

# INDEPENDENT DIRECTORS: EXPLORING THE HETEROGENEOUS NATURE OF MULTIPLE DIRECTORSHIPS

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## Abstract

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We examine the effect of independent directors' (IDs') heterogeneous directorships on performance and diversification of high growth firms in a sample of 1152 firm-year Australian listed company observations over the period 2007 to 2010. We find a positive association between some measures of IDs' heterogeneous directorships and the firm performance of high-growth firms as measured by return on assets. We also find a positive association between IDs' heterogeneous board ties and firm diversification. This study highlights that decisions concerning the appointment of IDs to corporate boards should be based on the strategic context of their other directorships. We extend the literature on multiple directorships by showing that it is not a narrow focus on the number of directorships as a proxy for reputation or busyness that matters. Instead, it is the precise nature of these directorships.

**Keywords:** Independent Directors, Heterogeneous Board Ties, Firm Performance, Firm Diversification, Growth Firms

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## 1. INTRODUCTION

We examine the influence of independent directors' (IDs)<sup>1</sup> heterogeneous directorships on the performance and diversification of growth firms. Heterogeneous board ties can be defined as a combination of independent directors' similar and

dissimilar board ties to other firms compared to the focal firm. Recently, many global regulatory bodies have recommended limits to the number of directorships a director may hold despite the fact that the academic debate on the benefits and downsides of multiple directorships is still unsettled. We contribute to this debate and extend the literature by drawing on strategic management literature and examining whether it is the absolute

<sup>1</sup> An ID is a non-executive director who is not an internal employee and is free from any material relationships with the company or any of its subsidiaries (ASX Corporate Governance Council, 2010).

number of directorships or their heterogeneous nature that matters.

The role of multiple directorships of independent directors (IDs) has been debated in both the academic and professional literature (Bhagat & Black, 2002; Fama & Jensen, 1983; Jiraporn, Singh, & Lee, 2009; Brown, Dai, & Zur, 2019; Gow, Wahid, & Yu, 2018; Chen & Keefe, 2020). One stream of the literature suggests that serving on multiple boards of companies is likely to be a source of both valuable experience and reputational benefits for IDs; both firm performance and firm value will benefit (Duchin, Matsusaka, & Ozbas, 2010; Fich & Shivdasani, 2006; Matolcsy, Stokes, & Wright, 2004; Lee & Lee, 2014; Chen & Moers, 2018; and Lel & Miller, 2019). This is because they possess many networks and are consequently able to access on behalf of the firm much needed operational and financial information (Ferris, Jagannathan, & Pritchard, 2003; Kim, Mauldin, & Patro, 2014; Wang, Xie, & Zhu, 2015).

In the context of agency theory, it is widely accepted that agency costs, information asymmetry, and potential for managerial opportunism are greater in high growth as opposed to low growth firms (Smith & Watts, 1992; Hutchinson & Gul, 2004; and Fosu, Danso, Ahmad, & Coffie, 2016). Therefore, it is contended that the boards of high-growth firms that are complex in nature require a higher percentage of IDs to act as more effective monitors (Hossain, Cahan, & Adams, 2000; Fosu et al., 2016). In Australia, the empirical evidence indeed shows a higher proportion of outside directors on the boards of high growth firms is associated with better accounting-based performance (Hutchinson, 2002; Hutchinson & Gul, 2004) and market value (Matolcsy et al., 2004). Matolcsy et al. (2004) also show that outside directors with three or more other board positions add significantly to the market value of high growth firms. However, these studies either do not look at multiple directorships or, in the case of Matolcsy et al. (2004) use an agency theory lens and rely on a simple count of these directorships rather than the heterogeneous nature of the directorships. We argue that independent directors potentially contribute diverse expertise, contacts, and related human capital that adds to and complements those of management. Furthermore, this is particularly important in the more complex high growth firms where disclosure information is not sufficiently informative (Mayorga & Sidhu, 2012). Jiraporn, Kim, and Davidson (2008) conjecture that multiple directorships impact on the degree of corporate diversification and firm value. Similarly, Chen, Dyball, and Wright (2009) find there is a positive relationship between the percentage of directors who have ties to boards of Australian companies in other industries and total diversification. As such it is the role of directors providing advice to management on strategic change or strategy implementation, rather than simply monitoring and control, which is the critical activities of the board (Carpenter & Westphal, 2001; Zhu, Ye, Tucker, Kam, & Chan, 2016; and Lee & Lee, 2014).

In contrast, extant research also argues that IDs' multiple directorships may mean that they are unable to devote adequate time to any single board

to which they are connected due to their busyness<sup>2</sup> (Adams, Hermalin, & Weisbach, 2010) for which there is some empirical support (Core, Holthausen, & Larcker, 1999; Fich & Shivdasani, 2006). Dilution of time and attention makes it difficult for these board members to understand the complex issues of the firm that may impact board monitoring quality and shareholder value (Carpenter & Westphal, 2001; Falato, Kadyrzhanova, & Lel, 2014).

Notwithstanding the fact that academic evidence on this issue is inconclusive, several international institutions have recommended arbitrary limits for the number of multiple directorships. For example, the Australian Shareholders' Association (ASA) believes that any director who sits on more than five equivalent boards is doing a disservice to the firms' shareholders. The Council of Institutional Investors (2004) in the US suggests that directors with an executive role should not sit on more than two other boards. Similarly, the Combined Code (Financial Reporting Council 2003) in the UK recommends that full-time executive directors should not take on more than one non-executive directorship in a Financial Times Stock Exchange (FTSE) 100 company<sup>3</sup>.

In sum, regulators appear to have mixed views on this subject and the academic debate on reputation and busyness hypothesis of multiple directorships of IDs is not settled. This study is therefore motivated by the aforementioned tension in the literature and draws on the strategic management literature and resource dependence theory (RDT) to examine the effects of IDs' heterogeneous directorships on the performance of high growth firms. In other words, we examine whether IDs' mix of both board ties<sup>4</sup> to dissimilar and similar firms to the focal firm affect the performance of the high growth focal firm. We also investigate whether IDs' heterogeneous directorships are associated with firm diversification. As such it addresses Carpenter and Westphal's (2001) call for research that investigates whether the strategic heterogeneity of board ties has implications for firm performance.

The bulk of the research into directors is limited to US data (Lel & Miller, 2019). Australia is chosen because it has a different regulatory, institutional, economic, and director network environment from that of the US and UK and other countries with strong legal shareholder protection mechanisms (Dignam & Galanis, 2004; Kang, Cheng, & Gray, 2007), and adoption of IFRS in 2005. A major concern with the full adoption of IFRS is its potential for opportunistic use by managers (Kabir & Rahman, 2016). We use 1152 firm-year observations over four years (2007-2010) and employ OLS and 2SLS regression models to test our hypotheses. We find that the independent directors' heterogeneous directorships in terms of product market heterogeneity and diversification heterogeneity are

<sup>2</sup> Busy IDs are those who serve on three or more other boards (Core et al., 1999). Most directors are employed as CEOs, bankers, and barristers and they serve on many boards. Such directors are classified as 'busy' directors.

<sup>3</sup> 100 companies listed on the LSE with the highest market capitalisation.

<sup>4</sup> We use product market heterogeneity (PMH), foreign market heterogeneity (FMH), diversification heterogeneity (DH), and internationalization heterogeneity (IH) to investigate the extent to which independent directors' multiple directorships are heterogeneous in their similarity on a given dimension. We do this in order to ascertain whether IDs' heterogeneous directorships affect the performance of high growth firms and firm diversification.

positively associated with the performance of high growth firms as measured by return on assets. As well, we document a positive association between independent directors' heterogeneous board ties and firm diversification.

