Social capital, human capital, and board appointments☆

Angela Andersen [a,1], Alexandre Garel [b], Aaron Gilbert [c,*], Alireza Tourani-Rad [c]

[a] Deloitte, New Zealand
[b] Audencia Business School, France
[c] Auckland University of Technology, New Zealand

ARTICLE INFO

ABSTRACT

This study investigates whether who a director knows is more important than what they know when it comes to gaining additional board seats. Specifically, we investigate the relative impact of human capital (a director's experiences, skills, and knowledge) and social capital (a director's connections to other directors) in gaining additional directorships. We employ a uniquely constructed index to measure human capital and Social Network Analysis to estimate a director's connectivity to other directors to proxy for social capital. We apply these to a sample of directors from publicly listed companies in New Zealand between 2000 and 2015. We observe that both human and social capital are positively related to acquiring additional board seats. Additionally, we find that directors gaining additional human capital are more likely to acquire additional board seats. We conclude that both human and social capital are important in determining which directors gain additional board seats, although directors should focus on acquiring additional human capital to enhance their chances of further appointments.

1. Introduction

The important role that the board of directors plays within a firm has attracted considerable attention from academics and practitioners interested in the best composition of a board. One stream of literature looking at board composition focuses on the behavior and attributes influencing new directors' board appointments. It has been shown that the chief executive officer's (CEO) experience (Brickley, Linck, & Coles, 1999), expertise and prestige (Ferris, Jagannathan, & Pritchard, 2003), professional knowledge (White, Woidtke, Black, & Schweitzer, 2014), and governance decisions (Coles & Hoi, 2003) are associated with directors gaining additional board appointments. In contrast, directors perceived as having performed poorly obtain fewer additional future board seats (Ertimur, Ferri, & Stubben, 2010; Fich & Shivdasani, 2007; Harford, 2003).

The extant literature mainly concentrates on directors' human capital attributes, such as skills, expertise, and knowledge acquired through past experiences, training, and education (Adams, Akyol, & Verwijmeren, 2018; Field & Mkrtchyan, 2017; Khanna, Jones, & Boivie, 2014); however, human capital only represents one aspect of the value that a director brings to the board. More recently, studies have also investigated a more comprehensive range of directors' attributes to improve our understanding of what directors need to be effective (Johnson, Schnatterly, & Hill, 2013). One potentially important attribute recently receiving considerable attention is

directors' social capital, particularly with their peers on other boards. The literature typically defines social capital as a director's ability to access resources through their social connections, including access to information, knowledge, and other resources (Burt, 1992). It has been argued that the ever-increasing complexity of businesses requires a broader range of knowledge, skills, and experience than can be acquired by a reasonably sized board (Van der Walt & Ingley, 2003). Directors may not be able to personally provide all the required knowledge, experience, and skills; however, accessing the expertise of directors sitting on the boards of other firms may be an effective way to overcome any deficiencies. Studies on interlocks among directors, a rough measurement of social capital based on director connectivity, have shown that information sharing among boards occurs, including relevant strategic knowledge (Carpenter & Westphal, 2001), acquisition strategies (Haunschild, 1993), anti-takeover practices (Davis, 1991), corporate disclosure policies (Cai, Dhaliwal, Kim, & Pan, 2014), and the design of executive compensation packages (Wong, Gygax, & Wang, 2015). Therefore, based on their connections with other directors, the directors' social capital may provide a vital resource that makes them more attractive to other firms willing to offer extra directorship.

One important issue is that social capital's impact must be examined conjointly with a director's human capital (Kor & Sundaramurthy, 2009). Specifically, the resources and knowledge available via social connections are vital in building human capital. A director with a larger social network can develop greater human capital. In contrast, a director with highly desirable skills and prior experience is likely to be attractive to multiple firms, resulting in the director holding multiple board seats on better-quality boards. Most studies on the importance of social capital do not control for human capital, which raises questions regarding the validity of their findings.

This study explicitly examines the value of social capital and how it could contribute to the appointment of directors to additional board seats while controlling for a director's human capital. In this study, social capital refers to the value derived from social relationships, such as the ability to access information and obtain resources from other people (Burt, 1992). Specifically, we investigate the social capital derived from the directors' connections with each other, i.e., directors' connectivity. We employ Social Network Analysis (SNA) to overcome the challenges in identifying and quantifying social interactions, which has previously limited the amount of research conducted on the financial implications of social connectedness. SNA centrality measures allow us to capture the multi-dimensional connections embedded in the social network of directors (Wasserman & Faust, 1994). This approach goes beyond measuring simple board interlocks (Handschumacher, Behrmann, Ceschinski, & Sassen, 2019; Mizruchi, 1996; Zona, Gomez-Mejia, & Withers, 2018) by considering broader indirect connections as well.[2]

Prior studies of human capital typically focus on one or more specific attributes, such as CEO experience (Fahlenbrach, Low, & Stulz, 2010). This study employs a self-constructed human capital index based on an extensive list of attributes identified in prior literature, which provides a complete measure of human capital.

This paper aims to distinguish social capital's impact from human capital and examine which of the two can help a director obtain extra board seats. We employ hand-collected data from various sources of all publicly listed companies listed on the NZX between 2000 and 2015 to calculate the centrality measures of social connectivity and human capital index.

New Zealand represents an interesting and, until now, understudied market with some significant differences compared to the US and UK, which to date have dominated the social capital research. The average size of the boards is one particularly noteworthy difference that may impact the relative importance of human and social capital. On average, US companies have boards comprising 11 directors, while in the UK, boards have nearly 10 directors. In contrast, the average New Zealand board contains just 6.5 directors. This suggests that US and UK boards have greater human capital pools and may therefore have less need for social capital. Furthermore, New Zealand is generally considered a social culture (Legatum Institute, 2018) and far less competitive than the US; therefore, New Zealand directors may be more willing to tap into their connections (Legatum Institute, 2018; New Zealand Government, 2013).

