ASX) Corporate Governance Principles and Recommendations, released in 2014, requires companies to spend more time and effort examining the skills and expertise present on their boards to help identify any gaps in the collective skills of the board.[4] This study provides policy-makers and boards of directors with important information to help with this task.

The sample used in this study covers 8791 directorships in 1548 ASX-listed companies in 2007. The intense nature of the data collection involved in classifying each director by their type of expertise means that this study uses only 1 year of data. However, we are confident that our analysis is applicable to the current business environment in Australia and other markets because the general nature of the guidance provided by policy-makers about the mix of skills and expertise of directors expected on corporate boards (e.g. ASX Corporate Governance Principles and Recommendations) has not changed over time.[5]

Our analysis indicates that the most common types of professional expertise on corporate boards in Australia are business executives, accountants, bankers, scientists, lawyers and engineers. We find that some types of professional expertise are clustered in certain industries – bankers (financial), scientists (materials, energy and health care), engineers (materials, energy and industrials) and academics and doctors (health care) – whereas other types of expertise are prevalent across all industries (accountants, bankers, executives and lawyers). Overall, expertise diversity is greater in firms with bigger boards and is dependent on firm location and industry.

In both our cross-sectional and event study analysis, we find no overall relationship between expertise diversity and firm value. However, we find evidence that shareholders benefit when boards limit their diversity to a subset of specialist business expertise. Specifically, shareholders react positively when directors bring new legal, accounting, consulting, banking and outside CEO

[4] The third edition of the ASX Corporate Governance Principles and Recommendations was released in March 2014 and is effective for financial years starting from 1 July 2014. Recommendation 2.2 covers the skills and expertise of the board. This guidance was changed from commentary to a specific recommendation in this version.

[5] See Section 3 of this study for additional details.

expertise to the board. Further diversity beyond this subset of expertise is associated with lower firm value and performance.

2. Literature review

This research draws on the two main theories in the literature that provide a rationale for board diversity. Agency theory examines the role of monitoring mechanisms and incentives, including the board of directors, in constraining the potentially opportunistic behaviour of managers (Jensen and Meckling, 1976; Fama and Jensen, 1983). Resource dependency theory proposes that directors bring their expertise and experience to the firm to provide advice and counsel, enhance its reputation and facilitate external linkages (Pfeffer, 1972; Pfeffer and Salancik, 1978).

Under both theories, a more diverse board has the potential to produce more effective board outcomes, such as better quality decision-making and more intense monitoring. Klein (1998) proposes that directors from different business and socio-economic backgrounds provide managers with a broader knowledge base relative to directors from more homogeneous backgrounds. Jensen (1993) argues that heterogeneous boards bring different perspectives to their monitoring and advising duties that can provide benefits to shareholders through improved resource utilisation, problem solving and strategy formulation. Williams and O'Reilly (1998) add that greater diversity brings greater resources to problem solving and increases the competitiveness of organisations. In addition, Kandel and Lazear (1992) suggest that greater diversity increases mutual monitoring, which results in less free-riding behaviour.

However, it is also possible that differences in opinion due to the presence of directors with different backgrounds and expertise can create conflicts in the boardroom and slow down decision-making (Baranchuk and Dybvig, 2009). Putnam (2007) argues that greater diversity decreases cooperation, impedes communication and leads to social loafing. Other studies also show that diversity increases the costs of communication and results in higher team member turnover (Lang, 1986; Arrow, 1998).

Board diversity can be measured from a number of different perspectives – gender, ethnicity, age, experience, education and professional expertise.[6] In recent work, Carter *et al*. (2003) find positive relationships between gender and ethnic diversity and firm value. Campbell and Minguez-Vera (2008) and Adams and Ferreira (2009) also find that gender diversity has a positive effect on firm value and board effectiveness. However, Farrell and Hersch (2005) and Chapple and Humphey (2014) find that gender diversity is not significantly

[6] This is not a complete list of measures of diversity. Recent studies also examine variation in the industry experience (e.g. Faleye *et al*., 2012; Knyazeva *et al*., 2012; Masulis *et al*., 2012b; Von Meyerick *et al*., 2012; Wang *et al*., 2013; Dass *et al*., 2014) and the nationality of directors (Masulis *et al*., 2012a).

related to stock market performance. Ali *et al*. (2014) find that age and gender diversity exhibit nonlinear relationships with firm performance. To date, Anderson *et al*. (2011) provides the most comprehensive analysis of board diversity by examining both the social heterogeneity (age, gender and ethnicity) and occupational heterogeneity (education, expertise and experience) of boards of directors. They find that greater board heterogeneity, including overall heterogeneity and both social and occupational heterogeneity, is associated with higher firm performance.

With respect to the professional expertise of directors, prior studies have generally focused on the existence of a specific type of professional expertise. Studies in Australia and overseas have investigated the role of accounting expertise on audit committees (DeFond *et al*., 2005; Christensen *et al*., 2010; Aldamen *et al*., 2012). Agrawal and Knoeber (2001) examine directors with backgrounds in law and politics and find that they are more prevalent on the boards of firms for which politics matters more. Guner *et al*. (2008) examine the role played by directors with banking expertise and show that firms that hire bankers to their boards subsequently increase their use of debt capital. Similarly, Fich (2005) shows that appointment announcement returns are higher for directors with expertise as a CEO of another listed company.

Anderson *et al*. (2011) examine multiple types of professional expertise in the same setting, with their measures of professional heterogeneity including the existence of lawyers, consultants, accountants, bankers and outside CEOs on the board. Jermias and Gani (2014) also examine the number of outside CEOs, academics and government officers in their measure of board capital. We extend their work by categorising directors into 11 professional expertise groups – academics, accountants, bankers, consultants, doctors, engineers, executives, lawyers, other CEOs, politicians and scientists. While most of these professional expertise groups have been the subject of prior work, we are the first to specifically document the existence of directors with expertise as scientists, engineers and medical doctors, and we are the first to examine such a large number of types of expertise in the same setting. In essence, this is the first study to categorise all directors on the board, rather than a subset of directors, by their type of professional expertise, which substantially reduces the possibility of omitted variable bias.

We expect the diversity of expertise on corporate boards to be determined by a number of factors – firm complexity, CEO power, location, firm attractiveness, board size and industry. Anderson *et al*. (2011) propose that board diversity is primarily driven by firm complexity and CEO power. They argue that greater firm complexity increases the demand for varying talents and skills of its board members. Shivdasani and Yermack (1999) show that powerful CEOs are associated with less independent boards, which means they experience less oversight. Thus, if expertise diversity improves the monitoring of management, powerful CEOs are expected to prefer less diverse boards.

Recent studies also suggest that board composition is influenced by supply factors, such as firm location and firm attractiveness. Since Knyazeva *et al.* (2013) show that that the supply of directors is heavily dependent on location, we expect the types of professional expertise on boards to be related to the location of the company and the supply of local talent. Masulis and Mobbs (2014) show that corporate directors place greater value on more prestigious directorships. Therefore, we expect more attractive firms to have a greater ability to attract a more diverse range of potential director candidates, suggesting that firm attractiveness is positively related to expertise diversity.

With respect to board characteristics, we expect larger and more independent boards to have more positions available to enable there to be a greater diversity of expertise present on the board. We also expect strong industry effects for certain types of expertise. For example, while scientists, engineers and doctors may exist on the boards of all firms, they are most likely to be concentrated in specific industries where their expertise is most relevant – the mining, energy and health care industries.

To determine whether shareholders benefit from higher or lower professional expertise diversity on the board, we relate expertise diversity to firm value. While it is possible that directors from different professional backgrounds find it harder to communicate effectively with each other, resulting in reduced cooperation, greater conflict and slower decision-making (Putnam, 2007; Baranchuk and Dybvig, 2009), the broader literature suggests that this is unlikely to be the dominant effect. A sizable literature posits that greater diversity of expertise on the board is expected to be beneficial to the monitoring and advising functions of the board. Anderson *et al.* (2011) propose that occupationally diverse boards bring multiple perspectives and varied talents to board oversight, resulting in greater monitoring benefits to shareholders. Kandel and Lazear (1992) suggest that greater diversity on the board increases mutual monitoring, which results in less free-riding behaviour. This suggests that boards with greater professional expertise diversity would be expected to exhibit stronger monitoring of management, which results in lower agency costs and higher firm performance.

Shareholders can also benefit from higher professional expertise diversity through improved advising outcomes. Directors from different professional backgrounds potentially bring a broader base of knowledge, a greater range of perspectives and a larger collection of problem-solving abilities to their advising duties (Jensen, 1993; Klein, 1998; Williams and O'Reilly, 1998). This is expected to result in better operational and strategic decision-making within the firm, resulting in enhanced firm competitiveness. These beneficial influences on the monitoring and advising functions of the board lead us to expect a positive relationship between professional expertise diversity and firm value.

As boards of directors are potentially endogenously determined (Hermalin and Weisbach, 2003), we test for a positive relationship between professional expertise diversity and firm value using a number of methodologies. In our

cross-sectional analysis, we use a two-stage least squares approach to reduce endogeneity concerns (Brown *et al*., 2011), with location variables used as instrumental variables (Anderson *et al*., 2011; Knyazeva *et al*., 2013). We also use an event study of new director appointments as an alternative setting to examine the relationship between professional expertise diversity and firm value.

Prior research using event studies shows that the market reaction to the appointment of directors varies with director characteristics. For example, the market reacts favourably to the appointment of directors with accounting expertise, CEO experience, female directors and experienced directors, but unfavourably to busy directors (Rosenstein and Wyatt, 1990; Ferris *et al*., 2003; DeFond *et al*., 2005; Fich, 2005; Fich and Shivdasani, 2006; Adams *et al*., 2011; Gray and Nowland, 2013). In our event study analysis, we expect the market reaction to be higher for directors that bring a new type of expertise to the board.