Our paper contributes to the corporate governance literature in several ways. To the best of our knowledge, this is the first study that empirically investigates the impact of independent directors' board ties on firm performance and firm diversification. Our study is therefore different in terms of theoretical development that prior research employed<sup>5</sup>, and adds to the corporate governance literature by drawing on the heterogeneous management literature and resource dependence theory (RDT). Our results<sup>6</sup> suggest that decisions concerning the appointment of IDs to corporate boards should make reference to the heterogeneous context of their other directorships. Rather than a narrow focus on the number of directorships as a proxy for reputation or busyness, we show that the precise nature of these directorships matters. Accordingly, this study extends the literature on the reputation and busyness hypothesis of multiple directorships. In fact, our findings suggest the ambiguous nature of findings on multiple directorships in prior research may have been because those studies draw inferences based on a count of the number of IDs' directorships rather than the heterogeneous nature of the directors' connections.

The outcomes of our study also have implications for practice<sup>7</sup> by providing guidance on board nomination committees when appointing new IDs to the boards of high growth firms. Similarly, showing that it is the precise nature, rather than the number of multiple directorships that matters, has implications for regulators and public policy. The remainder of this paper is structured as follows: Section 2 reviews prior research and develops hypotheses. Section 3 discusses the data and methodology, and Section 4 presents the results. Section 5 concludes the paper with a summary of the main themes covered here.

## 2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Serving on multiple boards is a source of both valuable experience and reputational benefits for independent directors (IDs) because they: firstly, provide important support to the senior managers in dealing with specialized decision problems; and, secondly, improve their ability to monitor their activities effectively (Fama & Jensen, 1983). Moreover, multiple directorships are regarded as significant for IDs because they give them prestige, knowledge and business contacts (Masulis & Mobbs, 2014; Kor & Sundaramurthy, 2009), making it possible for them to mitigate the firm's agency issues as contended by agency theory. Not only that

but also IDs' reputational attributes such as competence, diversity, leadership styles, community involvements, employee relations, environmental, and human rights protection, gained through corporate linkages and industry level expertise, influence corporate social performance (Mallin & Michelon, 2011; Larcker, So, & Wang, 2013; Horton, Millo, & Serafeim, 2012; Dass, Kini, Nanda, Onal, & Wang, 2013).

However, these reputed IDs may not be effective or efficient enough at some point due to their busyness in serving on several boards, which can result in poor corporate practices or outcomes (Fich & Shivdasani, 2006; Hauser, 2018). In these circumstances, IDs' multiple directorships lead to distraction and poor monitoring of management due to their inability to serve on board committees (Ferris et al., 2003; Jiraporn et al., 2009). On the basis of these findings, several institutions governing national corporate governance have imposed arbitrary limits for the number of multiple directorships that an ID can possess. This has included the Australian Shareholders' Association (ASA) in Australia, the Council of Institutional Investors in the US, and the Financial Reporting Council in the UK. Even so, the number of directorships they recommend ranges from five to one based on different connotations of executive and non-executive roles. Not surprisingly, regulators appear to have mixed views on this subject.

Rather than limiting the number of directorships to five or six, it is argued that independent directors who are carefully appointed to the firm's board, should be able to provide the breadth of perspective and diversity required on it to improve firm performance. Empirical support for this argument can be found in many studies that are based on the resource dependence perspective. Resource dependence theorists argue that multiple directorships serve as conduits for valuable information on market conditions, regulatory changes, innovations, and best practices, establishing links between the firm and its external environment, accessing vital resources, acting against adverse environmental complexities, internal greater fraud risks and assisting firms to achieve goals of efficiency and improved firm performance (Ferris et al., 2003; Masulis & Mobbs, 2011; Larcker et al., 2013).

### 2.1. Independent directors' heterogeneous directorships and the performance of high growth firms

Firms coping with various contingencies and this refers particularly high growth firms, arguably benefit from the expertise, perspective, and insight of a heterogeneous board because firm complexity augments the demand for varying talents and problem-solving skills of its corporate board of directors (Carpenter & Westphal, 2001; Anderson, Reeb, Upadhyay, & Zhao, 2011; Giannetti, Liao, & Yu, 2015). In the context of agency theory and monitoring perspective, it is commonly argued that agency costs, information asymmetry, and potential for managerial opportunism in high growth firms are greater than in low growth firms (Hutchinson & Gul, 2004). The boards of high growth firms that are complex in nature, hence require a higher

<sup>5</sup> Carpenter and Westphal (2001), using one-year data in the US context, document that boards of directors' strategically related ties affect firm strategy. However, their analysis is very different from the theoretical and conceptual perspectives developed in our study.

<sup>6</sup> We find that a positive relationship exists between IDs' heterogeneous directorships and the performance of high growth firms as measured by return on assets.

<sup>7</sup> Decisions concerning the appointment of IDs to the boards of high growth firms should be based on the fact that their directorship firms are heterogeneous to the focal firms.

percentage of IDs to act as more effective monitors (Hossain et al., 2000).

Empirical research finds that high growth firms are highly information asymmetric and bear higher adverse selection costs resulting in higher governance than low growth firms due to the inherent unpredictability associated with new projects or growth opportunities (Fosu et al., 2016; Pan, Lin, & Yang, 2013). The empirical evidence also demonstrates that low growth firms are less difficult to monitor, and corporate governance mechanisms play a less important role indicating that high growth firms need more monitoring and advising, and corporate governance plays a critical role (Hutchinson & Gul, 2004; Pan et al., 2013).

The RDT perspective is that independent directors potentially contribute diverse expertise, contacts, and related human capital that adds to and complements those of management. Hence, adopting this perspective, we argue that as independent directors have an important part to play in setting strategy, advising management, and adopting corporate governance while these growth options are exercised, the heterogeneous nature of IDs' other directorships are particularly important in high growth firms than low growth firms.

IDs with broad corporate and international experience can advise senior managers to consider risky, potentially profitable product diversification and internationalization strategies and reduce environmental uncertainty (Datta, Musteen, & Herrmann, 2009; Chen, 2011). The firm's senior managers can thus use IDs' informed guidance to improve their capabilities, which will undoubtedly help them in situations where they face competitive domestic and foreign markets (Datta et al., 2009) resulting in enhanced firm performance.

Independent directors who hold related board ties can obtain related industry-specific knowledge and experiences regarding technologies, regulatory issues, and market competition. This view is supported by a number of empirical studies that focus on the role of outside directors in terms of advising and monitoring capabilities (e.g., Wang et al., 2015; Coles, Daniel, & Naveen, 2012; Connelly et al., 2010; Linck, Netter, & Yang, 2008; Adams & Ferreira, 2007; Carpenter & Westphal, 2001). This perspective indicates that multiple directors with related board ties experienced in the industry in which a firm operates are potentially more effective advisors and monitors because their industry knowledge helps them to better understand the firm's unique risks, challenges, and opportunities, and finally assess the policy decision making by the firm's senior managers.

It is also widely argued that high growth firms encountering complex and diverse issues benefit from the knowledge, skills, and expertise of a mixed board because large and more diversified firms demand variety in decision-making skills and talents of its managers and board of directors (Anderson et al., 2011). It is posited that "directors on the corporate boards coming from different business, technical and professional backgrounds potentially provide managers of the high growth firms with a broader and deeper knowledge base than board members from more uniform backgrounds" (Anderson et al., 2011, p. 8). Anderson et al. (2011)

examined the costs and benefits of firms having a diverse pool of directors to more homogeneous boards, employing six separate dimensions across occupational and social components. They found that firm complexity and managerial control significantly affect the board's heterogeneity. However, they did not examine whether boards with IDs who possess such a mix of ties to similar and dissimilar firms to those of the focal firm affect firm performance. We argue that IDs' heterogeneous board ties encourage a broader range of potential ideas and information to the board of a high growth firm.