We start by regressing the number of board appointments on director connectivity, human capital, and control variables to determine the average effect of director connectivity and the human capital on their new board appointments. Our results support the importance of human and social capital in determining who gains an additional board seat in the following year. Human capital and social capital levels and increases in human capital are positively related to additional board appointments; however, there is no relationship with changes in social capital. We confirm our main finding by including director fixed effects and rerunning the regressions with orthogonalized versions of the human and social capital measures. We then perform logit regressions to determine if the likelihood of connectivity increases a director's chances of receiving an additional board appointment. These tests allow us to investigate whether firms value social or human capital when considering appointing board directors. We find that directors in the top tercile of both human and social capital are significantly more likely to gain additional appointments, while those in the bottom tercile for significantly less likely to get additional appointments. Finally, we consider the instances in which firms may express a preference for human over social capital. We find evidence that some industries are more likely to appoint high human capital but low social capital directors, suggesting they view human capital as more important. Only the oil and gas industry shows a preference for social capital. Additionally, we find that firms are more likely to appoint directors who match their existing board members, i.e., firms with high human capital and low social capital typically appoint directors with higher human capital and lower social capital.

Our paper is related to Cashman, Gillan, and Whitby (2013), who clearly distinguish between human and social capital and

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[2] Recently, the social connectedness index (SCI) has been introduced by Bailey, Cao, Kuchler, and Stroebel (2018) as a proxy for the social connectedness among different counties in the United States. This index is constructed based on the cross-sectional data of anonymized personal links between Facebook users across the US counties. Based on this index, Bailey, Cao, Kuchler, Stroebel, and Wong (2018), Kuchler et al. (2022), and Rehbein and Rother (2020), investigate the implications of social connectedness in making economic decisions. In our paper, we use direct, rather than virtual, links among New Zealand directors at individual level.

investigate US companies between 2003 and 2008 to determine how each affects a director's prospect of being appointed to a new board. Their results demonstrate that a director's social capital is considerably more important than human capital in determining a board appointment. Specifically, Cashman et al. (2013) find that a highly connected director is likelier to gain a board seat regardless of their level of human capital. It is worth noting that 2003–2008 represents a period where, in light of significant corporate governance failures in the early 2000s, director independence was a key focus of director recruitment. Since then, considerable emphasis has been placed on board diversity, necessitating in many countries a broadening of the director pool and subsequently a potential reduction in the emphasis on social capital. Therefore, it is worth revisiting the findings of Cashman et al. (2013) in light of the significant changes in board requirements. The findings of Cashman et al. (2013) contrast with our finding that human and social capital are equally important in gaining additional board appointments in New Zealand. Furthermore, we also show that directors who gain additional human capital are more likely to gain additional appointments, while changes in social capital are not associated with additional board seats. This suggests that directors within the New Zealand context would be better served by focusing on acquiring additional human capital to increase their prospects of obtaining additional directorships.

The rest of the study is structured as follows. Section 2 provides the relevant literature review, Section 3 describes the data and the variables, Section 4 presents the empirical results and discussions, and Section 5 concludes the study.

2. Literature review

2.1. Board appointments

Fama and Jensen (1983a) argue that the director labor market seeks directors with particular attributes that help them effectively monitor and advise management, rewarding such directors with additional board appointments. Studies have supported this empirically, including Brickley et al. (1999), who find that retired CEOs who perform well in their roles receive more board appointments. Coles and Hoi (2003) find that directors of a firm that rejected anti-takeover provisions gained additional board positions in the subsequent three years. Ferris et al. (2003) find a positive relationship between the past performance of firms that a director served and their subsequent number of directorships held. Fos and Tsoutsoura (2014) find that directors on the boards of firms subject to proxy contests subsequently experienced a decline in the number of directorships.

2.2. Human capital

There can be little doubt that a potential director's experiences and skills are crucial in their probability of being appointed to a board. The extant literature identifies a range of human capital attributes associated with gaining additional board appointments, including board expertise (Ferris et al., 2003), entrepreneurial experience (Faleye, Kung, Parwada, & Tian, 2020), and professional expertise, such as academic careers (White et al., 2014) and top executives (Keys & Li, 2005). In their survey article, Johnson et al. (2013) identify various attributes that describe an effective director, including CEO experience, financial expertise, venture capital experience, acquisition experience, affiliations, and social status. These studies indicate that a broad range of human capital attributes determines a director's chances of being appointed to additional boards.

2.3. Connectivity and social capital

In addition to a director's personal experiences and skills, a growing body of literature has sought to investigate the value of a director's social connections, so-called social capital. The extant literature on the value of director connectivity for firms has found mixed results. For instance, studies have shown that board networks can improve financial performance (Horton, Millo, & Serafeim, 2012), shareholder returns (Larcker, So, & Wang, 2013), firm value (Omer, Shelley, & Tice, 2014b), and financial reporting quality (Omer, Shelley, & Tice, 2014a). Others have found that connectivity can reduce earnings management (Fogel, Ma, & Morck, 2015), provide access to the corporate finance policies of peers (Fracassi, 2017), and reduce information asymmetry for sophisticated investors (Akbas, Meschke, & Wintoki, 2016). Conversely, connectivity has been associated with adverse outcomes, such as weaker corporate governance (Barnea & Guedj, 2007), managerial entrenchment (El-Khatib, Fogel, & Jandik, 2015), poor firm performance (Andres, Bongard, & Lehmann, 2013), or spreading value-destroying corporate practices (Chiu, Teoh, & Tian, 2013). Studies have argued that well-connected directors may feel more committed to their network than to shareholders (Barnea & Guedj, 2007), or they may overload the board with information that results in less timely or poor decisions (Chewning & Harrell, 1990; Jackson & Farzaneh, 2012; O'Reilly, 1980). Ostensibly, it has also been found that connectivity does not affect firm performance (Blanco-Alcantara, Diez-Esteban, & Romero-Merino, 2019). Several recent studies have also concluded that connected directors may be favorable for smaller (Chakravarty & Hegde, 2022) or younger firms (Ferris, Jagannathan, & Liao, 2022) but not all firms. As a result, there is an open question regarding the value of director connectivity for firms and whether it is a desirable attribute of directors.

Initially, board connectivity studies focused on the direct connections between boards via the concept of interlocks, where a single director sits on both boards. More recently, studies have applied SNA (Wasserman & Faust, 1994), arguing that companies exist within vast networks linked via chains of interlocked directors to study the implications of the direct and indirect connections between boards (Cashman et al., 2013; Horton et al., 2012). The broader networks created by indirect connections should allow boards to access more knowledge and expertise than just considering the traditional measures of interlocks. Renneboog and Zhao (2020) argue that access to more indirect and distant knowledge is more valuable than that from direct connections; however, the extant literature has yet to provide substantive evidence about the effectiveness of a well-connected director joining the board.