3. Professional expertise on corporate boards

To examine the types of professional expertise on corporate boards, we use a sample of ASX-listed companies. In Australia, section 300 of the Corporations Act 2001 and ASX-listing requirements mandate companies to disclose the skills, qualifications, experience and expertise relevant to the position of director held by each director in office. This information from director biographies in annual reports, along with supplementary internet searches, allows us to classify each director by their type of professional expertise.

Since the release of the first edition of the ASX Principles of Good Corporate Governance and Best Practice Recommendations in 2003, companies have only been provided with general guidance about the diversity of expertise expected on boards of directors, such as '*it is important that the board be of a size and composition that is conducive to making decisions expediently, with the benefit of a variety of perspectives and skills*' (ASX, 2003, p. 22) and boards are expected to '*comprise directors possessing an appropriate range of skills and expertise*' (ASX, 2010, p. 19). The third edition of the ASX Corporate Governance Principles and Recommendations, released in 2014, has maintained the same general theme but has increased the focus of the guidance from commentary to a specific recommendation – '*a listed entity should have and disclose a board skills matrix setting out the mix of skills and diversity that the board currently has or is looking to achieve in its membership*' (ASX, 2014, p. 15).[7]

Due to the intense nature of the data collection involved in classifying each director by their type of expertise, this study focuses on a large cross-section of directors in one particular year, 2007. We believe that focusing on

[7] We believe this only increases the importance of our analysis in understanding the diversity of expertise that exists on corporate boards.

1 year does not limit the generalisability of our analysis because, as shown above, the general nature of the guidance provided by the ASX Corporate Governance Principles and Recommendations about the mix of skills and expertise of directors expected on corporate boards has not changed over time. Thus, we are confident that our analysis is applicable to the current business environment in Australia and is relevant to the current situation in other markets.[8]

Our sample initially comprises all directors and firms available from the Boardroom database from Connect4 in 2007. After removing repeat director observations, alternate directors and a small number of companies where we could not find information on the professional expertise of all board members, our sample includes 8791 directorships in 1548 ASX-listed companies.[9]

Each director is classified by their type of professional expertise – accountant, banker, lawyer, scientist, engineer, consultant, politician, academic, doctor, other CEO or business executive.[10] Where directors have professional expertise in more than one area, they are classified by their primary expertise. All variable definitions are provided in the Appendix. Of the total of 8791 directorships, 4077 are held by executives, 1465 by accountants, 1102 by bankers, 695 by scientists, 620 by lawyers, 375 by engineers, 161 by consultants, 85 by both politicians and other CEOs, 65 by academics and 61 by doctors.

Table 1 shows the percentage of all firms and firms by industry (10 GICS industry sectors) with each type of professional expertise on their board. The statistics for all firms show that 85.92 percent of firms have at least one executive on their board, 64.01 percent have at least one accountant, 39.41 percent have at least one banker, 33.98 percent have at least one lawyer, 29.78 percent have at least one scientist, 18.67 percent have at least one engineer, 9.69 percent have at least one consultant, 5.36 percent have at least one politician, 5.04 percent have at least one other CEO, 4.20 percent have at least one academic, and 3.36 percent have at least one doctor. The table also shows that there is obvious clustering of some types of expertise in certain industries. Bankers are most prevalent in firms in the Financial sector. Scientists are most prevalent in firms in the materials, energy and health care industries. Engineers are most prevalent in firms in the materials,

[8] As an additional check, we track the board composition of a random sample of 36 sample companies each year from 2007 to 2012 and find that average board size (6.64) and the average number of types of expertise on the board (3.33) are the same in 2007 and 2012.

[9] We remove only 13 firms from our analysis because we cannot find professional expertise information on one or more directors on their boards.

[10] Professional expertise classifications were undertaken by two research assistants with the authors making a final decision on any classifications that were not consistent between the two research assistants.

Table 1
Percentage of firms with each type of professional expertise

	All firms	Consumer discretionary	Consumer staples	Energy	Financial	Health care	Industrials	Information technology	Materials	Telecom services	Utilities
Executives	85.92	98.57	100.00	78.06	75.10	97.10	99.42	100.00	76.41	100.00	95.83
Accountants	64.01	67.86	79.59	65.16	70.36	50.00	58.38	64.15	63.88	54.84	70.83
Bankers	39.41	30.71	34.69	29.68	81.03	36.23	26.59	32.08	31.11	32.26	41.67
Lawyers	33.98	39.29	20.41	37.42	38.34	28.99	27.75	26.42	35.70	35.48	33.33
Scientists	29.78	3.57	4.08	60.65	1.98	28.99	5.78	0.94	62.84	3.23	8.33
Engineers	18.67	3.57	0.00	32.26	5.14	4.35	21.39	2.83	35.49	6.45	12.50
Consultants	9.69	14.29	6.12	10.32	6.71	11.59	10.98	13.21	8.77	9.68	0.00
Politicians	5.36	5.00	10.20	2.58	3.95	5.80	10.40	11.32	3.34	0.00	12.50
Other CEOs	5.04	6.43	4.08	3.87	5.53	5.80	4.05	2.83	5.01	6.45	12.50
Academics	4.20	2.86	0.00	4.52	4.35	18.12	2.31	2.83	1.67	6.45	4.17
Doctors	3.36	0.71	0.00	0.65	1.58	31.16	0.00	0.94	0.42	0.00	0.00
No. firms	1548	140	49	155	253	138	173	106	479	31	24

This table shows the percentage of all firms and firms by industry with at least one director with the specific type of professional expertise on their board. The sample includes 1548 ASX-listed firms in 2007. Variable definitions are provided in the Appendix.

energy and industrials industries. Academics and doctors are most prevalent in firms in the health care industry.

Table 2 displays average board characteristics for all firms and across industries. Significance is shown for industry statistics that are higher (+) or lower (−) than the mean for all other industries. The average board has 5.68 directors and is comprised of 44.70 percent of executives, 17.04 percent of accountants, 12.10 percent of bankers, 9.42 percent of scientists, 7.23 percent of lawyers, 4.51 percent of engineers, 1.88 percent of consultants, 0.91 percent of politicians, 0.83 percent of other CEOs, 0.71 percent of doctors and 0.66 percent of academics. The number of types of expertise on the board ranges from 1 to 7 with an average of 2.99 (average expertise index of 0.53).[11] There are significantly more types of expertise on the boards of firms in the energy (3.25), materials (3.25) and health care (3.18) industries, due to the clustering of scientists, engineers, doctors and academics in these industries.

Figure 1 highlights these differences in professional expertise across industries for boards comprised of 10 directors. In the energy and materials industries, boards have approximately 3 executives, 2 scientists, 2 accountants, 1 engineer, 1 lawyer and 1 banker. In the Financial sector, boards have approximately 4 bankers, 3 executives, 2 accountants and 1 lawyer. In the health care industry, boards have approximately, 5 executives, 1 accountant, 1 banker, 1 scientist, 1 doctor and 1 lawyer. In all other industries, boards generally have 6 executives, 2 accountants, 1 banker and 1 lawyer.

Figure 2 also shows that the number of types of expertise on the board is positively related to board size. When there are three directors on the board, the average number of types of expertise is 2.27. When board size is seven, there is an average of 3.26 types of expertise on the board. When board size is eleven, there is an average of 3.76 types of expertise on the board. For the largest board of seventeen directors, there are 7.00 different types of professional expertise on the board.

In summary, this initial analysis highlights three aspects of the professional expertise of directors on corporate boards. First, industry is an important determinant of the type of expertise present on corporate boards. For example, we find that certain types of expertise are clustered in particular industries – bankers (financial), scientists (materials, energy and health care), engineers (materials, energy and industrials) and academics and doctors (health care). Second, the number of types of expertise on boards is positively related to board size, which suggests that boards are more likely to diversify their professional expertise when they have more board seats to fill. Third, while

[11] The breakdown of firms by the number of types of expertise is 1 type of expertise = 5.4 percent of firms, 2 = 26.9 percent, 3 = 39.3 percent, 4 = 20.8 percent, 5 = 6.7 percent, 6 = 0.9 percent and 7 = 0.06 percent.