Accordingly, we predict that the management of a firm receives better advice from a group of IDs when their board ties to other firms are heterogeneous in relation to the focal firm. This will eventually result in enhancing firm performance. We, therefore, suggest that these reputed IDs may be busy but should possess heterogeneous directorships (a mix of their board ties to firms with strategies dissimilar and similar to those of the focal firm). These provide them with up-to-date corporate insights that affect the performance of high growth firms experiencing complex systems, operations, and greater information asymmetry and agency costs. In these circumstances, we argue that when IDs hold more directorships in dissimilar firms (and these follow different diversification strategies and operate in the different product market and internationalization contexts) than that of board ties to similar firms (with similar diversification strategies and operate in similar product markets and internationalization contexts as those of the focal high growth firm), then the performance of the focal high growth firm will improve. Hence, we formulate the following hypothesis:

*H1: The greater the extent to which IDs' board ties are heterogeneous in their similarity to the high growth focal firm, the better the focal firm's performance will be.*

## 2.2. Independent directors' heterogeneous directorships and the firm's diversification

Multiple directorships generate benefits through directors' inter-organizational connections, which facilitate the transfer of scarce external resources to the firm (Brown et al., 2019; Larcker et al., 2013). Doing so, will effectively address the risk encountered by the firm and in return augment its business performance. These scarce resources include knowledge about products, markets, financial expertise, information about innovation and industry strategic expertise and firm-specific strategies such as capital structure decisions, and better governance (Wang et al., 2015; Zhu et al., 2016; Bhabra & Li, 2011; Lee & Lee, 2014; Kim et al., 2014; and Johnson et al., 1996). These predictions have been supported by empirical research conducted across the globe (Kiel & Nicholson, 2006; Jackling & Johl, 2009; Kang & Tan, 2008). It may also be possible, however, that holding too many directorships may render the IDs so busy that his or her ability to monitor management is compromised, resulting in less effective managerial oversight and in turn leading to value decreasing diversification (Chen et al. 2009; Al-Maskati, Bate, & Bhabra, 2015).

Hence, it seems there is no real consensus concerning the effects of diversification.

Firms that pursue diversification benefits from specific types of directors such as business specialists and support specialists and those directors who match such specific environmental needs of firms are able to effectively advise management (Jones, Makri, & Gomez-Mejia, 2008). Consistent with this argument, Chen et al. (2009) find a positive relationship between total diversification in Australian companies and the percentage of directors who have ties to boards of companies in other industries.

In line with this view, we argue that when IDs possess a combination of heterogeneous directorships - including firms that follow different diversification strategies and operate in the different product market and internationalization contexts as well as those that follow similar diversification strategies and operate in similar product markets and internationalization contexts as those of the focal firm - firm diversification will increase. Carpenter and Westphal (2001) proposed that when firm directors are highly concentrated among firms with similar strategies, these board members become highly socialized into accepting the firm's current business strategy. They go on to argue that they may ignore environmental changes with the potential to threaten the firm's viability. Heterogeneous boards are more likely then to identify strategic alternatives which in this case relate to diversification. It is argued in this present research that higher the proportion of IDs who hold

heterogeneous directorships the greater is the firm diversification. On this basis the following hypothesis is posited:

*H2: The greater the extent to which IDs' board ties are heterogeneous in their strategic similarity to the focal firm, the higher the focal firm's diversification.*

### 3. RESEARCH DESIGN AND VARIABLE MEASUREMENTS

We use the top 500 companies listed on the ASX in 2010 as a data source and collect data over a four-year period, 2007 to 2010. The sample has been reduced to 288, as shown in Table 1, owing to the elimination of firms with missing data. We exclude nine banks and financial institutions from the sample because of the exceptional regulatory environment in which those institutions operate (Bliss, 2011; Fich & Shivdasani, 2006; Francis & Stokes, 1986). A significant amount of missing data is a prominent factor in many studies using Australian corporation governance data (for example, Hutchinson & Gul, 2004) and we exclude another 203 firms due to insufficient information for our study. The sample selection procedure is illustrated in Panel A of Table 1. The final sample comprises the remaining firms, which belong to 17 Global Industrial Classification Standard (GICS) sectors: a total of 1152 firm-year observations over the four-year period 2007-2010, as shown in Panel B of Table 1.

**Table 1. Panel A. Sample selection**

Top 500 listed companies	500
Less banks	(09)
Top 500 listed companies except banks	491
Missing values for the FMS	(86)
Missing values for the DS	(56)
Missing values for the IS	(61)
Total listed companies in sample	288
Firm years (2007-2010)	1152

Notes: FMS - foreign market similarity; DS - diversification similarity; IS - internationalization similarity.

**Table 1. Panel B. Industry type per GICS code - Sample companies**

No.	Sector		GICS code	Industry group	No.	Total Assets \$(000) 2010
1	10	Energy	1010	Energy	38	77,562,807
2	15	Materials	1510	Materials (Metals & Mining 83, Chemicals 3, Containers & Packaging 2, Paper & Forest Products 3)	86	92,118,719
3	20	Industrials	2010	Capital Goods	29	27,360,790
4	20	Industrials (cont'd)	2020	Commercial Services & Supplies	14	21,581,812
5	20	Industrials (cont'd)	2030	Transportation	06	40,380,879
6	25	Consumer Discretionary	2520	Consumer Durables & Apparel	03	2,919,217
7	25	Consumer Discretionary (cont'd)	2530	Consumer Services	06	8,185,661
8	25	-Do-	2540	Media	11	19,852,414
9	25	-Do-	2550	Retailing	10	7,068,173
10	30	Consumer staples	3010	Food & Staples Retailing	02	57,723,300
11	30	-Do-	3020	Food, Beverages & Tobacco	10	15,067,199
12	35	Health Care	3510	Health Care Equipment & Services	07	14,158,569
13	35	-Do-	3520	Pharmaceuticals, Biotechnology & Life Sciences	11	17,105,936
14	40	Financials	4020	Diversified Financials	20	14,145,038
15	40	-Do-	4040	Real Estate (Real estate 10, Real estate investment trusts (REITs) 07)	17	89,839,520
16	45	Information Technology	4510	Software & Services	08	4,046,115
17	55	Utilities	5510	Utilities	10	33,978,340
<b>Total</b>					<b>288</b>	<b>\$543,094,488</b>

Notes: GICS - Global Industry Classification Standard.

Data were collected from the following databases – Osiris, Fin Analysis, Connect 4 ASX, Who's Who in Australia – and annual reports published by each company during the period 2007 to 2010. The conventional wisdom suggests that corporate directors' directorships help them to gain industry expertise and become effective monitors and advisors to the management. During the 2008-2009 global financial crisis, the issue of independent directors' industry expertise was brought to the forefront of the debate on the efficient use of corporate governance and corporate boards (Wang et al., 2015). Therefore, we selected the 2007 to 2010 period to assess the impact of ID's heterogeneous board ties on firm performance and firm diversification. Our selection criteria are also influenced by ASX corporate governance principles because in that year the first revision of the ASX Corporate Governance Council's Corporate Governance Principles and Recommendations (ASX 2007) emphasized that the board nomination committee should identify and assess director competencies when appointing new IDs to the board.