2.4. Interaction between human capital and social capital

The extant literature has separately identified that various human capital attributes are essential determinants of directors acquiring additional board seats, and there is limited evidence to suggest that social capital may also be considered important (Cashman et al., 2013); however, a strong argument must be made for joint consideration, as these attributes are interrelated but separate concepts (Kor & Sundaramurthy, 2009; Sundaramurthy, Pukthuanthong, & Kor, 2014; Tian, Haleblian, & Rajagopalan, 2011). In particular, directors with high human capital are highly sought after, resulting in more opportunities to gain additional board seats and increase their social capital. In addition, directors with higher social capital are also better positioned to increase their human capital by having more opportunities to build their knowledge and experiences. Considering either human or social capital in isolation runs the risk of biasing the findings. To date, few studies of social capital have considered the human capital of directors comprehensively.

While these concepts are interrelated, having capital in one aspect may help acquire the other; however, the value of social capital in acquiring directorships remains uncertain. A substantial body of literature has shown that boards want to appoint directors who personally bring knowledge and skills to assist the board in functioning effectively. In contrast, social capital is harder to quantify, and the material benefits of whom you know may be harder to conceptualize, especially when convincing shareholders to vote for a new director candidate. This raises the question of whether social capital should result in additional board seats. To date, only Cashman et al. (2013) provide evidence on the impact of social capital on board appointments, finding it far more valuable than human capital. There is also the question of whether access to other directors' knowledge and skills is valuable for all firms in all circumstances. For instance, some firms, particularly those dealing with highly confidential information, may find social capital less valuable as directors cannot seek advice externally, making it more critical that the board has people with the right human capital. We seek to add more recent experiences from another market to Cashman et al. (2013) and examine whether social capital is important for all firms.

3. Sample and variables

We draw our sample of directors from the firms on the NZX covering the period from 2000 to 2015. Each year, we identify all the directors on the boards of listed firms based on records from the New Zealand Companies Office register. We collect their names, appointment dates, resignation dates, and country of residence to determine their primary location; this information is cross-checked with firms' annual reports and data from the NZX. We hand-collect information about each director using multiple data sources. Information on characteristics and biographical information is primarily from the annual reports and appointment announcements, supplemented by web sources including Linkedin, Bloomberg, and the National Business Review. We collect mergers and acquisitions data from the Bloomberg database, and firm-level data are from the Thomson Reuters Datastream and Eikon. Appendix 1 describes all

Table 1
Director Board Appointments from 2000 to 2015.

1	2	3	4	5	6	7
Year	IPOs	N Firms	N Directors	N Appointed Directors	N Board Appointments	% New Appointed Directors
2000	21	132	702	185	200	41%
2001	4	144	733	173	188	75%
2002	5	142	729	171	183	74%
2003	6	144	711	129	137	71%
2004	15	166	811	157	166	73%
2005	6	169	811	134	139	62%
2006	7	161	784	114	118	65%
2007	10	167	795	138	142	79%
2008	3	163	765	124	125	59%
2009	1	158	766	106	110	69%
2010	2	155	785	129	134	73%
2011	4	152	751	114	123	72%
2012	2	154	764	155	161	71%
2013	6	153	762	152	161	68%
2014	12	155	769	116	119	66%
2015	4	158	773	130	135	67%
Average	7	155	763	139	146	68%
Total	108	2473	12,211	2227	2341	1501
Unique	108	279	2432	1743	271	1501

This table presents annual summary statistics for the sample of 2341 board appointments to New Zealand public firms from 2000 to 2015. The first column presents the number of initial public offerings by year to show the relationship between appointments and newly public firms. Columns 2 and 3 report the total number of firms and directors in the sample each year. Column 4 reports the number of unique directors each year that firms appointed. Column 5 reports the number of board appointments per year, while Column 6 reports the percentage of directors that received their first appointment to a firm in our sample for the respective year. The three bottom rows report averages, totals, and the number of unique events. For example, the 2341 appointments were to 271 different boards.

variables used in the analysis.

Table 1 reports annual summary statistics for the sample and board appointments; the sample includes 279 unique firms, 2432 unique directors, and 12,211 director-year observations. We identify 2341 new board appointments for 1743 unique directors at 271 firms between 2000 and 2015. The average number of directors per year sitting on a board is 763, with 139 receiving a new or additional appointment, to an average of 146 boards per year. This suggests that around 18% of directors receive either a first or an additional directorship per year. Table 1 shows that a higher percentage of new directors were appointed to boards from 2001 to 2004. This increase follows the high number of initial public offerings (IPOs) in 2000 and the change in the recommended practices for corporate governance in New Zealand, encouraging greater board independence (Boyle & Ji, 2013). Another interesting point is the substantially lower percentage of newly appointed directors in 2008 (a drop from 79% to 59%) during the onset of the GFC. This decline indicates that boards may have preferred to appoint directors from other public boards with more experience during those turbulent years, combined with a reduction in the number of available directorships (795 in 2007 drops to 765 in 2008).

3.1. Social capital measures

We estimate a director's social capital by measuring their connectivity based on SNA (Wasserman & Faust, 1994). SNA allows for a deeper analysis of the value of a director's connections by considering factors like the quality of a director's connections (being linked to more connected directors allows access to greater resources). To construct the director network for each year, we model the networks formed by directors who share at least one board in the same year. We employ four standard social network measures that capture different aspects of connectivity: Degree, Closeness, Betweenness, and Eigenvector. Additionally, we create an aggregated connectivity measure based on the four connectivity measures using principal components analysis. Next, we explain each measure in more detail.

The first measure, *Degree* (*DEG*), is the number of direct connections that a director holds (Freeman, 1977; Nieminen, 1974). *DEG* is measured as the number of unique direct connections between Director i and all other directors j, that is as follows:

$$C_{i,\tau}^D = \sum_{j=1}^{n-1} \delta(i,j), j \neq i \tag{1}$$

where $S(i,j)$ is a dummy variable that equals one if directors i and j sit on one or more of the same boards, and zero otherwise.[2] *DEG* measures the direct information shared between two directors that a board can access (Freeman, 1977). A higher *DEG* score indicates a director with many direct connections to other directors and hence more opportunities to exchange or acquire information. To consider differences in network size from changes in the number of listed firms and board size, we normalize *DEG* by dividing C_{it}^D by $(n-1)$, where n is the total number of publicly listed directors in the corresponding year (Hochberg, Ljungqvist, & Lu, 2007; Horton et al., 2012). Normalizing the scores by *n-1* confines *DEG* between 0 and 1, which can be interpreted as a director's proportion of the maximum direct connections possible within the network. This measure can be compared between years (Freeman, 1977).