Table 2
Board characteristics

	All firms	Consumer discretionary	Consumer staples	Energy	Financial	Health care	Industrials	Information technology	Materials	Telecom services	Utilities
Board size	5.68	6.30^{+++}	6.59^{+++}	5.05^{---}	6.03^{+++}	5.93	6.17^{+++}	5.44	5.14^{---}	6.13	6.75^{++}
% Executives	44.70	64.04^{+++}	68.80^{+++}	33.65^{---}	29.22^{---}	54.72^{+++}	64.89^{+++}	63.66^{+++}	31.72^{---}	68.98^{+++}	57.96^{++}
% Accountants	17.04	16.56	16.80	18.18	20.06^{+++}	11.41^{---}	14.25^{--}	16.54	18.11^{+}	14.19	17.95
% Bankers	12.10	5.98^{---}	6.09^{--}	6.73^{---}	37.38^{+++}	7.19^{---}	5.51^{---}	6.97^{---}	8.31^{---}	6.79	9.46
% Scientists	9.42	0.74^{---}	0.92^{---}	20.81^{+++}	0.46^{---}	7.08	1.38^{---}	0.19^{---}	20.38^{+++}	0.36^{---}	3.61^{-}
% Lawyers	7.23	7.44	3.36^{--}	8.35	8.42^{+}	5.56^{-}	5.28^{--}	5.87	8.27^{++}	5.94	4.64
% Engineers	4.51	0.64^{---}	0.00^{---}	7.93^{+++}	0.95^{---}	0.68^{---}	4.38	0.82^{---}	9.19^{+++}	1.00^{-}	2.16
% Consultants	1.88	2.46	1.10	2.20	1.07^{--}	2.09	1.88	2.80	1.99	1.28	0.00
% Politicians	0.91	0.58	1.84	0.53	0.68	0.86	1.76^{+++}	2.10^{+++}	0.59^{--}	0.00	2.40^{+}
% Other CEOs	0.83	0.94	1.09	0.59	0.82	0.87	0.45	0.39	1.04	0.76	1.36
% Doctors	0.71	0.10^{-}	0.00	0.16^{-}	0.34	6.56^{+++}	0.00^{--}	0.19	0.11^{---}	0.00	0.00
% Academics	0.66	0.49	0.00	0.87	0.61	2.98^{+++}	0.22^{-}	0.49	0.28^{---}	0.69	0.46
No. Expertise											
Mean	2.99	2.73^{---}	2.59^{---}	3.25^{+++}	2.94	3.18^{++}	2.67^{---}	2.58^{---}	3.25^{+++}	2.54^{--}	2.92
Minimum	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Maximum	7.00	5.00	5.00	6.00	6.00	6.00	6.00	5.00	7.00	6.00	5.00
Expertise Index											
Mean	0.53	0.45^{---}	0.43^{---}	0.61^{+++}	0.53	0.54	0.44^{---}	0.44^{---}	0.61^{+++}	0.42^{---}	0.50
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	0.82	0.78	0.78	0.82	0.79	0.81	0.82	0.80	0.82	0.74	0.75
No. firms	1548	140	49	155	253	138	173	106	479	31	24

This table shows mean (and selected minimum and maximum) board characteristics for all firms and by industry for 1548 ASX-listed firms in 2007. Notations denote results of mean *t*-tests as to whether the mean for the particular industry is higher than all other industries at the 1% +++, 5% ++ and 10% + levels or lower than all other industries at the 1% −−−, 5% −− and 10% − levels. Variable definitions are provided in the Appendix.

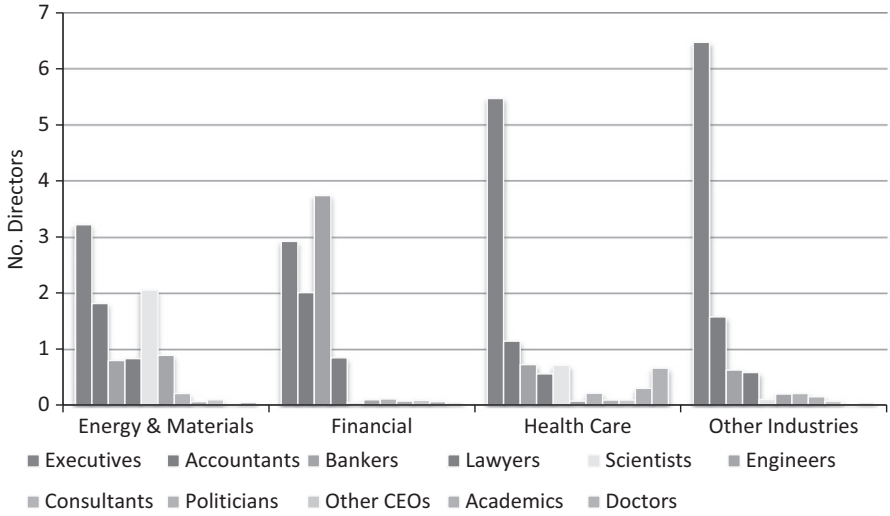

Figure 1 Average number of directors with each type of expertise across industries (board size = 10).

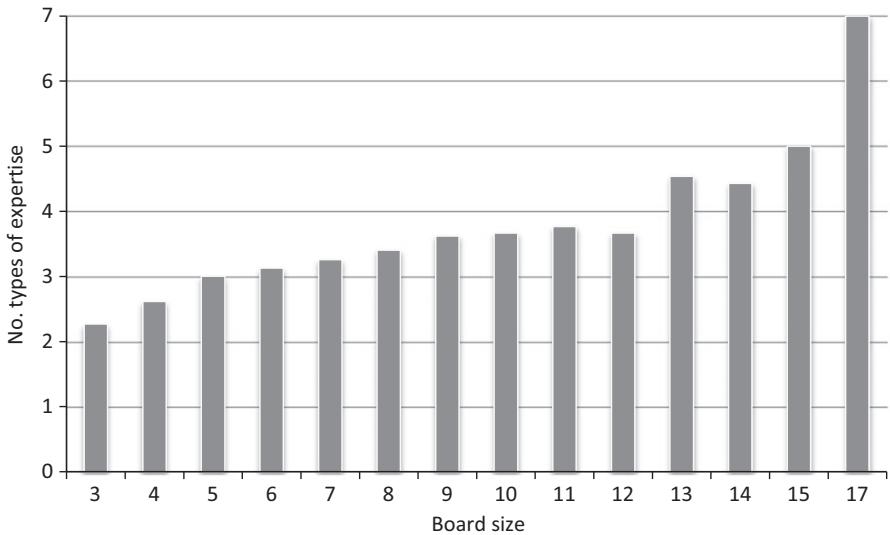

Figure 2 Board size and average number of types of expertise.

certain types of expertise are prevalent across all industries (executives, accountants, bankers and lawyers), we also find that less common types of expertise are also found in most industries. For example, some firms in the

financial sector have scientists, engineers, academics and doctors on their board.

4. Professional expertise diversity and firm value

In this section, we examine factors related to professional expertise diversity and relate the diversity of expertise on the board to firm value. The cross-sectional sample used in this section includes 1196 ASX-listed firms in 2007 that have director data available from the Boardroom database from Connect4 and firm financial data available from the Aspect DatAnalysis database. Firm financial data include total assets, return on assets, leverage and Tobin's Q in 2007 and asset growth from 2006 to 2007. The financial variables (excluding total assets) are winsorized at the 1st and 99th percentiles.

Table 3 provides descriptive statistics of this cross-sectional sample. Panel A shows that the mean (median) firm has total assets of $2.66 billion ($36 million), Tobin's Q of 2.83 (1.94), return on assets of −9.59 percent (0.39 percent), asset growth of 57.13 percent (21.42 percent) and debt to total assets of 0.33 (0.29). Average board size is 5.74, with board independence of 38.18 percent, female representation of 4.01 percent and 38.97 percent of directors with other directorships in listed companies.[12] The incidence of Chairman–CEO duality is 9.28 percent. The average number of types of expertise on the board is 3.02, average expertise index is 0.54, and average industry-adjusted number of expertise is 1.01.[13]

Panel B displays information on the location of the primary registered office of the firms in the cross-sectional sample. This information is acquired from the corporate directory section of firm annual reports. Most firms are located in the states of Western Australia (375), New South Wales (355), Victoria (246), Queensland (114) and South Australia (44). Due to the small number of observations from the Australian Capital Territory (5), Tasmania (5) and the Northern Territory (1), we treat these as a combined group in our analysis. There are also 51 firms with their primary registered offices outside of Australia, which we denote as Foreign. Mean *t*-tests show that the average number of types of expertise is significantly higher for firms located in Western Australia and outside of Australia and significantly lower for firms located in

[12] Independent directors are identified by the company based on the guidelines provided by the ASX Corporate Governance Principles and Recommendations. For details, see http://www.asx.com.au/regulation/corporate-governance-council.htm.

[13] The descriptive statistics are comparable to those of Christensen *et al*. (2010) who have a sample of 1039 companies in 2004. Their median firm size is $32 million, and median board size is 5 directors.

Table 3
Descriptive statistics of cross-sectional sample

Panel A: Firm characteristics

	Mean	Median	Min.	Max.	Std. dev.
Total assets (billions)	2.66	0.04	0.00	564.63	26.57
Tobin's Q	2.83	1.94	0.01	9.27	2.30
Return on assets (%)	−9.59	0.39	−100.00	82.32	30.59
Growth (%)	57.13	21.42	−94.00	376.00	101.56
Debt to total assets	0.33	0.29	0.00	1.00	0.27
Board size	5.74	5.00	3.00	17.00	2.16
% Independent	38.18	40.00	0.00	100.00	27.26
% Females	4.01	0.00	0.00	66.67	8.81
% Other directorships	38.97	33.33	0.00	100.00	27.58
Duality	9.28	0.00	0.00	100.00	29.32
No. Expertise	3.02	3.00	1.00	7.00	1.02
Expertise index	0.54	0.58	0.00	0.82	0.18
Industry adjusted no. expertise	1.01	0.94	0.31	2.35	0.33

Panel B: Location

	n	No. Expertise	*t*-statistic
WA	375	3.11	2.00**
NSW	355	2.99	−0.72
VIC	246	2.87	−2.59***
QLD	114	2.95	−0.84
SA	44	3.05	0.14
ACT/TAS/NT	11	2.91	−0.37
FOREIGN	51	3.51	3.48***

This table shows descriptive statistics of firm characteristics in Panel A and average number of types of expertise by firm location in Panel B. The sample includes 1196 ASX-listed firms in 2007 with director data available from the Boardroom database from Connect4 and financial data available from the Aspect DatAnalysis database. Location data is the primary registered office of firms collected from the corporate directory section of annual reports. The locations of ACT, TAS and NT are grouped together due to the small number of observations. Variable definitions are provided in the Appendix. Asterisks denote significance of mean tests of the number of expertise between the identified location and all other locations at 1% ***, 5% ** and 10% *.