We followed the ASX *Corporate Governance Principles and Recommendations* in identifying IDs. We also reviewed the directors' report and notes to the financial statements on related party transactions to ascertain directors' potential links with the company. For each company in the sample, we recorded all directorships held in ASX-listed companies by each director and analysed these firms. This extends the extant research on multiple directorships, which only examines directorships in firms within their examined sample (e.g., Ferris et al., 2003).

### 3.1. Measurements of variables

#### 3.1.1. Dependent variables

The extant literature uses various measures to assess company performance. We use return on assets (ROA) as dependent variables to measure firm performance. To measure firm diversification we use the entropy measure which has been employed in the extant research. This measure was developed by Palepu (1985) to consider the percentage weight for each segment of the total sales volume in the firm diversification calculation.

#### 3.1.2. Independent variables

##### 3.1.2.1. Measure of heterogeneous board ties

We follow Carpenter and Westphal (2001) and employ the four variables they used to assess independent directors' mix of board ties. These are: product market heterogeneity (PMH); foreign market heterogeneity (FMH); diversification heterogeneity (DH); and internationalization heterogeneity (IH).

We compute to what extent an individual independent director's board ties in its similarity differ from the similarity of all other independent directors on the board of the focal firm. We use the following formula to measure the extent to which independent directors' board ties of the focal firm "is heterogeneous in its relatedness on a given dimension.

$$\{\sum |r_i - \bar{r}|\}/n \quad (1)$$

Where  $r_i$  is the relatedness score for the independent director  $i$ ,  $\bar{r}$  is the average relatedness for the other independent directors on the board, and  $n$  is the number of independent directors on the board of the focal firm" (Carpenter & Westphal, 2001, p. 647).

Product market heterogeneity of IDs' board ties is measured in the following way. Product market similarity (PMS) of IDs' board ties was first constructed as the number of IDs' board ties to the other listed companies in a principal business similar to that of the focal firm, divided by the number of board ties. We use four-digit GICS codes to identify the same primary business as the focal firm. Secondly, we use Equation (1) to calculate product market heterogeneity by calculating absolute differences in the similarity between each ID and other IDs of the board of the focal firm. Finally, all IDs' heterogeneous values thus calculated, summed up and averaged by the number of IDs on the board of the focal firm.

IDs' board ties related by foreign market heterogeneity were calculated as below. Firstly, we calculate foreign market similarity (FMS) of IDs' board ties by the number of board ties to the other listed companies with the same principal foreign markets as the focal firm divided by the number of board ties. We thereafter use Equation (1) to calculate foreign market heterogeneity by calculating absolute differences in the similarity between each ID and other IDs on the board of the focal firm. Finally, all IDs' heterogeneous values thus calculated were added up and divided by the number of IDs on the board of the focal firm.

We employ an entropy measure developed by Palepu (1985) to measure diversification similarity (DS) between the focal firm and the other listed companies to which directors were appointed, in order to calculate IDs' board ties related by diversification similarity as we have done for other independent variables. The formula to assess the diversification similarity is:

$$\sum P_i \times \ln(1/P_i) \quad (2)$$

where  $P$  is the sales volume on segment  $i$  and  $\ln(1/P_i)$  is the weight for each segment  $i$ . The absolute difference between the diversification of a focal firm and the diversification of each of the directorships firms was calculated. The difference scores were then added and divided by the total number of appointments. This score is then subtracted from the highest value of diversification dissimilarity in the sample (Carpenter & Westphal, 2001, p. 646).

Secondly, we use Equation (1) to determine IDs' board ties related by diversification heterogeneity.

We measure the internationalization similarity (IS) by first using a composite measure. This measure is constructed employing two main organizational portfolios: foreign sales and number of subsidiaries. Foreign sales revenue is calculated by dividing foreign sales by total sales of the firm. This reveals the extent to which the firm is dependent on foreign trade. The second portfolio, being the number of subsidiaries considered to be geographically dispersed by the firm is calculated by

dividing the number of subsidiaries of the firm by the highest number of subsidiaries of the firm in our sample. Thereafter, to construct the composite measure of IS two ratios of subsidiaries and foreign sales are added. To measure IS:

“...the absolute difference between the degree of internationalization (DOI) of a focal firm and the DOI of each of the directorship firms was calculated. The difference scores were then added and divided by the total number of appointments. This figure was then subtracted from the highest value of DOI dissimilarity in the sample to create an index of similarity” (Carpenter & Westphal, 2001, p. 647).

We thereafter employ Equation (1) to determine IDs' board ties related by internationalization heterogeneity.

Based on previous research (Kiel & Nicholson, 2003; Barroso, Villegas, & Perez-Calero, 2011), we control for the following variables that prior literature has found to affect firm performance. These include IDs' management experience, CEO duality, CEO ownership, director age, the board size, director's tenure on the board, firm size, leverage, and firm age.

To make possible an analysis of the impact of IDs' board heterogeneity on high growth firms' performance, we use four interaction explanatory variables, i.e., PMH\*G, FMH\*G, DH\*G, and IH\*G by multiplying the growth dummy variable. A dummy variable is coded 1 when measuring a high growth effect and 0 otherwise.

### 3.1.2.2. Growth factor

The most commonly used proxies for growth firms are the ratio of the market value of assets to the book value of assets and Tobin's q (Perfect & Wiles,

1994; Smith & Watts, 1992; Lel & Miller, 2019). It has been found that the market-to-book assets ratio and Tobin's q are highly correlated (Perfect & Wiles, 1994). In keeping with the extant empirical literature, Tobin's q is used as a proxy for a growth factor (Aivazian, Ge, & Qiu, 2005). We examine the growth effect as a dummy variable rather than splitting the sample, to increase degrees of freedom. We follow the extant literature and identify high growth and low growth firms by employing a cut-off point with the value of 1 (Lang, Stulz, & Walkling, 1991; Opler & Titman, 1993). High-q firms ( $q > 1$ ) are defined as high growth firms and low-q firms ( $q < 1$ ) are graded as low growth firms.

Accordingly, 738 firm-year observations are graded as high growth firms and the balance of 414 firm-year observations is classified as low growth firms. The robustness of this measure is tested using market value to the book value of equity being a proxy for growth opportunity. The robustness of this measure is tested using market-to-book value as prior studies have done (Matolcsy et al., 2004). High growth and low growth firms are identified by splitting the sample into two sub-samples at the median market-to-book ratio; firms falling above the median are classified as high growth firms while firms falling below the median are classified as low growth firms. The results are substantively unchanged.

## 3.2. Model specification

We test *H1* and *H2* using the following OLS models. Model (1) examines the impacts of IDs' heterogeneous board ties on the performance of high growth firms:

### OLS Model 1

$$ROA_{it} = \alpha + \beta_1 PMH_{it} + \beta_2 FMH_{it} + \beta_3 DH_{it} + \beta_4 IH_{it} + \beta_5 G_{it} + \beta_6 PMH * G_{it} + \beta_7 FMH * G_{it} + \beta_8 DH * G_{it} + \beta_9 IH * G_{it} + \beta_{10} ME_{it} + \beta_{11} PREIDS_{it} + \beta_{12} DF_{it-1} + \beta_{13} BT_{it} + \beta_{14} BS_{it} + \beta_{15} CEOD_{it} + \beta_{16} DAGE_{it} + \beta_{17} CEOOW_{it} + \beta_{18} FS_{it-1} + \beta_{19} LEV_{it-1} + \beta_{20} FAGE_{it-1} + \varepsilon \quad (3)$$

PMH\*G, FMH\*G, DH\*G, and IH\*G are interaction variables which proxy for the power of independent directors' heterogeneous board ties in high growth firms.