The second measure employed is *Closeness* (*CLO*) (Freeman, 1977; Sabidussi, 1966). *CLO* measures the distance between a director and every other director with whom they are connected. Following Freeman (1977), *CLO* is defined as the sum of the inverse of the shortest distance between Director i and all other directors in the network:

$$C_{i,\tau}^C = \sum_{j=1}^{n-1} d(i,j)^{-1}, j \neq i \tag{2}$$

Note: We define a director as a director or an alternative director position held on a firm's board for the majority of one year.

where n is the total number of directors in the network, and $d(i,j)$ is the shortest distance between Director i and director j. We set the distance between disconnected directors to 0. Effectively, this overcomes the issue of excluding directors who are not connected at all or are connected to smaller satellite networks but not to the main network (Opsahl, Agneessens, & Skvoretz, 2010). A higher closeness score represents a director with closer connections that enable quicker and more readily available information and resource exchange. *CLO* is normalized by dividing by *(n − 1)*, representing the percentage of the maximum *CLO* possible for a given Director i.

The third measure, *Betweenness* (*BET*) (Freeman, 1977), measures how well-situated the director is for connecting other directors with each other and the ability to potentially control the exchange of information and resources (Borgatti, 2005; Freeman, 1977). Freeman (1977) constructs the *BET* measure to represent the probability that Director i is positioned on a randomly selected shortest path that links two directors *(h,j)*. By doing so, *BET* considers the likelihood of information being circumvented through other channels to capture the probability of Director i successfully controlling the information flow, i.e.:

$$B_{(h,i,j)t}^B = \frac{g(h,i,j)}{g(h,j)} \tag{3}$$

where $g(h,j)$ is the maximum number of communication paths, another director could be in a position to control. Therefore, the information passing between Directors *(h,j)* can be wholly controlled by Director i when there are no other directors between Directors *(h,j)*, such that $B_{(hij)t}^B = 1$. To measure the overall *BET* of Director i, we follow Freeman (1977) and take the sum of the proportions of all the shortest paths linking two directors, which pass through Director i:

$$C_{i,t}^B = \sum_{h<}^{n-1} \sum_{j}^{n-1} B_{(h,i,j)t}^B, where\ h \neq i \neq j \tag{4}$$

where n is the number of directors in the network and $B_{(h,i,j)}^B$ is defined as per Eq. (3). We normalize *BET* by expressing it as the proportion of its maximum value in year t. The maximum value for C_{it}^B is essentially the most central point a director can sit $\frac{n^2-3n+2}{2}$ (Freeman, 1977). The final measure is the relative *BET* centrality of Director i in year t, which is as follows:

$$C_{i,t}^{'B} = \frac{2\left(C_{i,t}^B\right)}{n^2 - 3n + 2} \tag{5}$$

where C_{it}^B is defined by Eq. (4), and n represents the number of directors in the network.

The fourth measure is *Eigenvector* (*EIG*) (Bonacich, 1972), which expands on the degree measure and is typically interpreted as capturing the power and prestige of a director's connections. Specifically, *EIG* combines a director's *DEG* score with their direct connections' *DEG* scores. *EIG* is defined as the sum of Director i's first-degree connections to all other directors in the network, weighted by the *EIG* of the directors to which Director i is connected, that is as follows:

$$C_{i,t}^E = \frac{1}{\lambda} \sum_{j=1}^n \delta(i,j) C_{j,t}^E, j \neq i \tag{6}$$

where is the *EIG* score for a particular director, $\delta(i,j)$ is defined in Eq. (1), and λ is a constant, defined as the maximum possible eigenvector for a given network in year t. Connections to a highly connected director can increase a director's *EIG* score more than connections to less connected directors. A high *EIG* director has faster and increased access to information and resources, which should increase their value on a board.

Finally, we employ principal components analysis to create an aggregate connectivity score (AGG). This method is commonly used to consider the multidimensionality of social capital and examine several indicators simultaneously (Cashman et al., 2013; Larcker et al., 2013; Omer et al., 2014a, 2014b) by extracting the common variance in the four network measures; *Degree (DEG), Betweenness (BET), Closeness (CLO),* and *Eigenvector (EIG)*. This paper relies primarily on *AGG* for the analysis. We relate a director's connectivity measure at $t-1$ to the board appointment at t, which excludes any increase in connectivity because of the new board appointment(s) we are examining. We also remove directors from the sample who were not a director of one of the sample firms in the prior year as we focus on public firms' directorships to measure connectivity. After applying these criteria, our final sample contains 9620 director-year observations of 507 director appointments.

3.2. Human capital measures

We next construct our human capital index by scoring directors between 0 and 2 on nine attributes. The scores are summed to form our human capital index *(HCI),* which has a maximum possible value of 18. We drew the nine attributes from the extant literature on director attributes. The first attribute is education, where we use a director's highest qualification as a proxy for their level of education (Shuller, 2001). We assign a director 2 if their highest level of education is a postgraduate degree, 1 for an undergraduate degree, and 0 for no degree.

The next attribute is director experience based on the years a director has served on publicly listed boards. Similar to the approach of Gray and Nowland (2013), a director scores 2 if they have four or more years' experience, 1 for 1–3 years' experience, and 0 for 1 year or no experience. A director in their first year on a board is assumed to have little board experience and so may not contribute strongly to a board; conversely, a director with more than three years has served a full term as a director (three-year terms are typical in most countries), experiencing a full range of board activities.

We also consider a director's expertise. Directors of large firms (which are more complex, more publicly visible, and prestigious) are more likely to have dealt with a wide range of corporate issues (Cashman et al., 2013; Ferris et al., 2003), creating a set of transferrable skills (Cashman et al., 2013; Ferris et al., 2003). Expertise is measured by classifying directors based on the size of the firms a director currently serves; specifically, the director of an NZX10 (top 10 listed firms) is assigned 2, and an NZX50 (top 50 listed firms) is assigned 1; all other directors receive 0.