Victoria. These differences between locations likely reflect differences in both the industry composition of firms and the supply of local director expertise.[14]

The prior section indicates that the number and types of professional expertise on corporate boards differ across industries and by board size. In this section, we examine these and other factors related to the diversity of expertise

[14] These differences are important as location is used as an instrumental variable in our subsequent analysis.

on corporate boards – firm complexity, CEO power, firm location, firm attractiveness, board size and industry. Greater firm complexity is expected to increase the demand for a diverse range of expertise on the board (Anderson *et al*., 2011). We use firm size and leverage to examine the relationship between firm complexity and board expertise diversity. If expertise diversity improves the monitoring of management, then powerful CEOs are expected to prefer less diverse boards (Shivdasani and Yermack, 1999; Anderson *et al*., 2011). We use Chairman–CEO duality to examine the relationship between CEO power and board expertise diversity.

Board composition can also be influenced by supply factors, such as firm location and firm attractiveness. We expect the types of professional expertise on boards to be related to the location of the company and hence the local supply of director expertise (Knyazeva *et al*., 2013). As directors prefer more prestigious directorships (Masulis and Mobbs, 2014), more attractive firms are expected to have a greater ability to attract a more diverse range of potential director candidates. We use firm size, return on assets and growth prospects as proxies for firm attractiveness.

With respect to board factors, we expect larger and more independent boards to have more positions available to enable there to be a greater diversity of expertise present on the board. We also expect strong industry effects for certain types of expertise. For example, while scientists, engineers and doctors may exist on the boards of all firms, they are most likely to be concentrated in specific industries where their expertise is most relevant – the mining, energy and health care industries. To control for correlations between different aspects of board diversity, we also relate expertise diversity to the gender diversity and director experience diversity of the board.[15] Thus, our model relating board expertise diversity to these factors is:

$$\begin{aligned} \textit{Expertise diversity}_i = \alpha + \sum \textit{Firm}_i + \sum \textit{Board}_i + \sum \textit{Industry}_i \\ + \sum \textit{Location}_i + \varepsilon_i \end{aligned} \quad (1)$$

where $\textit{Expertise diversity}_i$ represents the number of types of expertise or the expertise index or the industry-adjusted number of expertise for company *i*. $\textit{Firm}_i$ is a set of firm level variables including the natural logarithm of total assets, return on assets, growth and debt to total assets. $\textit{Board}_i$ is a set of board level variables including board size, percentage of independent directors, percentage of female directors, percentage of directors with other directorships

[15] Kaczmarek *et al*. (2012) also examine the relationship between nomination committees and board diversity. In our sample, only 305/1196 (= 26 percent) of firms have a nomination committee. If we include a nomination committee dummy variable in our models in Table 4, we find an insignificant coefficient on this nomination committee dummy variable in all specifications. Similarly, we find no differences in the results in Tables 4 and 5 between firms with and without nomination committees.

and duality. $Industry_i$ is a set of industry sector dummy variables (e.g. consumer staples, energy, materials, utilities), and $Location_i$ is a set of location dummy variables (e.g. WA, NSW, VIC, QLD). We use Poisson count models when the dependent variable is the number of types of expertise and ordinary least squares (OLS) models for continuous dependent variables. All specifications include robust standard errors.

Table 4 provides the results of our analysis of expertise diversity. We find that both the number of types of professional expertise and the expertise index are positively related to board size, higher for firms in the energy, financial, health care and materials industries, and lower for firms located in the states of New South Wales and Victoria. The number of types of expertise is also positively related to board independence, while the expertise index is positively related to firm growth. The results for the industry-adjusted number of expertise are similar, except the significance of the industry results is diminished due to the industry adjustment.

To compare our results to those of Anderson *et al.* (2011), we separate our types of professional expertise into two subsets. The first subset includes the five types of specialist business expertise (lawyers, consultants, accountants, bankers and other CEOs) covered by Anderson *et al.* (2011). The second subset includes the additional six types of expertise we introduce in this study – the general business expertise of executives and the specific expertise of scientists, engineers, politicians, academics and medical doctors.[16]

We find diversity within the first subset of specialist business expertise (lawyers, consultants, accountants, bankers and other CEOs) is positively related to return on assets, leverage and board size and is higher in the financial sector and lower in the industrials sector and in the states of Victoria and Queensland. These results are similar to Anderson *et al.* (2011) who find that their measures of diversity are positively related to firm complexity (including leverage), firm performance and board size. However, we find that diversity within the second subset is negatively related to return on assets and director experience (percentage of directors with other directorships in listed companies), is positively related to board size and independence, is higher in the energy, health care, industrials, materials and utilities industries and is lower in the financial industry and in the states of New South Wales and Victoria.

Thus, this analysis highlights some differences in the results between different measures of expertise diversity. For example, for return on assets, we find no relationship with the overall number of types of professional expertise, a positive relationship with the first subset of specialist business expertise and a negative relationship with the second subset of other types of expertise. The positive relationship suggests that better performing firms have more diversity

[16] The results are consistent if we exclude the general business expertise category from this second subset. It is included to ensure we include the expertise of all the directors on the board in our analysis.

Table 4
Professional expertise diversity

	No. Expertise (1)	Expertise index (2)	Industry adjusted No. Expertise (3)	No. Expertise (*Lawyers, Consultants, Accountants, Bankers, Other CEOs*) (4)	No. Expertise (*Other types of expertise*) (5)
Intercept	0.56***	0.37***	0.52***	−0.17**	−0.11*
	(12.88)	(13.70)	(11.39)	(−2.26)	(−1.90)
Ln (Total assets)	−0.01	−0.01	−0.01	−0.01	−0.01
	(−1.53)	(−1.25)	(−1.36)	(−0.87)	(−1.30)
Return on assets	−0.02	−0.02	−0.02	0.11*	−0.12**
	(−0.61)	(−0.82)	(−0.63)	(1.69)	(−2.53)
Growth	0.01	0.01**	0.01	0.02	0.01
	(1.61)	(2.17)	(1.54)	(1.06)	(0.88)
Debt to total assets	0.02	0.01	0.02	0.13*	−0.09
	(0.45)	(0.06)	(0.43)	(1.86)	(−1.59)
Board size	0.07***	0.02***	0.08***	0.09***	0.06***
	(15.64)	(6.52)	(14.63)	(11.59)	(7.70)
% Independent	0.09***	0.03	0.09***	0.04	0.14***
	(2.97)	(1.61)	(2.72)	(0.73)	(3.12)
% Females	−0.08	−0.04	−0.08	−0.14	−0.06
	(−0.80)	(−0.66)	(−0.78)	(−0.76)	(−0.42)
% Other directorships	−0.02	−0.01	−0.02	0.03	−0.08*
	(−0.65)	(−0.31)	(−0.51)	(0.62)	(−1.80)
Duality	−0.03	−0.02	−0.03	−0.05	−0.01
	(−1.05)	(−1.11)	(−0.95)	(−0.94)	(−0.22)
Consumer staples	−0.04	−0.01	0.01	−0.05	−0.03
	(−0.64)	(−0.11)	(0.20)	(−0.44)	(−0.56)
Energy	0.25***	0.16***	0.08*	0.06	0.46***
	(6.24)	(6.85)	(1.92)	(0.85)	(9.83)
Financial	0.13***	0.10***	0.06	0.27***	−0.14***
	(3.22)	(4.10)	(1.42)	(4.49)	(−2.37)
Health care	0.20***	0.10***	0.05	−0.07	0.48***
	(4.49)	(3.59)	(1.04)	(−0.93)	(8.82)
Industrials	−0.02	−0.01	0.01	−0.25***	0.23***
	(−0.50)	(−0.53)	(0.11)	(−3.51)	(5.57)
Information technology	0.02	0.01	0.08	−0.01	0.07
	(0.43)	(0.31)	(1.59)	(−0.04)	(1.32)
Materials	0.24***	0.15***	0.07*	0.03	0.46***
	(6.67)	(7.07)	(1.93)	(0.48)	(11.46)
Telecom services	−0.07	−0.04	−0.01	−0.13	0.02
	(−0.88)	(−0.98)	(−0.03)	(−1.00)	(0.24)
Utilities	0.07	0.04	−0.01	−0.05	0.21**
	(0.76)	(0.81)	(−0.05)	(−0.30)	(2.35)
NSW	−0.04*	−0.03**	−0.04*	0.01	−0.09***

(continued)

Table 4 (continued)

	No. Expertise (1)	Expertise index (2)	Industry adjusted No. Expertise (3)	No. Expertise (*Lawyers, Consultants, Accountants, Bankers, Other CEOs*) (4)	No. Expertise (*Other types of expertise*) (5)
	(−1.65)	(−2.23)	(−1.64)	(0.18)	(−2.66)
VIC	−0.08***	−0.04***	−0.08***	−0.08*	−0.07*
	(−2.91)	(−2.72)	(−2.93)	(−1.67)	(−1.87)
QLD	−0.04	−0.02	−0.05	−0.11*	0.03
	(−1.21)	(−1.24)	(−1.31)	(−1.68)	(0.62)
SA	−0.01	−0.01	−0.01	−0.02	0.01
	(−0.15)	(−0.43)	(−0.17)	(−0.22)	(0.13)
ACT/TAS/NT	−0.03	−0.03	−0.05	0.09	−0.18
	(−0.40)	(−0.62)	(−0.56)	(0.69)	(−1.36)
FOREIGN	−0.01	−0.03	−0.01	0.01	−0.02
	(−0.28)	(−1.00)	(−0.17)	(0.18)	(−0.38)
R^2	0.30	0.19	0.26	0.22	0.30
n	1196	1196	1196	1196	1196

This table shows Poisson count and OLS models. Poisson count models examine the determinants of the number of types of professional expertise. OLS models examine determinants of industry-adjusted number of expertise and the expertise index. The sample includes 1196 ASX-listed firms in 2007 with director data available from the Boardroom database from Connect4 and financial data available from the Aspect DatAnalysis database. Location data is the primary registered office of firms collected from the corporate directory section of annual reports. The locations of ACT, TAS and NT are grouped together due to the small number of observations. Variable definitions are provided in the Appendix. *t*-statistics (*z*-statistics) are in parentheses. Asterisks denote significance at 1% ***, 5% ** and 10% *.

within the subgroup of specialist business expertise. The negative relationship suggests that poor performing firms have more diversity with the subgroup of other expertise. These differences suggest that certain groupings of expertise may be more beneficial than others.