### OLS Model 2

$$DF_{it} = \alpha + \beta_1 PMH_{it} + \beta_2 FMH_{it} + \beta_3 DH_{it} + \beta_4 IH_{it} + \beta_5 PREIDS_{it} + \beta_6 BT_{it} + \beta_7 BS_{it} + \beta_8 CEOD_{it} + \beta_9 DAGE_{it} + \beta_{10} CEOOW_{it} + \beta_{11} FS_{it-1} + \beta_{12} LEV_{it-1} + \beta_{13} FAGE_{it-1} + \varepsilon \quad (4)$$

These variables' definitions are outlined in Table 2.

We use the following model to investigate the effects of IDs' heterogeneous board ties on the firm diversification:

**Table 2.** Variables used to test the hypotheses

<i>Variable</i>	<i>Definition</i>	<i>Measurement</i>	<i>Source</i>
PMS	Product market similarity	No. of firm's independent directors is connected to directorships of firms operating in similar product markets to those of the focal firm ÷ Total number of directors' appointments.	Osiris & Connect 4
FMS	Foreign market similarity	No. of firm's independent directors is connected by directorships of firms operating in similar foreign markets to those of the focal firm ÷ Total number of directors' appointments.	Osiris & Connect 4
DS	Diversification similarity	Highest value of diversification dissimilarity - (sum of the absolute difference between the total diversification of focal firm and each of the other firms a director is connected to ÷ Total number of director's appointments).	Osiris & Connect 4
IS	Internationalization similarity	Highest value of internationalization dissimilarity - (sum of the absolute difference between the internationalization of focal firm and each of the other firms a director is connected to ÷ Total number of director's appointments).	Osiris & Connect 4
PMH	Product market heterogeneity	Sum of absolute difference between average PMS score of the other directors on the board and individual ID's similarity score ÷ Total number of IDs on the board.	Osiris & Connect 4
FMH	Foreign market heterogeneity	Sum of absolute difference between average FMS score of the other directors on the board and individual IDs' similarity score ÷ Total number of IDs on the board.	Osiris & Connect 4
DH	Diversification heterogeneity	Sum of absolute difference between average DS score of the other directors on the board and individual IDs' similarity score ÷ Total number of IDs on the board.	Osiris & Connect 4
IH	Internationalization heterogeneity	Sum of absolute difference between average IS score of the other directors on the board and individual IDs' similarity score ÷ Total number of IDs on the board.	Osiris & Connect 4
<i>Dependent Variables</i>			
ROA	Return on assets	Net income (BT) ÷ Total assets.	Osiris
MKTBE	Market value to book value of equity	(Stock price × Total number of shares outstanding) ÷ Book value of equity.	Osiris
DF	Firm diversification	" $\sum P_i \times \ln(1/P_i)$ ", where $P$ is the sales volume on segment $i$ and $\ln(1/P_i)$ is the weight for each segment $i$ .	Osiris
<i>Control Variables</i>			
ME	Management experience	Summing up each director's years of service ÷ No. of directors on the board.	Connect 4
PREIDS	% of IDs on the board	No. of independent directors/No. of directors on the board.	Osiris
BT	Board tenure	No. of years directors have served on the board ÷ No. of directors on the board.	Connect 4
BS	Board size	Natural logarithm of the No. of directors on the board	Osiris
CEOD	CEO duality	Measured by a dummy variable coded '1' if the CEO is also the chair of the board and '0' if the two positions are occupied by different individuals.	Connect 4
DAGE	Directors' age	Total age of IDs ÷ No. of IDs.	Osiris
CEOW	CEO ownership	Shares owned by CEO ÷ Total shares.	Osiris
FS	Firm size	Natural log of total assets.	Osiris
LEV	Leverage	Total liability ÷ Total equity.	Osiris
FAGE	Firm age	No. of years since establishment of company.	Osiris

### 3.3. Endogeneity

Corporate governance literature (e.g., McKnight & Weir, 2009; Bhagat & Bolton, 2008) often suggests the existence of a potential endogeneity problem in the relationship between corporate governance variables and firm performance. We execute the Hausman test of endogeneity for each model and find that the independent variables are not correlated with the error term and therefore endogeneity is not indicated. Endogeneity could be caused by measurement error, omitted variables, and reverse causality. Notwithstanding the results of the Hausman test and as discussed in further analysis, we mitigate the potential for measurement error and omitted variables by the use of an alternative proxy for the dependent variable and use of firm fixed effect models, respectively. However, one of the most difficult challenges for studies examining the effect of multiple directorships is the direction of causation (Barzuza & Curtis, 2014). It may be that firms appointing multiple directors may also have attributes that predict other aspects of the firm operation or, in this context it is possible that better-performing firms choose to appoint directors

with heterogeneous board ties. As a consequence, in line with Larcker et al. (2013), we presume that board compositions of the focal firm remained unchanged, and IDs' heterogeneous board ties score changed due to alterations in policies and strategies of the focal firm and other firms that are connected by multiple directorships.

Most studies that have attempted to deal with this problem use instrumental variables (IV) method-based 2SLS regression (Bhagat & Bolton, 2008; Larcker & Rusticus, 2010). To address this issue, we utilize the 2SLS regression in an effort to deal with possible endogeneity between IDs' multiple directorships and firm performance. The instrumental variable (IV) that we use is a lagged endogenous variable in keeping with extant research (Bhagat & Bolton, 2008; Sarkar & Sarkar, 2009; Neanidis & Savva, 2009; Renders, Gaeremynck, & Sercu, 2010; Bouwman, 2011; Chan et al., 2013). We use one-year lagged multiple directorships variables as the instrument for panel data. Past multiple directorships variables should be correlated with current multiple directorships variables. Despite the fact that past multiple directorship variables could be the predetermined variables for current firm



performance, there should be no reverse causation with current firm performance. Additionally, past multiple directorships variables are expected to influence current firm performance. We identify lagged product market heterogeneity (lagged\_PMH), lagged foreign market heterogeneity (lagged\_FMH), lagged diversification heterogeneity (lagged\_DH), and lagged internationalization heterogeneity (lagged\_IH), respectively, as instruments for product market heterogeneity (PMH), foreign market heterogeneity (FMH), diversification heterogeneity (DH), and internationalization heterogeneity (IH).

## 4. RESULTS

### 4.1. Descriptive statistics

Table 3 reports the descriptive statistics concerning IDs' heterogeneous directorships and their impact on the performance of high growth firms and firm diversification. The measures of financial performance indicate there are wide variations in the

performance variables in the firms included in our sample. The variation in the sample is significant, with the minimum ROA -1.34 and the maximum 0.65. The mean ROA is 0.01%. Untransformed descriptive statistics further reveal that the firm size ranges from AUD\$5.0 million to AUD\$86,265 million, and the mean of the sample is AUD\$2,156 million. Descriptive statistics also indicate that firms in the sample are fairly mature, as the mean firm age is 29 years given that the range is 0 to 176 years. The mean firm diversification is 0.49 as indicated in the table.

Control variables in the descriptive statistics illustrate that board size varies from three to 14 directors, with a mean score of 6.4. CEO duality is operationalized as a dichotomous variable with values of 0 and 1. Directors' age is a board demographic variable ranging from 42 to 76 years, with a mean value of 58 years. The descriptive values further reveal that board tenure ranges from 1 to 17.2 years, with a mean value of 4.7 years.