CEOs are seen as bringing valuable skills and experiences to boards (El-Khatib et al., 2015; Fracassi & Tate, 2012), although current CEOs are often constrained by their current time commitments. We consider a director's CEO experience, assigning the CEO of a public firm a 2, 1 for the CEO of a private firm, and 0 for no CEO experience. CEOs of publicly listed firms have more relevant experience than those from private firms through dealing with additional responsibilities, such as those relating to listing rules and continuous disclosure rules.[3]

International experience is an essential attribute of the board to adequately deal with today's globalized business environment. We classify directors based on whether they have had international exposure, predominantly through sales, or having worked abroad

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[3] Current CEOs who have been CEOs before the respective year are assigned "Prior CEO Experience." The only directors that do not fall in the "Prior CEO Experience" category are those who have not previously been a CEO of a public or private firm for at least one year, as they have not had time to gain a decent amount of top management skill.

(Herrmann & Datta, 2005; Hsiang-Lan, 2014; Johnson et al., 2013; Volonte & Gantenbein, 2014). We assign directors a score of 2 if they have international experience and 0 otherwise.

We also consider a director's exposure to mergers and acquisitions (M&A) deals based on the cumulative number of deals with which a director has been involved. We assign a director a score of 2 if they have been involved with three or more deals, 1 for directors involved with one or two deals, and 0 for directors with no deal experience.

Directors with financial or legal acumen are attractive potential directors, given that boards require members with these skills (Equilar, 2016; Spencer Stuart, 2017). We consider a director to have financial acumen if their primary or secondary career is in accounting or banking or if they are financial experts (see Appendix I for variable definitions). Directors who are or have been lawyers are deemed to have legal acumen. We assign a director a score of 2 if they have financial and legal acumen, 1 for financial or legal acumen, and 0 if they have no financial or legal acumen.

Professional directors are typically individuals who have retired from successful careers; as such, they have the time and ability to commit to directorships and are potentially attractive directors (Jahan, 2018; Larcker & Miles, 2011; Wells & Mueller, 2014). We assign a director a score of 2 if they classify as a professional director and 0 otherwise.

Finally, we consider a director's industry experience based on the range of industries in which they have worked. Using the Industry Classification Benchmark level one coding system, we assign a director a score of 0.2 for each of the 10 international competitive bidding (ICB) industries they have substantial experience in; thus, a director with five industries receives a score of 1.

3.3. Control variables

We further control for a director's gender and country of residence. Globally, gender equality has been a significant area of interest in boards of directors, with efforts being made to increase the proportion of female directors (Clydesdale & Hu, 2019; Grau, de Cabo, Gimeno, Olmedo, & Gabaldon, 2020; Vinnicombe, Singh, Burke, Bilimoria, & Huse, 2008). As a result, gender is likely to influence board appointments. We control for gender (*FEM*) using a dummy variable that equals one if the director is female. Additionally, local directors are more than likely to have an advantage over foreign directors when applying for a board appointment in a New Zealand firm. We control for the place of residence (*NZ*), using a dummy variable that equals one if the director resides in New Zealand. We also include a dummy variable that equals one if the director holds more than two directorships to control for whether a director is "busy" (*DIR + 2*). Finally, we control for executive appointments, as an insider is more likely to be appointed for their tacit knowledge of the firm obtained through executive employment (Masulis & Mobbs, 2011). As a result, the firm's executives would not compete with the broader director labor market for the board seat; they are also potentially less active in looking for additional appointments.

Panel A of Table 2 presents descriptive statistics of the connectivity measures *DEG, CLO, BET,* and *EIG,* expressed as the percentage of the maximum possible value per year; the factor of the four individual connectivity measures AGG. These values measure a director's social capital. Overall, the sample averages of *DEG, CLO, BET, and EIG* are 0.89%, 10.15%, 0.26%, and 1.25%, respectively. Based on *DEG*, the average director is directly connected to 0.89% of the other directors. The table indicates that *DEG, BET*, and *EIG* all demonstrate a positive skew, indicating that a small number of highly connected directors have significantly increased the mean level of connectivity measures. This can also be seen in the p75 statistics for these three variables, which are very low values or 0 for the first 75% of the sample, with the final 25% scoring markedly higher. *CLO* demonstrates a negative skew, with disconnected or isolated directors pulling the mean score below the median. We focus on the connectivity factor, *AGG,* in the analysis because we are interested in the overall connectedness of directors.

Panel B of Table 2 presents descriptive statistics of director characteristics and the HCI's human capital measures. We observe that the average score for the overall index is 6.08 with a median of 6.2, ranging from 0, indicating little relevant human capital, to 15.20 out of a maximum of 18.[4] The typical director (based on the median values) is 56 years old, has 5 years of board experience,[5] holds just one directorship of a publicly listed company,[6] and is based in New Zealand. Only 15% of directors in our sample sit on multiple boards. Furthermore, 9% of directors are women; 70% of our sample has a tertiary qualification; 9% are directors of an NZX10 company; 40% are directors of an NZX50 company; prior CEOs hold 41% of the directorships, and current CEOs hold 26% (either for public or private companies). Additionally, 44% of the sample have international experience; on average, directors have been involved with 2.13 M&A deals. We also consider directors' professional experience and find that general executives are most common, followed by financial experts, and 11% are professional directors. In terms of industry experience, the average director has gained experience in 1.45 out of 10 different industries.[7] Specifically, 45% of the sample have banking and finance experience, and 41% have consumer goods and services experience, while other industry experience is considerably less common.

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[4] We note that a director with an HCI score of 0 can be considered as having the barest minimum human capital required to sit on a board. This includes the skills and abilities acquired from holding general executive roles.

[5] Board experience counts the total number of years that a director has served on boards. For instance, a director sitting on three boards concurrently for one year increases their board experience by one year.

[6] The busiest director sits on six boards in a single year (untabulated).

[7] We categorize industry experience using the Industry Classification Benchmark (ICB) level one coding system, including banking and finance, basic materials, consumer goods, consumer services, health, industrial, oil and gas, technology, telecommunications, and utilities.

Table 2

Descriptive statistics of director human capital and social capital variables.