In summary, our analysis of the factors related to board expertise diversity indicates that the primary determinants are board size, industry and location. We find little evidence that other factors, such as firm complexity, CEO power and firm attractiveness, have a significant influence on the diversity of expertise on corporate boards. However, we stress that our analysis of different subgroups of expertise indicates that results can differ depending on the types of expertise included (or excluded) in the measure of expertise diversity.

Next, we investigate the relationship between expertise diversity and firm value. Consistent with prior studies, our measure of firm value is Tobin's *Q* and

control variables include firm, board and industry factors. Our model relating expertise diversity to firm value is

$$Tobin's\ Q_i = \alpha + Expertise\ diversity_i + \sum Firm_i + \sum Board_i + \sum Industry_i + \varepsilon_i \quad (2)$$

where $Expertise\ diversity_i$ represents the number of types of expertise or the expertise index or the industry-adjusted number of expertise for company *i*. $Firm_i$ is a set of firm level variables including the natural logarithm of total assets, return on assets, growth and debt to total assets. $Board_i$ is a set of board level variables including board size, percentage of independent directors, percentage of female directors, percentage of directors with other directorships and duality. $Industry_i$ is a set of industry sector dummy variables (e.g. consumer staples, energy, materials, utilities). All specifications include robust standard errors.

Table 5 displays these results. In the first specification, we use OLS to relate the number of types of expertise to firm value and find an insignificant relationship. In the second specification, we use a two-stage approach (2SLS) to control for potential endogeneity between firm value and expertise diversity. The first stage is model 1 and effectively uses the location variables as instrumental variables.[17] In the second stage, we use the predicted values from the first stage for the number of types of professional expertise. Using this 2SLS approach, we find that the number of types of expertise is insignificantly related to firm value.

In the third and fourth specifications, we repeat our analysis using the expertise index and industry-adjusted number of expertise as the measures of expertise diversity and continue to find insignificant relationships with firm value. In the fifth specification, we follow Ali *et al.* (2014) and estimate a nonlinear relationship between the number of types of expertise and firm value and again find insignificant results. In the sixth specification, we split the number of types of expertise into two subsets, with the first subset consistent with the types of specialist business expertise covered by Anderson *et al.* (2011). We find that both subsets of expertise diversity are insignificantly related to firm value.

We also repeat our analysis using return on assets as an alternative measure of firm performance.[18] In unreported results, we find insignificant relationships between expertise diversity and return on assets in the first five specifications in Table 5. For the final specification, including the two subsets of expertise

[17] We believe location is a good instrument as we show that location is significantly related to the diversity of professional expertise in both Tables 3 and 4. Location has also been used as a valid instrument in prior studies (Anderson *et al.*, 2011; Knyazeva *et al.*, 2013).

[18] We also repeat our analysis using Tobin's *Q* and return on assets in 2008 instead of 2007, with consistent results.

Table 5
Expertise diversity and firm value

	Tobin's *Q*						ROA
	OLS (1)	2SLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)	OLS (7)
Intercept	2.85***	2.16***	2.93***	2.83***	3.17***	2.83***	−0.04
	(10.38)	(3.49)	(10.39)	(10.27)	(6.94)	(10.23)	(−1.18)
No. Expertise	0.07				−0.14		
	(0.99)				(−0.59)		
Predicted		0.64					
(No. Expertise)		(1.39)					
Expertise index			0.01				
			(0.01)				
Industry adj.				0.21			
No. Expertise				(1.10)			
No. Expertise^2					0.03		
					(0.88)		
No. Expertise (*Lawyers, Consultants, Accountants, Bankers, Other CEOs*)						0.04	0.01
						(0.51)	(0.67)
No. Expertise (*Other types of expertise*)						0.11	−0.02**
						(1.18)	(−2.15)
Ln(Total assets)	−0.16***	−0.14***	−0.17***	−0.16***	−0.16***	−0.16***	0.09***
	(−3.57)	(−2.99)	(−3.60)	(−3.57)	(−3.55)	(−3.51)	(18.05)
Return on assets	−1.97***	−1.93***	−1.97***	−1.97***	−1.97***	−1.96***	
	(−5.60)	(−5.53)	(−5.61)	(−5.59)	(−5.59)	(−5.58)	
Growth	0.23***	0.21***	0.24***	0.23***	0.23***	0.23***	0.04***
	(3.98)	(3.40)	(4.03)	(3.98)	(3.99)	(3.98)	(5.59)

Table 5 (continued)

	Tobin's *Q*						ROA
	OLS (1)	2SLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)	OLS (7)
Debt to total assets	−0.67**	−0.70**	−0.66**	−0.67**	−0.67**	−0.66**	−0.28***
	(−2.29)	(−2.41)	(−2.28)	(−2.28)	(−2.30)	(−2.26)	(−7.81)
Board size	0.01	−0.13	0.02	0.01	0.01	0.01	−0.03***
	(0.21)	(−1.12)	(0.70)	(0.18)	(0.09)	(0.22)	(−6.98)
% Independent	0.40*	0.25	0.42*	0.40*	0.40*	0.39*	−0.02
	(1.72)	(0.96)	(1.79)	(1.71)	(1.70)	(1.67)	(−0.61)
% Females	−0.05	0.12	−0.08	−0.06	−0.05	−0.05	0.12
	(−0.08)	(0.17)	(−0.11)	(−0.09)	(−0.08)	(−0.07)	(1.38)
% Other	0.47**	0.50**	0.47**	0.47**	0.48**	0.48**	−0.04
directorships	(1.99)	(2.11)	(1.98)	(1.98)	(2.01)	(2.03)	(−1.49)
Duality	−0.07	−0.01	−0.07	−0.07	−0.08	−0.07	0.01
	(−0.36)	(−0.03)	(−0.36)	(−0.35)	(−0.38)	(−0.33)	(0.29)
Consumer staples	−0.51	−0.45	−0.51	−0.52	−0.50	−0.51	−0.09**
	(−1.60)	(−1.38)	(−1.61)	(−1.63)	(−1.59)	(−1.60)	(−2.04)
Energy	−0.04	−0.50	0.02	−0.01	−0.04	−0.07	−0.19***
	(−0.12)	(−1.09)	(0.06)	(−0.01)	(−0.12)	(−0.22)	(−6.45)
Financial	−0.66***	−0.88***	−0.63***	−0.64***	−0.66***	−0.64***	−0.07***
	(−2.84)	(−3.02)	(−2.70)	(−2.82)	(−2.85)	(−2.75)	(−2.90)
Health care	0.29	−0.04	0.33	0.32	0.29	0.26	−0.25***
	(0.87)	(−0.10)	(0.99)	(0.98)	(0.87)	(0.75)	(−6.77)
Industrials	0.03	0.05	0.03	0.03	0.02	0.01	−0.02
	(0.13)	(0.22)	(0.12)	(0.11)	(0.10)	(0.03)	(−0.67)
Information technology	0.42	0.39	0.43	0.41	0.42	0.42	−0.06
	(1.23)	(1.14)	(1.24)	(1.19)	(1.22)	(1.22)	(−1.54)
Materials	0.13	−0.33	0.18	0.16	0.12	0.09	−0.19***

(continued)

Table 5 (continued)

	Tobin's *Q*						ROA
	OLS (1)	2SLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)	OLS (7)
	(0.51)	(−0.75)	(0.71)	(0.67)	(0.49)	(0.38)	(−6.98)
Telecom services	−0.19	−0.08	−0.20	−0.20	−0.20	−0.20	−0.04
	(−0.40)	(−0.17)	(−0.42)	(−0.42)	(−0.42)	(−0.41)	(−0.49)
Utilities	−0.37	−0.48	−0.36	−0.36	−0.37	−0.38	−0.14***
	(−0.87)	(−1.17)	(−0.85)	(−0.84)	(−0.87)	(−0.91)	(−4.30)
R^2	0.22	0.22	0.22	0.22	0.22	0.22	0.43
n	1196	1196	1196	1196	1196	1196	1196

This table shows OLS and 2SLS regression models, which relate the number of types of professional expertise to firm value (Tobin's Q) and firm performance (Return on Assets). No. Expertise in the 2SLS specification is the predicted value from Table 4, specification 1. The sample includes 1196 ASX-listed firms in 2007 with director data available from the Boardroom database from Connect4 and financial data available from the Aspect DatAnalysis database. Location data is the primary registered office of firms collected from the corporate directory section of annual reports. The locations of ACT, TAS and NT are grouped together due to the small number of observations. Variable definitions are provided in the Appendix. *t*-statistics (*z*-statistics) are in parentheses. Asterisks denote significance at 1% ***, 5% ** and 10% *.

diversity, we find a negative relationship between the number of other types of expertise (executives, scientists, engineers, politicians, academics and doctors) and return on assets, which is reported in specification seven. This result suggests that diversity beyond the subgroup of specialist business expertise is associated with reduced cooperation, increased conflicts and slower decision-making, resulting in lower firm performance (Putnam, 2007; Baranchuk and Dybvig, 2009).