**Table 3.** Descriptive statistics for analysis of IDs' heterogeneous board ties, firm performance and firm diversification

<i>Variables</i>	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Median</i>	<i>SD</i>
ROA	1152	-1.349	0.650	0.011	0.043	0.222
DF	1152	0.000	1.827	0.493	0.476	0.440
PMH	1152	0.002	0.875	0.225	0.211	0.194
FMH	1152	0.000	0.666	0.098	0.007	0.138
DH	1152	0.001	1.172	0.261	0.195	0.274
IH	1152	0.001	1.263	0.339	0.330	0.294
ME	1152	14.85	40.00	27.90	28.00	4.311
PREIDS	1152	0.333	0.909	0.719	0.750	0.137
BT	1152	1.000	17.25	4.700	4.250	2.378
BS	1152	3.000	14.00	6.460	6.000	1.803
CEOD	1152	0.000	1.000	0.060	0.000	0.243
DAGE	1152	42.000	76.71	58.32	58.20	5.252
LOG_CEOW	1152	0.000	0.682	0.033	0.004	0.085
LOG_FS	1152	6.649	19.66	12.80	12.61	1.984
LOG_LEV	1152	0.000	17.17	4.730	0.297	6.119
LOG_FAGE	1152	0.693	17.76	6.269	3.714	4.922

Notes: DF - diversification of firm; PMH - product market heterogeneity; FMH - foreign market heterogeneity;

DH - diversification heterogeneity; IH - internationalization heterogeneity; PREIDS - percentage of independent directors;

BT - board tenure; BS - board size; CEOD - CEO duality; DAGE - director age; CEOW - CEO ownership; FS - firm size;

LEV - leverage; FAGE - firm age.

Table 4 reports the correlation coefficient of IDs' heterogeneous board ties, the firm performance of high growth firms, and firm diversification. The correlations suggest that ROA is positively correlated with the PMH, FMH, DH, IH, board tenure, board size, firm size, leverage, and firm age, and negatively related with CEO duality. The table also demonstrates that DF is positively correlated with PMH, FMH, DH, IH, PRIDS, board tenure, board size,

firm size, leverage, and firm age. The correlation matrix shows that the highest degree of correlation of 0.590 is between board size and firm size. To test for multicollinearity, the variance inflation factor (VIF) is calculated for each independent variable. Myers (1990) suggests that a VIF value of 10 and above is a cause for concern. Accordingly in this study multicollinearity does not constitute a problem.

**Table 4.** Correlation coefficient for analysis of IDs' heterogeneous board ties, firm performance and firm diversification

<i>Variables</i>	<i>ROA</i>	<i>DF</i>	<i>PMH</i>	<i>FMH</i>	<i>DH</i>	<i>IH</i>	<i>PREIDS</i>	<i>BT</i>	<i>BS</i>	<i>CEOD</i>	<i>DAGE</i>	<i>CEOW</i>	<i>FS</i>	<i>LEV</i>	<i>FAGE</i>
ROA	1.000	.285 .000	.367 .000	.192 .000	.315 .000	.094 .000	.012 .688	.194 .000	.092 .002	-.101 .001	.040 .168	-.007 .809	.306 .000	.015 .602	.078 .008
DF		1.000	.113** .000	.202** .000	.336** .000	.213** .000	.170** .000	.131** .000	.306 .000	-.064* .028	.145** .000	-.045 .124	.474** .000	.271** .000	.368** .000
PMH			1.000	.191** .000	.397** .000	.192** .000	-.070* .017	.107** .000	-.043 .145	-.095** .001	.041 .160	-.025 .386	.069* .019	.186** .000	.188** .000
FMH				1.000	.154** .000	.279 .000	.007 .823	.118* .000	.122** .000	-.032 .276	.025 .393	.000 .987	.162** .000	.019 .517	.055 .063
DH					1.000	.316** .000	.056 .054	.148** .000	.116** .000	-.046 .120	.075* .010	.019 .510	.253** .000	.377** .000	.419** .000
IH						1.000	-.004 .902	.127** .000	.123** .000	-.127** .000	.007 .807	.019 .510	.178** .000	.388** .000	.408** .000
PREIDS							1.000	.040 .170	.212** .000	-.094** .001	.156** .000	-.178 .000	.287** .000	.141** .000	.168** .000
BT								1.000	.081** .006	-.086** .003	.253** .000	.028 .346	.192** .000	.096** .001	.153** .000
BS									1.000	-.063* .032	.054 .068	-.101** .001	.590** .000	.206** .000	.267** .000
CEOD										1.000	-.048 .101	.146** .000	-.043 .140	-.003 .916	-.017 .573
DAGE											1.000	.084** .004	.180** .016	.070* .000	.120** .000
CEOW												1.000	-.20** .000	-.072* .014	-.079** .007
FS													1.000	.419** .000	.485** .000
LEV														1.000	.959** .000
FAGE															1.000

Notes: \*\*Correlation is significant at the 0.01 level (2-tailed); \*Correlation is significant at the 0.05 level (2-tailed);

DF - firm diversification; PMH - product market heterogeneity; FMH - foreign market heterogeneity; DH - diversification heterogeneity; IH - internationalization heterogeneity; PREIDS - percentage of independent directors; BT - board tenure; BS - board size; CEOD - CEO duality; DAGE - director age; CEOW - CEO ownership; FS - firm size; LEV - leverage; FAGE - firm age.

#### 4.1.1. Multiple regression results and discussion

Table 5 summarizes the results regarding the relationship between heterogeneous directorships of IDs and the performance of high growth firms. We carry out an analysis similar to Mak and Li (2001), by running OLS and 2SLS regressions for the performance of high growth firms on various corporate governance mechanisms. The objective here is to investigate whether the corporate governance mechanisms are endogenously determined and affect the performance of growth firms or otherwise. There is support for IDs' heterogeneous directorships being positively related with the performance of high growth firms as measured by ROA over the four-year period reviewed. Product market heterogeneity (PMH\*G) exhibits a positive and significant relationship ( $\beta = 0.338$ ,  $p < .01$ ) with ROA. The estimated coefficient of PMH\*G is 0.338 with a  $t$  statistic of 7.667. Regarding the economic significance, a one-standard-deviation increase of PMG\*G will lead to a 6% increase in ROA at the mean. This outcome indicates that both the statistical and economic significance of PMH\*G are positive. It also suggests that the high growth firm's board should comprise more IDs who are armed with different and more diverse views about company products and markets than the number of IDs who are familiar with currently applied business policies and strategies. This enables them to monitor and advise management in such a way that the firm performance improves.

Diversification heterogeneity (DH\*G) also reveals a positive and significant relationship ( $\beta = 0.190$ ,  $p < .01$ ) with ROA. The estimated coefficient of DH\*G is 0.190 with a  $t$  statistic of 4.804. In connection with the economic significance, a one-standard-deviation increase of DH\*G will lead to a 5% increase in ROA at the mean. This result reveals that both the statistical and economic significance of DH\*G are positive. Furthermore, it indicates that the performance of high growth firms is greater when the board consists of IDs who possess more board ties to firms that follow different diversification strategies compared to those IDs having board ties to firms with similar diversification. It can, therefore, be stated here that more board appointments to firms with different diversification strategies tend to increase IDs' ability to contribute to the performance of high growth firms.

Whilst IDs' board ties measured by foreign market heterogeneity (FMH\*G) are positively associated with the ROA of high growth firms, this result is not significant. It simply indicates that having more board ties to firms with dissimilar foreign market strategies than directorships in firms with similar foreign market strategies may not contribute to the performance of high growth firms.

Finally, heterogeneity in internationalization (IH\*G) is negative and not statistically significant. This means that firm performance is not significantly affected by IDs who hold more board ties to firms that adopt dissimilar, as opposed to similar, internationalization strategies.

Our instrumental variable regression and the 2SLS results are consistent with the OLS results. The overall findings suggest that a board consisting of a higher percentage of IDs with dissimilar directorships than that of the similar board ties as measured by product market and diversification heterogeneity may enhance the performance of high growth firms. This result provides more nuanced support for Hutchinson (2002) and Hutchinson and Gul (2004), who discover that a higher proportion of outside directors adds value to high growth firms.