Panel A: Director connectivity measures					
	Mean	Median	SD	P25	P75
DEG	0.0089	0.0078	0.0051	0.0062	0.0105
CLO	0.1015	0.1274	0.0696	0.0099	0.1556
BET	0.0026	0.0000	0.0101	0.0000	0.0000
EIG	0.0125	0.0001	0.0497	0.0000	0.0025
AGG	0.0000	−0.2635	1.4929	−0.9105	0.2697
Panel B: Director characteristics and human capital					
HCI (overall)	6.08	6.22	2.66	4.20	7.60
Female (0/1)	0.0875	0.0000	0.2826	0.0000	0.0000
Age (years)	56.2443	56.0000	9.4518	50.0000	63.0000
New Zealand (0/1)	0.7038	1.0000	0.4566	0.0000	1.0000
Undergraduate (0/1)	0.3548	0.0000	0.4785	0.0000	1.0000
Postgraduate (0/1)	0.3470	0.0000	0.4760	0.0000	1.0000
No Degree (0/1)	0.2982	0.0000	0.4575	0.0000	1.0000
Director Experience (years)	6.5321	5.0000	6.5685	2.0000	10.0000
Directorships (N)	1.2125	1.0000	0.5742	1.0000	1.0000
Directorships (2+) (0/1)	0.1521	0.0000	0.3591	0.0000	0.0000
NZX10 (0/1)	0.0909	0.0000	0.2875	0.0000	0.0000
NZX50 (0/1)	0.3951	0.0000	0.4889	0.0000	1.0000
Prior CEO Experience (0/1)	0.4088	0.0000	0.4916	0.0000	1.0000
Current CEO (listed) (0/1)	0.1413	0.0000	0.3483	0.0000	0.0000
Current CEO (non-listed) (0/1)	0.1172	0.0000	0.3217	0.0000	0.0000
International Experience (0/1)	0.4445	0.0000	0.4969	0.0000	1.0000
M & A Experience (N deals)	2.1300	0.0000	5.4599	0.0000	2.0000
Professional Expertise (0/1)					
Accountant	0.1803	0.0000	0.3845	0.0000	0.0000
Banker	0.1560	0.0000	0.3629	0.0000	0.0000
Consultant	0.0949	0.0000	0.2931	0.0000	0.0000
Financial Expert	0.2363	0.0000	0.4248	0.0000	0.0000
General Executive	0.3161	0.0000	0.4650	0.0000	1.0000
Lawyer	0.0736	0.0000	0.2612	0.0000	0.0000
Prof Director	0.1078	0.0000	0.3101	0.0000	0.0000
Industry Experience					
Banking & Finance (0/1)	0.4465	0.0000	0.4971	0.0000	1.0000
Consumer Goods & Services (0/1)	0.4120	0.0000	0.4922	0.0000	1.0000
Industry Experience (N)	1.4866	1.0000	0.9017	1.0000	2.0000

This table presents descriptive statistics for the human capital and social capital variables employed in this study. Panel A reports descriptive statistics for the centrality measures and AG*G*. Panel B reports the director characteristics and human capital variables. All variables are defined in Appendix I.

4. Empirical findings

4.1. Univariate analyses

We begin our analysis by examining the univariate relationship between connectivity and subsequent board appointments. We first examine the Pearson pairwise correlations in Table 3 and observe positive but relatively low correlation coefficients between the centrality measures and new appointments. We also observe positive and moderately strong coefficients between the centrality measures and *HCI,* ranging from 0.25 to 0.35, supporting the need to control for both human and social capital separately. *HCI* also has a positive relationship with new appointments, indicating that directors with higher human capital have a greater chance of gaining a new appointment.

Table 4 compares the attributes of directors who gained an additional board seat to those that did not. Panel A indicates that newly appointed directors are generally more connected overall based on all the centrality measures and *AGG,* irrespective of whether the lagged connectivity measures or the contemporaneous measure are considered, including the connections arising from the new appointment.[8] From Panel B, newly appointed directors are more likely to have higher human capital (*HCI* difference = 0.9), are younger (by 1.2 years), more likely to be female (3%), live in New Zealand (14%), and sit on more boards, relative to those that do not receive a new board appointment. The results suggest that directors who gain additional appointments are more connected and have higher human capital.

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[8] The results are unablated but are available upon request from the authors.

Table 3
Pearson pairwise correlations.

	DEG$_{t-1}$	CLO$_{t-1}$	BET$_{t-1}$	EIG$_{t-1}$	AGG$_{t-1}$	HCI$_{t-1}$	FEM$_{t-1}$	NZ$_{t-1}$	DIR±2$_{t-1}$	New Appt	N Appts	Exec Appt
CLO$_{t-1}$	0.47											
BET$_{t-1}$	0.71	0.33										
EIG$_{t-1}$	0.44	0.27	0.22									
AGG$_{t-1}$	0.91	0.66	0.8	0.59								
HCI$_{t-1}$	0.33	0.22	0.26	0.07	0.31							
FEM$_{t-1}$	0.02	0.01	0.02	0	0.02	0						
NZ$_{t-1}$	0	0.11	0.13	0.01	0.08	−0.16	−0.04					
DIR+2$_{t-1}$	0.61	0.23	0.66	0.16	0.59	0.22	0.02	0.11				
New Appt	0.12	0.09	0.1	0.05	0.12	0.08	0.03	0.07	0.11			
N Appts	0.12	0.09	0.1	0.05	0.12	0.07	0.02	0.07	0.11	0.97		
Exec Appt	−0.01	0.01	−0.01	0	0	−0.01	0	0	0	0.34	0.33	
N Exec Appts	−0.01	0.01	−0.01	0	0	−0.01	0	0	0	0.34	0.33	1

This table reports Pearson pairwise correlations for the variables employed in the empirical analyses. All variables are defined in Appendix I.

Table 4
Univariate analysis of social capital differences between appointed directors and non-appointed directors.