The results of the control variables indicate that firm value is positively related to growth, board independence and director experience, and negatively related to firm size, return on assets, leverage and the financial sector. Return on assets is positively related to firm size and growth, is negatively related to leverage and board size and varies across industries.

In summary, we find no cross-sectional relationship between expertise diversity and firm value. However, we find some evidence that firm performance, in the form of return on assets, is lower if firms diversify their board expertise beyond the specialist business expertise of lawyers, consultants, accountants, bankers and other CEOs. In general, however, we acknowledge that the results in this section relating expertise diversity to firm value are largely insignificant. In a cross-sectional setting, this is not unusual. If most firms are close to having the optimal mix of expertise on their boards and these optimal mixes are different for different firms, then it is difficult for cross-sectional analysis to find an overall significant relationship between expertise diversity and firm value. To overcome this issue, the next section focuses on individual director appointments, which allow us to investigate how a specific change in the expertise on the board is related to firm value.

5. Director appointments

In this section, we conduct an event study of new director appointments as a cleaner setting to examine the relationship between professional expertise diversity and firm value. More specifically, we focus on the market reaction to appointments that bring a new type of expertise to the board, relative to appointments that reinforce the existing expertise on the board. We access new nonexecutive director appointments recorded on the Boardroom database from Connect4 from 1 January 2004 to 31 December 2007.[19] We then remove appointments where announcement dates cannot be confirmed on the ASX Announcement database, where there are multiple movements (appointments

[19] There are an insufficient number of observations if we just use new director appointments in 2007. We choose to go back in time as directors appointed during 2004–2007 will likely still be on the board at the end of 2007, which makes our appointment and cross-sectional samples more comparable. Appointments after 2007 are potentially affected by the financial crisis, and these directors will not be in our cross-sectional sample in 2007.

or departures) on the same day, where other news is released around the announcement date (−1, +1), where stock price data is not available from the SIRCA database, and where financial data is not available from the Aspect DatAnalysis database. This leaves our appointment sample with 584 observations, all of which are interim appointments (not appointments at annual meetings).

Consistent with prior sections, we analyse appointment announcements and director biographies in annual reports to classify each new appointee and the existing directors on the hiring board by their type of professional expertise. Other director and hiring board characteristics are collected from the Boardroom database, company annual reports and appointment announcements. For all observations, hiring board data are adjusted from year end to the specific date of the appointment to ensure that we have data on the hiring board that was in place when the new appointment announcement was released to the market.

The market reaction to new director appointments is measured by cumulative abnormal returns (CARs) around the appointment announcement following the event study methodology of Dodd and Warner (1983). Market model parameters are estimated from 250 trading days to 20 trading days prior to the announcement date. We also calculate CARs based on average returns over the estimation period and excess returns over the 3-day period. The results presented are consistent across these three measures. In unreported analysis, we find the mean and median 3-day CARs (−1,+1) are 0.34 and 0.15 percent. The mean firm has total assets of $2.86 billion, market-to-book ratio of 3.24, return on assets of −10.79 percent, board size of 4.57 directors, board independence of 47 percent, CEO tenure of 4.6 years and the average number of types of expertise on the board is 2.71. Other characteristics of the new appointees include 6 percent women, 80 percent independent, an average of 0.72 other directorships, 5 percent with interlocking directorships with the hiring board, 5 percent bring a new gender to the board and 28 percent bring a new degree to the board. These statistics for the appointing firms are similar to those of the previous sections.

Table 6 identifies the appointments that bring new expertise to the hiring board. A total of 269 appointments bring new expertise, whereas 315 appointments reinforce existing expertise on the hiring board. The most common types of new expertise to hiring boards are bankers (58), accountants (49), engineers (35) and lawyers (27). The most common types of appointments that reinforce existing expertise are executives (178), bankers (46), accountants (34) and scientists (24).

The event study methodology used in this section relates the 3-day market reaction to the announcement of new director appointments to a dummy variable (New Expertise), which highlights the addition of a new type of professional expertise to the hiring board, and a range of control variables as follows:

Table 6
Appointments and new expertise

	New expertise	Existing expertise	Total
Executives	14	178	192
Bankers	58	46	104
Accountants	49	34	83
Engineers	35	17	52
Scientists	18	24	42
Lawyers	27	8	35
Consultants	25	1	26
Other CEOs	24	2	26
Politicians	7	3	10
Academics	10	0	10
Doctors	2	2	4
No. appointments	269	315	584

This table shows appointments that bring new expertise to the hiring board. The sample includes 584 appointments to ASX-listed firms during 2004–2007 where the appointment is recorded on the Boardroom database from Connect4 and is confirmed through ASX announcements, there is no other news around the announcement date (−1,+1), financial data is available from Aspect DatAnalysis, and stock price data is available from SIRCA. Variable definitions are provided in the Appendix.

$$CARs(-1,+1)_{i,j,t} = \alpha + New\,Expertise_{i,j,t} + \sum Appointee_{j,t} + \sum Firm_{i,t} + \sum Industry_{i,t} + \sum Year_{i,t} + \varepsilon_{i,t} \quad (3)$$

where the control variables include other characteristics of the appointee j – gender, independence, number of other directorships in listed companies, interlocking directorships and dummy variables to isolate the average effect for each type of professional expertise; characteristics of the hiring company i – firm size, return on assets, market-to-book, thin trading, CEO tenure and hiring board independence; and industry and year effects (Rosenstein and Wyatt, 1990; Shivdasani and Yermack, 1999; Ferris *et al*., 2003; DeFond *et al*., 2005; Fich, 2005; Fich and Shivdasani, 2006; Adams and Ferreira, 2009; Adams *et al*., 2011; Gray and Nowland, 2013). To control for other diversity the appointee may bring to the hiring board, we also include dummy variables to indicate when the appointee brings a new gender and new degree to the hiring board. All specifications include robust standard errors.

Table 7 presents the results. In the first and second specifications, the coefficient on *New Expertise* is insignificant, which indicates that, on average, the addition of a new type of professional expertise to the board is unrelated to firm value. This is consistent with our cross-sectional results in the previous

Table 7
Appointment CARs and expertise diversity

	CARs (−1,+1)		
	(1)	(2)	(3)
Intercept	−2.13	−1.96	−2.02
	(−1.07)	(−1.04)	(−1.07)
New Expertise	−0.82	−0.58	−2.75**
	(−1.15)	(−0.77)	(−2.01)
New Expertise * (*Lawyers, Consultants, Accountants, Bankers, Other CEOs*)			3.65**
			(2.34)
Academic		0.48	2.42
		(0.14)	(0.68)
Accountant		0.92	−0.08
		(0.99)	(−0.09)
Banker		−1.00	−2.07**
		(−1.12)	(−2.38)
Consultant		−1.75	−3.34*
		(−1.02)	(−1.91)
Doctor		−14.42**	−13.67**
		(−2.26)	(−2.13)
Engineer		0.31	1.62
		(0.24)	(1.16)
Lawyer		−0.14	−1.44
		(−0.11)	(−1.14)
Other CEO		−2.01	−3.58*
		(−0.99)	(−1.71)
Politician		−2.77	−1.39
		(−1.50)	(−0.62)
Scientist		0.58	1.38
		(0.37)	(0.84)
Female	3.90**	3.86**	3.94**
	(2.03)	(1.98)	(1.99)
Independent	−0.44	−0.52	−0.37
	(−0.49)	(−0.59)	(−0.42)
Other directorships	0.43*	0.47**	0.43*
	(1.81)	(2.03)	(1.86)
Interlocking	−1.64	−1.69	−1.63
	(−1.55)	(−1.55)	(−1.56)
New female	−3.08	−2.94	−2.84
	(−1.39)	(−1.33)	(−1.27)
New degree	0.56	0.58	0.53
	(0.77)	(0.77)	(0.71)
Ln(Total assets)	0.20	0.19	0.21
	(1.04)	(1.06)	(1.13)
Return on assets	0.42	−0.46	−0.73
	(0.30)	(−0.33)	(−0.52)

Table 7 (continued)

	CARs (−1,+1)		
	(1)	(2)	(3)
Market-to-book	0.10	0.05	0.04
	(0.71)	(0.42)	(0.29)
Thin trading	1.49*	1.50**	1.55**
	(1.95)	(2.02)	(2.08)
CEO tenure	−0.07	−0.07	−0.08
	(−1.20)	(−1.38)	(−1.46)
Independent Board	−0.25	−0.25	−0.24
	(−0.37)	(−0.37)	(−0.35)
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
R^2	0.042	0.076	0.084
n	584	584	584

Regressions relate CARs (−1,+1) as a percentage (%) to professional expertise, director, firm and industry characteristics. The sample includes 584 appointments to ASX-listed firms during 2004–2007 where the appointment is recorded on the Boardroom database from Connect4 and is confirmed through ASX announcements, there is no other news around the announcement date (−1,+1), financial data is available from Aspect DatAnalysis, and stock price data is available from SIRCA. Variable definitions are provided in the Appendix. *t*-statistics are in parentheses. Asterisks denote significance at 1% ***, 5% ** and 10% *.

section. The results for the control variables indicate that the market reaction to the appointment of new directors is higher when the appointee is women and has other directorships in listed companies, and for firms that are thinly traded. The market reaction is lower when the appointee has professional expertise as a doctor. These results are consistent with prior studies (Adams *et al*., 2011; Gray and Nowland, 2013).