In terms of other control variables, the percentage of independent directors, directors' age, board size, and leverage are negative and significant with ROA. Board tenure and firm size are positively significantly correlated with the ROA of high growth firms ( $p < .01$ ). Moreover, the power of the model ( $R^2$  of .314) supports its predictive accuracy. In conclusion, it appears there is partial support for *H1* in that a positive relationship exists between IDs' heterogeneous directorships as measured by heterogeneity in product markets and diversification and the performance of high growth firms as measured by ROA.

Table 6 presents the estimation results for Model (2). The results indicate there is partial support for IDs' heterogeneous board ties being significantly associated with the firm diversification. There is a positive relationship ( $p < .01$ ) between foreign market heterogeneity (FMH) and firm diversification. Diversification heterogeneity is also positive and significant at the 1% level with firm diversification. This outcome suggests that IDs having more board appointments to firms with the different foreign market and diversification strategies are able to increase their ability to meaningfully and effectively contribute to firm diversification.

Whilst internationalization heterogeneity is also positively related with firm diversification the result is not positive. Product market heterogeneity (PMH) is negative and insignificant. The 2SLS results are consistent with the OLS results suggesting that explanatory variables are not endogenously determined.

Overall, the F-value of the model is significant at the 1% level. The power of the model ( $R^2$  of .336 for firm diversification over the four-year period) supports its predictive accuracy. In conclusion, it appears there is partial support for *H2* in that a positive relationship appears between IDs' heterogeneous directorships and firm diversification.

**Table 5.** Multiple (OLS) and Two-stage least squares (2SLS) regression results for association between IDs' heterogeneous board ties and the performance of high-growth firms

Dependent Variable		Model 1: ROA - OLS							
Variables	Pred. Sign	Beta	t-value	Sig.	VIF	Beta	t-value	Sig.	VIF
<i>Independent variables</i>									
PMH	+	-.021	-.581	.562	2.008	-.114	-1.592	.112	2.008
FMH	+	.029	.682	.496	3.044	.136	1.537	.125	3.044
DH	+	.042	1.236	.217	1.870	.039	0.729	.466	1.870
IH	+	.039	1.082	.279	2.102	-.012	-.226	.821	2.102
G		-.495	-2.660	.008	2.453	-.699	-3.131	.002***	2.589
PMH*G		.338	7.667	.000***	3.076	.519	4.274	.000***	3.076
FMH*G		-.014	-.288	.773	3.679	-.190	-1.610	.108	3.679
DH*G		-.190	4.804	.000***	2.570	.202	2.044	.041**	2.570
IH*G		-.009	-.227	.821	2.690	.097	1.161	.246	2.690
<i>Board characteristics</i>									
ME		.019	.680	.497	1.258	.013	.471	.638	1.652
PREIDS	?	-.071	-2.677	.008***	1.559	-.062	-2.254	.024**	1.559
BT	+	.091	3.382	.001***	1.167	.094	3.223	.001***	1.167
BS	+	-.053	-1.885	.060*	1.608	-.107	-3.236	.001***	1.608
CEOD	-	-.032	-1.265	.206	1.083	-.022	-.817	.414	1.083
DAGE	-	-.061	-2.228	.026**	1.150	-.066	-2.330	.020**	1.150
LOG CEOW	+	.019	.722	.471	1.106	.020	.745	.457	1.106
<i>Firm characteristics</i>									
DF		.098	3.170	.002***	1.583	.081	2.286	.022**	1.583
LOG FS	+	.284	7.501	.000***	2.293	.329	7.326	.000***	2.293
LOG LEV	-	-.556	-2.592	.010**	7.436	-.602	-2.633	.009***	7.436
LOG FAGE	+	.208	2.077	.038**	6.668	.200	1.875	.061*	6.668
R-squared		.314				.285			
Adj R-squared		.302				.272			
F-value		25.964				22.581			
N		1152				1152			

Notes: \*\*\*, \*\*, \* indicates significance at the 1%, 5%, and 10% levels, respectively.

ROA - return on assets; PMH - product market heterogeneity; FMH - foreign market heterogeneity; DH - diversification heterogeneity; IH - internationalization heterogeneity; G - high growth dummy; PMH\*G - is the interaction between the PMH and high growth dummy; FMH\*G - is the interaction between the FMH and high growth dummy; DG\*G - is the interaction between the DG and high growth dummy; IH\*G - is the interaction between the IH and high growth dummy; ME - management experience; PREIDS - percentage of independent directors; DF - firm diversification; BT - board tenure; BS - board size; CEOD - CEO duality; DAGE - director age; CEOW - CEO ownership; FS - firm size; LEV - leverage; FAGE - firm age.

**Table 6.** Multiple (OLS) and Two-stage least squares (2SLS) regression results for association between IDs' heterogeneous board ties and firm diversification

Dependent Variable:		Model 1: DF - OLS							
Variables	Pred. Sign	Beta	t-value	Sig.	VIF	Beta	t-value	Sig.	VIF
<i>Independent variables</i>									
PMH	+	-.006	-.247	.805	2.008	-.040	-.514	.608	2.008
FMH	+	.092	3.541	.000***	3.044	.155	2.791	.005***	3.044
DH	+	.144	5.202	.000***	1.870	.420	3.168	.002***	1.870
IH	+	.039	1.363	.173	2.102	.013	.226	.821	2.102
<i>Board characteristics</i>									
ME		.026	.959	.330	1.258	.036	.752	.452	1.651
PREIDS	?	.025	.974	.338	1.559	.021	1.262	.207	1.559
BT	+	-.035	-1.339	.181	1.167	-.057	-1.927	.054*	1.167
BS	+	.045	1.655	.098*	1.608	.038	1.309	.191	1.608
CEOD	-	-.025	-1.004	.315	1.083	-.019	-.680	.497	1.083
DAGE	-	.021	.767	.444	1.150	.020	.685	.493	1.150
LOG CEOW	+	.016	.650	.516	1.106	.004	.129	.897	1.106
<i>Firm characteristics</i>									
LOG FS	+	.291	9.022	.000***	2.293	.267	7.699	.000***	2.293
LOG LEV	-	-.775	-8.673	.000***	7.436	-.751	-7.585	.000***	7.436
LOG FAGE	+	.875	9.341	.000***	6.668	.761	6.850	.000***	6.668
R-squared		.336				.308			
Adj R-squared		.328				.299			
F-value		28.425				27.993			
N		1152				1152			

Notes: \*\*\*, \*\*, \* indicates significance at the 1%, 5%, and 10% levels, respectively.

DF - firm diversification; PMH - product market heterogeneity; FMH - foreign market heterogeneity; DH - diversification heterogeneity; IH - internationalization heterogeneity; ME - management experience; PREIDS - percentage of independent directors; DF - firm diversification; BT - board tenure; BS - board size; CEOD - CEO duality; DAGE - director age; CEOW - CEO ownership; FS - firm size; LEV - leverage; FAGE - firm age.

#### 4.2. Further analyses

Several additional tests were conducted in order to test the findings' robustness and reliability. First, we followed the more traditional accounting and finance literature (Ferris et al., 2003; Fich &

Shivdasani, 2006) and tested for any effects of IDs' multiple directorships on firm performance in this sample. The results shown in Table 7 indicate that multiple directorships of independent directors on the board of Australian companies are not significantly associated with firm performance.