Panel A: Prior year director connectivity							
	Obs	New Appt = 1 (Mean)	Obs	New Appt = (Mean)	0 Mean Difference		T/z stat
DEGt−1	507	1.19%	9113	0.90%	0.29%	***	(8.53)
CLOt−1	507	13.10%	9113	10.30%	2.80%	***	(8.99)
BETt−1	507	0.77%	9113	0.28%	0.48%	***	(6.74)
EIGt−1	507	2.40%	9113	1.20%	1.20%	***	(3.91)
AGGt−1	507	0.90	9113	0.03	0.872	***	(8.95)
Panel B: Director attributes							
HCIt−1	507	6.99	9113	6.09	0.903	***	(7.43)
Femalet−1	507	0.11	9113	0.08	3%	**	(2.47)
Aget−1	365	55.05	5527	56.24	−1.19	**	(2.40)
New Zealandt−1	507	0.86	9113	0.72	14%	***	(7.05)
Directorshipst−1	507	1.58	9113	1.23	0.358	***	(8.82)
Directorships+2 t − 1	507	0.15	9113	0.04	10%	***	(10.31)

This table reports the social capital, human capital, and other attributes of the appointed directors versus directors who were not appointed. The second to last column of the table reports the average differences in the characteristics between the appointed directors and directors who were not appointed, and the statistical significance is based on a two-tailed two-sample t/z test with unequal variances. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. All variables are defined in Appendix I.

4.2. Multivariate analysis

So far, the results suggest that well-connected directors and those with higher levels of human capital are more likely to receive additional board appointments. Next, we formally test whether receiving a board appointment is positively related to director connectivity. We estimate ordinary least squares regressions using panel data of the following specification:

$$N\ Appts_{it} = \alpha + \beta_1 AGG_{it-1} + \beta_2 \Delta AGG_{it-1-(t-2)} + \beta_3 HCI_{it-1} + \beta_4 \Delta HCI_{it-1-(t-2)} + \beta_5 FEM_{it-1} + \beta_6 NZ_{it-1} + \beta_7 DIR + 2_{it-1}$$

$$+ \beta_8 N\ Exec\ Appts_{it} + \sum_{y=1}^{Y} \theta_y Year_{yt-1} + \varepsilon_{it} \tag{7}$$

where *N Appts$_{it}$* is the number of new appointments for Director *i* in year t. *AGG$_{it\_1}$* is the aggregate connectivity measure for Director *i* in year *t − 1,* and *ΔAGG$_{it-1-(t-2)}$* equals the one-year change in connectivity between years *t − 1* and *t − 2*. *HCI$_{it}$* represents human capital for Director *i* in year *t − 1, ΔHCI$_{it-1-(t-2)}$* equals the one-year change in human capital between years *t − 1* and *t − 2, FEM$_{it-1}$ is a* dummy variable that equals one if the director is a female and zero if a male, and *NZ* is a dummy variable that equals one if the director resides in New Zealand and zero otherwise. *DIR + 2$_{t-1}$* is a dummy variable that equals one if the director holds two or more other directorships, *N Exec Appts$_{it-1}$* is the number of executive appointments, and *Year$_t$* is a set of year dummies to control for time-series trends. Robust standard errors (*s$_{it}$*) are clustered at the director level (Petersen, 2009); they are assumed to be independent and identically distributed over directors and time.[9]

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[9] We provide results for Degree, Closeness, Betweenness, and Eigenvector as the independent variable in place of AGG. The results, available on request, show that the relationship with the number of appointments is consistent for all centrality measures except for Betweenness after controlling for busyness. A director requires more than one directorship for Betweenness Centrality; therefore, directors who sit on more than two boards would score higher in Betweenness, so controlling for directorships of more than two reduces the significance of the relationship between N Appts and Betweenness.

A positive relationship with the lagged level of connectivity would suggest that better-connected directors receive more additional director appointments. Furthermore, a positive relationship with the change in connectivity would suggest that directors with recently acquired connectivity are appointed to additional boards. Changes in connectivity could either be due to an additional board appointment in the prior year or a change in the network structure to which directors are connected.[10] Similarly, a positive relationship between the number of new appointments and the level of human capital would suggest that directors with more experience and knowledge obtain appointments from additional firms. A positive relationship with the change in human capital suggests that a director who recently improved their human capital (for example, by gaining a university degree) is more attractive to appointing firms. Including the first differences alleviates concerns about endogenous time-invariant omitted variables correlated with either connectivity or human capital. We include multiple appointments of directors to the same firm as we are interested in the required attributes of the individual directors and not the firm's characteristics.

Column 1 of Table 5 shows the regression results for the number of new appointments. We find positive and significant coefficients on *AGG* and HCI. Specifically, a one standard deviation increase in connectivity is associated with a 35.40% increase in the average number of new appointments for a director.[11] In comparison, a one standard deviation increase in *HCI* is associated with a 32.47% increase in the average number of new appointments for a director.[12] This finding suggests that New Zealand firms may appoint directors based on how much connectivity and human capital they have. We also observe a positive coefficient on *AHCI,* suggesting that firms may appoint directors based on recently accumulated human capital. Interestingly, we find no significant relationship between *AAGG* and *N Appts.* This result suggests that a recent gain or loss in connectivity has no material effect on gaining additional appointments. These results remain consistent after controlling for directors' busyness and executive appointments. Of note, busy directors holding three or more directorships are more likely to receive additional appointments despite the theory that directors sitting on more boards have less ability to add value due to time constraints. In contrast, Fama and Jensen (1983b) and Ferris et al. (2003) argue that multiple directorships signal expertise in board oversight, making such directors more attractive for future board positions. The relationships with the other variables suggest that females and local directors are associated with an increased number of new appointments. Overall, the results, within the New Zealand context, indicate that receiving a board appointment is positively related to director connectivity and their level of human capital.

4.3. Additional tests

We conduct two additional sets of regressions to ensure the validity of the findings in Table 5. First, we add in director fixed effects to control for any time-invariant director characteristics that might affect the appointment potential of a director. As gender is time-invariant, it is excluded from the regression. The results, presented in Table 6, broadly support the findings in Table 5. Specifically, we still observe positive and significant results for social capital and *AGG*. The results are weaker but still significant for both the level and change in human capital (*HCI* and *ΔHCI*), excluding *ΔHCI*, when we include executive appointments (Column 3). Interestingly, the impact on the number of new appointments for *AGG* and *HCI* nearly doubles compared to Table 5, at 62.2% and 53.2%, respectively. We also observe that NZ becomes insignificant because few directors switch from foreign to NZ locations or vice versa. We can conclude that our results are robust to including director fixed effects.