In the third specification, we distinguish between the five types of specialist business expertise covered by Anderson *et al*. (2011) and the additional six types of professional expertise we introduce in this study. The coefficient on *New Expertise * (Lawyers, Consultants, Accountants, Bankers, Other CEOs)* indicates that the market reaction to directors who bring these new types of specialist business expertise to the board is significantly higher, on average by 3.65 percent, than other types of new expertise. In addition, the negative coefficient on *New Expertise* indicates that the average market reaction to the appointment of directors with other types of new expertise is negative (−2.75 percent).

In summary, our analysis of new director appointments indicates that, on average, we find an insignificant market reaction to the addition of new professional expertise to the hiring board. This is consistent with our prior analysis and indicates that there is no overall relationship between professional

expertise diversity and firm value. However, we find evidence that shareholders benefit when boards limit their diversity to a subset of specialist business expertise (lawyers, accountants, consultants, bankers and other CEOs). Further diversity beyond this subset of expertise is associated with lower firm value.

Our interpretation of these results is that all types of expertise are not equally important to boards. On average, the expertise provided by lawyers, accountants, consultants, bankers and other CEOs is valued more by shareholders than other types of expertise. This is likely because these types of specialist business expertise are more relevant to the monitoring and advising functions performed by boards of directors across all firms. While we do not test for these particular outcomes in this study, prior studies document that accounting and legal expertise is associated with higher accounting quality, banking expertise helps firms source additional funding and outside CEOs are valuable sources of managerial talent and expertise (DeFond *et al*., 2005; Fich, 2005; Guner *et al*., 2008).

In addition, our results indicate that, in general, boards need to be wary of diversifying their expertise beyond these types of specialist business expertise, as diversification into other types of expertise is likely to result in reduced cooperation, increased conflicts and slower decision-making on the board (Putnam, 2007; Baranchuk and Dybvig, 2009), which is associated with lower firm value and performance.

6. Further analysis and robustness checks

So far, our analysis has been conducted on all sample firms. However, it is possible that our results may differ in different subsamples. For example, having scientists and engineers on the boards of firms in certain industries (e.g. energy and materials) may be more beneficial than in other industries (e.g. financial). Thus, we repeat our analysis using different industry subsamples – financial, energy and materials, health care, and all other industries as a group. We find that the negative relationship between return on assets and the number of other types of expertise is significant for firms in the other industries group (consumer staples, consumer discretionary, industrials, information technology, telecommunication services and utilities). The positive share market reaction to the appointment of directors with specialist business expertise (lawyers, accountants, consultants, bankers and other CEOs) is significant in firms in the energy and materials industries. Unfortunately, all other results are insignificant, likely due to the smaller number of observations.

As it is possible that expertise diversity is more important in firms that are larger and more complex (Anderson *et al*., 2011), we also divide the sample into subsamples above and below the median firm size. In both our cross-sectional and event study analysis, we find no significant differences in the results for the two subsamples. In other words, the results for both large and small firms are consistent with those reported in Tables 5 and 7.

We also undertake a number of robustness checks. As it is possible for directors to hold a directorship for less than a full year, we examine the effect of partial-year directorships on our analysis. We hand collect the attendance records of directors from annual reports in 2007. This reduces our initial sample to a total of 7549 directorships (of 8791 directorships) in 1404 firms (of 1548 firms). We find that 1653 of 7549 (21.8 percent) directorships are partial-year directorships and this affects 695 of 1404 (49.5 percent) firms. When we weight directorships by the proportion of board meetings directors are eligible to attend during the year, we find that board size in this sample is reduced from a mean of 5.38 to 4.79 directors.[20] The mean number of types of expertise is reduced from 2.91 to 2.76. However, these changes have no material effect on our reported results.

Most prior studies of directors only examine the role played by outside (nonexecutive) directors (e.g. Agrawal and Knoeber, 2001; Fich, 2005; Guner *et al.*, 2008; Adams and Ferreira, 2009; Anderson *et al.*, 2011). This is the norm for U.S. studies as the boards of directors of U.S. companies are predominantly comprised of outside directors. However, in Australia, inside (executive) directors are still prevalent on corporate boards. In our analysis, 2675 of 8791 (30.4 percent) directorships are held by executive directors. Therefore, in our analysis of the professional expertise on corporate boards, we have included the expertise of both outside and inside directors to obtain an understanding of all of the expertise present on the board.

In our analysis of the market reaction to director appointments (Table 7), we have presented the results for a subset of the control variables that we have used in wider testing. Additional control variables include appointee qualification dummy variables (bachelor degree, law degree, MBA degree, other master degree and PhD degree), a dummy variable indicating CEO involvement in the appointment process, a dummy variable indicating CEO–Chairman duality and variables controlling for the professional expertise diversity, qualification diversity and gender diversity of the hiring board. As the coefficients on these variables are all insignificant and do not affect the reported results, they are not included in our main analysis.

7. Conclusion

To effectively perform their monitoring and advising functions, boards of directors are expected to comprise directors possessing an appropriate range of expertise. Yet, little is known about the expertise that exists on corporate boards and what an appropriate range of expertise may be. In this study, we

[20] For example, if a director is appointed during the year and is eligible to attend 5 of 10 board meetings, then the directorship is weighted at 5/10 = 0.50. If a director resigns during the year and is eligible to attend 4 of 7 board meetings, then the directorship is weighted at 4/7 = 0.57.

examine the diversity of professional expertise on corporate boards in Australia and implications for shareholder value using a hand-collected data set of directors categorised by 11 types of expertise.

We find the most common types of professional expertise on corporate boards in Australia are business executives, accountants, bankers, scientists, lawyers and engineers. Expertise diversity is greater in firms with bigger boards and is dependent on firm location and industry. Our results indicate that shareholders benefit when firms limit their expertise diversity on the board to directors with legal, accounting, consulting, banking and outside CEO expertise. If these types of expertise do not exist on the board, our analysis suggests that adding them to the board will benefit shareholders. However, further diversity beyond this subset of expertise is associated with lower firm performance and value.

This study contributes to both the academic literature and practice. From an academic perspective, we are the first to examine all types of professional expertise on the board, rather than a subset of directors, thus broadening our understanding of the heterogeneity of directors on corporate boards. From a practical perspective, this study provides vital information to boards to help in the process of identifying any gaps that may exist in the skills and expertise on corporate boards. Finally, we acknowledge that there are many different ways to categorise and investigate the skills and expertise of corporate directors. Thus, we look forward to future studies examining these issues from different perspectives and the types of expertise in more depth.

References

Adams, R., and D. Ferreira, 2009, Women in the boardroom and their impact on governance and performance, *Journal of Financial Economics* 94, 291–309.

Adams, R., S. Gray, and J. Nowland, 2011, Does gender matter in the boardroom? Evidence from the market reaction to mandatory new director announcements, Working paper (University of Queensland).

Ali, M., Y. L. Ng, and C. Kulik, 2014, Board age and gender diversity: a test of competing linear and curvilinear predictions, *Journal of Business Ethics* 125, 497–512.

Aldamen, H., K. Duncan, S. Kelly, R. McNamara, and S. Nagel, 2012, Audit committee characteristics and firm performance during the global financial crisis, *Accounting and Finance* 52, 971–1000.

Anderson, R., D. Reeb, A. Upadhyay, and W. Zhao, 2011, The economics of director heterogeneity, *Financial Management* 40, 5–38.

Agrawal, A., and C. Knoeber, 2001, Do some outside directors play a political role?, *Journal of Law and Economics* 44, 179–198.

Arrow, K., 1998, What has economics to say about racial discrimination?, *Journal of Economic Perspectives* 12, 91–100.

ASX Corporate Governance Council, 2003, *Principles of Good Corporate Governance and Best Practice Recommendations* (ASX, Sydney).

ASX Corporate Governance Council, 2010, *Corporate Governance Principles and Recommendations with 2010 Amendments* (ASX, Sydney).