**Table 7.** Multiple (OLS) regression results for association between IDs' Multiple directorships and the performance of high-growth firms

Dependent Variable		Model 1: ROA			
Variables	Pred. Sign	Beta	t-value	Sig.	VIF
<i>Independent variables</i>					
AMDS		-.015	-.572	.568	1.670
<i>Board characteristics</i>					
ME		.008	.274	.784	1.542
PREIDS	?	-.100	-3.539	.000***	1.869
BT	+	.130	4.529	.000***	1.167
BS	+	-.070	-2.322	.020**	1.568
CEOD	-	-.071	-2.596	.010***	1.062
DAGE	-	-.060	-2.014	.044**	1.142
LOG CEOW	+	.031	1.134	.257	1.156
<i>Firm characteristics</i>					
DF		.198	6.206	.000***	1.433
LOG FS	+	.309	8.443	.000***	2.193
LOG LEV	-	-.379	-3.757	.000***	6.216
LOG FAGE	+	.033	2.197	.028**	6.018
R-squared		.194			
Adj R-squared		.186			
F-value		22.963			
N		1152			

Notes: \*\*\*, \*\*, \* indicates significance at the 1%, 5%, and 10% levels, respectively.

ROA - return on assets; AMDS - average multiple directorships; ME - management experience; PREIDS - percentage of independent directors; DF - firm diversification; BT - board tenure; BS - board size; CEOD - CEO duality; DAGE - director age; CEOW - CEO ownership; FS - firm size; LEV - leverage; FAGE - firm age.

Second, a sensitivity test was employed to examine the association between IDs' similar board ties and performance of high growth firms. The regression results shown in Table 8 indicate that the impact of IDs' similar board ties in terms of PMS, FMS, DS, and IS on ROA do not establish any significant positive relationships. This suggests that

the IDs on the board of the focal firm only hold board ties to firms that operate in similar product markets, foreign markets, and adopt similar diversification and internationalization strategies as of the focal firm do not affect the performance of the focal high growth firms.

**Table 8.** Multiple (OLS) regression results for association between IDs' similar board ties and the performance of high-growth firms

Dependent Variable		Model 1: ROA			
Variables	Pred. Sign	Beta	t-value	Sig.	VIF
<i>Independent variables</i>					
PMS	+	.249	3.193	.001	2.258
FMS	+	.010	.199	.842	2.244
DS	+	.351	3.160	.002	1.890
IS	+	-.143	-1.452	.147	3.102
G		-.471	-2.457	.014	
PMS*G		-.025	-.272	.786	3.016
FMS*G		.085	1.505	.133	3.529
DS*G		-.300	-2.347	.019**	2.690
IS*G		.094	.806	.421	1.670
<i>Board characteristics</i>					
ME		.003	.092	.926	1.510
PREIDS	?	-.073	-2.700	.007***	1.869
BT	+	.123	4.465	.000***	1.167
BS	+	-.118	-3.652	.000***	1.568
CEOD	-	-.060	-2.298	.022**	1.062
DAGE	-	-.067	-2.367	.018**	1.142
LOG CEOW	+	.029	1.076	.282	1.156
<i>Firm characteristics</i>					
DF		.185	6.099	.000***	1.433
LOG FS	+	.393	9.416	.000***	2.193
LOG LEV	-	-.600	-3.087	.002***	6.216
LOG FAGE	+	.029	1.006	.315	6.018
R-squared		.278			
Adj R-squared		.265			
F-value		21.816			
N		1152			

Notes: \*\*\*, \*\*, \* indicates significance at the 1%, 5%, and 10% levels, respectively.

ROA - return on assets; PMS - product market similarity; FMS - foreign market similarity; DS - diversification similarity; IS - internationalization similarity; G - high growth dummy; PMS\*G is the interaction between the PMS and high growth dummy; FMS\*G - the interaction between the FMS and high growth dummy; DS\*G is the interaction between the DS and high growth dummy; IS\*G is the interaction between the IS and high growth dummy; PREIDS - percentage of independent directors; DF - firm diversification; BT - board tenure; BS - board size; CEOD - CEO duality; DAGE - director age; CEOW - CEO ownership; FS - firm size; LEV - leverage; FAGE - firm age.

Third, the relationship between corporate governance and performance might be endogenous, thus raising doubts about the causality explanation between independent variables and dependent variables. In addressing the endogeneity issue, the fundamental requirements are that independent variables should be exogenous and should not be correlated with the error term in the structural equation (Larcker & Rusticus, 2010). In addition to the previously reported 2SLS regressions, we also conduct the Hausman test of endogeneity for each model. The untabulated results confirm that explanatory variables and dependent variables are not endogenous because the former are not correlated with the error term.

Fourth, in untabulated results, we re-run the analysis in Table 5 using return on equity (ROE) as the measure of firm performance. We find that the results are qualitatively similar. Again, we re-run the analysis using firm fixed effects regression and find qualitatively similar results.

## 5. DISCUSSION

Employing OLS and 2SLS regression models, and resource dependence theory, we find a positive association between IDs' heterogeneous directorships in terms of product market heterogeneity, diversification heterogeneity and the performance of high growth firms as measured by ROA. This indicates that IDs who amass diverse experience, skills, knowledge, perspectives, and varying talents, and have more board ties to firms that follow different diversification strategies and operate in different product markets compared to the focal firm are able to influence the performance of high growth firms. Our sensitivity tests results also support our main results.

We also find a positive association between IDs' heterogeneous board ties and firm diversification. This result suggests that the divergent experience, skills and perspectives obtained by IDs who hold more board ties to firms that use dissimilar diversification and foreign market strategies enhance firm diversification. Overall our results contend that independent directors who hold heterogeneous board ties play a major role in enhancing the performance of high growth firms.

Our study adds to the corporate governance literature by drawing on the strategic management literature with a consideration of how the IDs' heterogeneous directorships facilitate the performance of high growth firms and firm diversification. We also productively contribute to the debate on the association between directors' busyness and firm performance. Evidence is provided here that one possible channel of influence of director busyness on firm performance and firm

diversification may be through their heterogeneous directorships. In sum, rather than a narrow focus on the number of directorships, we show it is the precise nature of these directorships that matters.

Hence, the research demonstrates the applicability of utilizing resource dependence theory in corporate governance and board research. Specifically, it can be implemented where directors' strategic experience and knowledge can benefit the firm performance and diversification. Addressing strategic issues, independent board members provide information through structural relationships (Carpenter & Westphal, 2001). They can do this by embracing a network and having mature sociocognitive perspectives of governance rather than an agency perspective. This study broadens the extant body of research in a number of ways. In terms of governance, issues of power and control are circumvented by matters of relationships, knowledge, networks, and information flows. It seems that these considerations are important ones when determining the impact of corporate governance on firm performance. This work also extends the directorship interlocking research (Pettrigrew, 1992), which has been called for so that the consequences can be determined, not just simply discuss the type and form.

## 6. CONCLUSION

We examine whether the heterogeneous directorships of IDs on corporate boards affect the performance of high growth firms and firm diversification and find a positive association between some measures of IDs' heterogeneous directorships and the firm performance of high-growth firms. We also find a positive association between IDs' heterogeneous board ties and firm diversification.

This study highlights that decisions concerning the appointment of IDs to corporate boards should be based on the strategic context of their other directorships. From a practical perspective, these findings should be of value to board nomination committees when appointing new IDs and to policy-makers when considering changes to governance principles and guidelines. However, this study is not without its limitations. Since this study uses secondary data, it is not possible to observe the processes involved in board-level financial decision-making and directors' dynamics. We suggest that these limitations provide an avenue for future research using a behavioral approach. Also, the findings are limited to larger companies operating in Australia; further research should be carried out internationally and with smaller firms.

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