ASX Corporate Governance Council, 2014, *Corporate Governance Principles and Recommendations*, 3rd edn (ASX, Sydney).
Balatbat, M., S. Taylor, and T. Walter, 2004, Corporate governance, insider ownership and operating performance of Australian initial public offerings, *Accounting and Finance* 44, 299–328.
Baranchuk, N., and P. Dybvig, 2009, Consensus in diverse corporate boards, *Review of Financial Studies* 22, 715–747.
Brown, P., W. Beekes, and P. Verhoeven, 2011, Corporate governance, accounting and finance: a review, *Accounting and Finance* 51, 96–172.
Campbell, K., and A. Minguez-Vera, 2008, Gender diversity in the boardroom and firm financial performance, *Journal of Business Ethics* 83, 435–451.
Carter, D., B. Simkins, and W. Simpson, 2003, Corporate governance, board diversity and firm value, *Financial Review* 38, 33–53.
Chapple, L., and J. Humphey, 2014, Does board gender diversity have a financial impact? Evidence using stock portfolio performance, *Journal of Business Ethics* 122, 709–723.
Christensen, J., P. Kent, and J. Stewart, 2010, Corporate governance and company performance in Australia, *Australian Accounting Review* 20, 372–386.
Cotter, J., and M. Silvester, 2003, Board and monitoring committee independence, *Abacus* 39, 211–232.
Dass, N., O. Kini, V. Nanda, B. Onal, and J. Wang, 2014, Board expertise: do directors from related industries help bridge the information gap?, *Review of Financial Studies* 27, 1533–1592.
DeFond, M., R. Hann, and X. Hu, 2005, Does the market value financial expertise on audit committees of boards of directors?, *Journal of Accounting Research* 43, 153–193.
Dodd, P., and J. Warner, 1983, On corporate governance: a study of proxy contests, *Journal of Financial Economics* 11, 401–438.
Faleye, O., R. Hoitash, and U. Hoitash, 2012, Industry expertise on corporate boards, Working paper (Northeastern University).
Fama, E., and M. Jensen, 1983, Separation of ownership and control, *Journal of Law and Economics* 26, 301–325.
Farrell, K., and P. Hersch, 2005, Additions to corporate boards: the effect of gender, *Journal of Corporate Finance* 11, 85–106.
Ferris, S., M. Jagannathan, and A. Pritchard, 2003, Too busy to mind the business? Monitoring by directors with multiple board appointments, *Journal of Finance* 58, 1087–1111.
Fich, E., 2005, Are some outside directors better than others? Evidence from director appointments by Fortune 1000 firms, *Journal of Business* 78, 1943–1971.
Fich, E., and A. Shivdasani, 2006, Are busy boards effective monitors?, *Journal of Finance* 61, 689–724.
Gray, S., and J. Nowland, 2013, Is prior director experience valuable?, *Accounting and Finance* 53, 643–666.
Gray, S., I. Harymawan, and J. Nowland, 2014, Political and government connections on corporate boards in Australia: good for business?, *Australian Journal of Management*. forthcoming.
Guner, A., U. Malmendier, and G. Tate, 2008, Financial expertise of directors, *Journal of Financial Economics* 88, 323–354.
Hermalin, B., and M. Weisbach, 2003, Boards of directors as an endogenously determined institution: a survey of the economic literature, *Economic Policy Review* 9, 7–26.
Jensen, M., and W. Meckling, 1976, Theory of the firm, managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305–360.

Jensen, M., 1993, The modern industrial revolution, exit and the failure of internal control systems, *Journal of Finance* 48, 831–880.
Jermias, J., and L. Gani, 2014, The impact of board capital and board characteristics on firm performance, *British Accounting Review* 46, 135–153.
Kaczmarek, S., S. Kimino, and A. Pye, 2012, Antecedents of board composition: the role of nominating committees, *Corporate Governance: An International Review* 20, 474–489.
Kandel, E., and E. Lazear, 1992, Peer pressure and partnerships, *Journal of Political Economy* 100, 801–817.
Kiel, G., and G. Nicholson, 2006, Multiple directorships and corporate performance in Australian listed companies, *Corporate Governance: An International Review* 14, 530–546.
Klein, A., 1998, Firm performance and board committee structures, *Journal of Law and Economics* 41, 275–303.
Knyazeva, A., D. Knyazeva, and R. Masulis, 2013, The supply of corporate directors and board independence, *Review of Financial Studies* 26, 1561–1605.
Knyazeva, A., D. Knyazeva, and C. Raheja, 2012, Do opposites attract? Dissimilar directors and coordination within corporate boards, Working paper (University of Rochester).
Lang, K., 1986, A language theory of discrimination, *Quarterly Journal of Economics* 101, 363–382.
Masulis, R., and S. Mobbs, 2014, Independent director incentives: where do talented directors spend their limited time and energy?, *Journal of Financial Economics* 111, 406–429.
Masulis, R., C. Wang, and F. Xie, 2012a, Globalizing the boardroom: the effects of foreign directors on corporate governance and performance, *Journal of Accounting and Economics* 53, 527–554.
Masulis, R., C. Ruzzier, S. Xiao, and S. Zhao, 2012b, Do independent directors matter?, Working paper (University of New South Wales).
Pfeffer, J., 1972, Size and composition of corporate boards of directors: the organization and its environment, *Administrative Science Quarterly* 17, 218–228.
Pfeffer, J., and G. Salancik, 1978, *The External Control of Organizations: A Resource Dependency Perspective* (Harper and Row, New York, NY).
Putnam, R., 2007, E pluribus unum: heterogeneity and community in the twenty-first century – The 2006 Johan Skytte Prize lecture, *Scandinavian Political Studies* 30, 137–174.
Rosenstein, S., and J. Wyatt, 1990, Outside directors, board independence and shareholder wealth, *Journal of Financial Economics* 26, 175–191.
Shivdasani, A., and D. Yermack, 1999, CEO involvement in the selection of new board members: an empirical analysis, *Journal of Finance* 54, 1829–1853.
Von Meyerick, F., D. Oesch, and M. Schmid, 2012, The value of director industry experience, Working paper (University of Hamburg).
Wang, C., F. Xie, and M. Zhu, 2013, Industry expertise of independent directors and board monitoring, Working paper (Chinese University of Hong Kong).
Wang, Y., and J. Oliver, 2009, Board composition and firm performance variance: Australian evidence, *Accounting Research Journal* 22, 196–212.
Williams, K., and C. O'Reilly, 1998, Demography and diversity in organizations: a review of 40 years of research, *Research in Organizational Behavior* 20, 77–140.

Appendix

Table AI
Variable definitions

Variable	Definition
Academic	Dummy variable equal to one if the director is classified as an academic (current university appointment)
Accountant	Dummy variable equal to one if the director is classified as an accountant (experience as a CPA/CA or CFO)
Banker	Dummy variable equal to one if the director is classified as a banker (experience in banking or finance industries)
Consultant	Dummy variable equal to one if the director is classified as a consultant (management, marketing, IT or industry specific)
Doctor	Dummy variable equal to one if the director is classified as a medical doctor
Engineer	Dummy variable equal to one if the director is classified as an engineer (engineering experience)
Executive	Dummy variable equal to one if the director is classified as a general executive/businessperson (not classified into another occupation group)
Lawyer	Dummy variable equal to one if the director is classified as a lawyer (experience as a practicing lawyer)
Other CEO	Dummy variable equal to one if the director currently the CEO of another listed company
Politician	Dummy variable equal to one if the director is classified as a politician (previously held a political office)
Scientist	Dummy variable equal to one if the director is classified as a scientist (experience as a scientist)
No. Expertise	The number of different types of professional expertise on the board
Expertise Index	1 – Herfindahl index of squared proportions of each type of professional expertise on the board
Industry Adjusted No. Expertise	The number of different types of professional expertise on the board divided by the industry average number of expertise
Consumer Discretionary	Indicates firms in the GICS Consumer Discretionary sector
Consumer Staples	Indicates firms in the GICS Consumer Staples sector
Energy	Indicates firms in the GICS Energy sector
Financial	Indicates firms in the GICS Financial sector
Health Care	Indicates firms in the GICS Health Care sector

(continued)

Table AI (continued)

Variable	Definition
Industrials	Indicates firms in the GICS Industrials sector
Information Technology	Indicates firms in the GICS Information Technology sector
Materials	Indicates firms in the GICS Materials sector
Telecom Services	Indicates firms in the GICS Telecommunication Services sector
Utilities	Indicates firms in the GICS Utilities sector
Total Assets	Total assets in billions of Australian dollars
Ln (Total Assets)	Natural logarithm of total assets
Tobin's Q	Market value of equity plus book value of debt all divided by total assets
Return on Assets	Return on assets (winsorized at 1st and 99th percentiles)
Growth	One-year growth in total assets (winsorized at 1st and 99th percentiles)
Debt to Total Assets	Total debt divided by total assets (winsorized at 1st and 99th percentiles)
Market-to-Book	Market-to-book ratio (winsorized at 1st and 99th percentiles).
CARs (−1,+1)	Three-day cumulative abnormal returns around the announcement of the new director appointment. Market model parameters are estimated from 250 trading days to 20 trading days prior to the announcement date
Thin Trading	Dummy variable equal to one if the firm is thinly traded (not traded every day in the −30, +30 period around the appointment announcement)
Board Size	Number of directors on the board
% Independent	Percentage of independent directors on the board
% Females	Percentage of female directors on the board
% Other Directorships	Percentage of directors on the board who hold directorships in other listed companies
Duality	Dummy variable equal to one if the same person holds the Chairman and CEO positions
CEO Tenure	Tenure of the CEO in years
Independent Board	Dummy variable equal to one if the board is majority independent (% Independent > 50%)
WA	Dummy variable equal to one if the primary registered office of the company is located in Western Australia
NSW	Dummy variable equal to one if the primary registered office of the company is located in New South Wales
VIC	Dummy variable equal to one if the primary registered office of the company is located in Victoria
QLD	Dummy variable equal to one if the primary registered office of the company is located in Queensland.

Table AI (continued)

Variable	Definition
SA	Dummy variable equal to one if the primary registered office of the company is located in South Australia.
ACT/TAS/NT	Dummy variable equal to one if the primary registered office of the company is located in the Australia Capital Territory, Tasmania or Northern Territory
FOREIGN	Dummy variable equal to one if the primary registered office of the company is located outside of Australia
Female	Dummy variable equal to one if the director is female
Independent	Dummy variable equal to one if the director is classified as an independent director
Other Directorships	Number of directorships in other listed companies
Interlocking	Dummy variable equal to one if the appointee and a director on the hiring board both hold directorships in a common other company
New Female	Dummy variable equal to one if the appointee is female and the hiring board does not contain female directors
New Degree	Dummy variable equal to one if the appointee brings a new qualification to the hiring board. Qualifications are classified into PhD, MBA, other Master degree, law degree, other bachelor degree and no reported degree holders
New Expertise	Dummy variable equal to one if the appointee brings a new type of professional expertise to the hiring board