As social and human capital are interlinked, we also rerun our regression after orthogonalizing both social and human capital measures. We orthogonalize by regressing each variable against the other (i.e., human capital on social capital and vice versa) and using the residuals as the orthogonalized measure. The results, including director fixed effects, are presented in Table 7. The results are broadly consistent with the earlier findings, with the only notable differences being the significance for stronger *HCI* compared with Table 6. Overall, the results support the idea that the level and change in both human and social capital are essential for new director appointments.

4.3.1. Relative importance of human capital and connectivity

The previous empirical analysis provides evidence that human capital and social capital positively relate to the number of new appointments; however, Cashman et al. (2013) suggest that social capital in their sample of U.S firms is far more important than human capital for board appointments. To compare our results with theirs, we employ a similar approach to determine the relative importance of human and social capital for board appointments in New Zealand. To conduct the analysis, we group directors into terciles each year based on the rankings of their *HCIt-i* and *AGGt-i* variables. From these groups, we create four dummy variables to identify directors in extreme human and social capital groups: *LowHCIt-i_LowAGGt-i* (Group 1,1), *LowHCIt-i_High AGGt-i* (Group 1,3), *HighHCIt-i_LowAGGt-i* (Group 3,1), and *HighHCIt-i_HighAGGt-i* (Group 3,3). We then replace the standard human capital and connectivity measures in *Equation i* with these dummy variables to investigate the number of new appointments a director gains based on their relative human and social capital.

The results in Table 8 suggest that human and social capital are equally important attributes for gaining a board seat in our sample

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[10] For instance, a previously isolated firm may gain a new director connecting them to the main network, thus increasing the connectivity of the other directors.

[11] The percentage change in NAppts is calculated as (one standard deviation change in AGG x coefficient on AGG in Column 1)/Average N Appts for the sample = $(1.57 \times 0.013)/0.06 = 35.40\%$.

[12] The percentage change in NAppts is calculated as (one standard deviation change in HCI x coefficient on HCI in Column 1)/Average N Appts for the sample = $(2.67 \times 0.007)/0.06 = 32.47\%$.

Table 5

Regressions for number of appointments on social capital.

	1	2	3	4
	NAPPTS	N APPTS	N APPTS	N APPTS
	OLS	OLS	OLS	OLS
Constant	−0.002	−0.002	0.000	0.000
	(−0.14)	(−0.15)	(0.02)	(0.01)
AGG − 1	0.013***	0.009***	0.014***	0.010***
	(5.62)	(3.37)	(5.90)	(3.67)
AAGGt−1	0.000	0.000	−0.001	−0.001
	(0.05)	(0.05)	(−0.10)	(−0.09)
HCI − 1	0.007***	0.006***	0.006***	0.006***
	(5.61)	(5.49)	(5.37)	(5.22)
AHCIt−1	0.010**	0.010**	0.008**	0.009**
	(2.32)	(2.40)	(1.98)	(2.06)
FEMt−1	0.035**	0.034**	0.033**	0.032**
	(2.42)	(2.45)	(2.31)	(2.31)
NZt − 1	0.049***	0.047***	0.046***	0.045***
	(8.67)	(8.44)	(8.47)	(8.22)
DIR + 2 t − 1		0.047*		0.047**
		(1.93)		(2.02)
N Exec Appts			1.112***	1.112***
			(11.38)	(11.55)
Observations	7559	7559	7559	7559
Adj R2	0.029	0.03	0.073	0.074
Year fixed effects	Y	Y	Y	Y

This table presents results for ordinary least squares (OLS) regressions where each observation represents a director for a given year between 2000 and 2015. The dependent variable is the number of board appointments. The t-statistics are reported in parentheses below coefficients and based on robust standard errors clustered at the director level. Year dummies are included but not shown. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. All variables are defined in Appendix I.

Table 6

Fixed effects regressions for number of appointments on social capital.

	1	2	3	4
	NAPPTS	N APPTS	N APPTS	N APPTS
	OLS	OLS	OLS	OLS
Constant	0.223***	0.225***	0.224***	0.226***
	(4.40)	(4.38)	(4.39)	(4.38)
AGGt−1	0.025***	0.017**	0.025***	0.017**
	(3.91)	(2.43)	(3.90)	(2.43)
AAGGt−1	0.005	0.006	0.005	0.006
	(0.80)	(0.84)	(0.80)	(0.85)
HCI t − 1	0.012*	0.011*	0.013*	0.011*
	(1.80)	(1.78)	(1.80)	(1.81)
AHCIt−1	0.012*	0.011*	0.010	0.010*
	(1.69)	(1.68)	(1.61)	(1.67)
NZt − 1	−0.024	−0.019	−0.024	−0.019
	(−1.24)	(−0.88)	(−1.24)	(−0.88)
DIR + 2 t − 1		−0.158*** (−4.64)		−0.158*** (−4.63)
N Exec Appts			−0.032 (−0.25)	−0.024 (−0.20)
Observations	5930	5930	5930	5930
Adj R2	0.031	0.045	0.031	0.045
Director fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y

This table presents the director fixed effect regression results, where each observation represents a director for a given year between 2000 and 2015. The dependent variable is the number of board appointments. The t-statistics are reported in parentheses below coefficients and based on robust standard errors clustered at the director level. Year dummies are included but not shown. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. All variables are defined in Appendix I.

of New Zealand firms. We find that low human capital and low connectivity significantly decrease the number of subsequent new appointments, while high human capital and high connectivity significantly increase the number of subsequent new appointments. We observe insignificant coefficients when we consider the less clear-cut situations, *LowHCIt-i_High AGGt-i* and *HighHCIt-i_LowAGGt-i*. Put differently, a highly connected director with low human capital is no more likely to be appointed to a board than a director with high human capital and low connectivity. This finding contrasts with Cashman et al. (2013), who found that highly connected directors

Table 7
Regressions for number of appointments on orthogonalized social and human capital.

	1	2	3	4
	NAPPTS	N APPTS	N APPTS	N APPTS
	OLS	OLS	OLS	OLS
Constant	0144***	0.155***	0144***	0.155***
	(5.67)	(5.88)	(5.66)	(5.88)
$AGG-1$	0.038***	0.025**	0.038***	0.025**
	(3.91)	(2.43)	(3.90)	(2.43)
$AAGGt-1$	0.008	0.009	0.008	0.009
	(0.80)	(0.84)	(0.80)	(0.85)
$HCI-1$	0.046***	0.038**	0.046**	0.039**
	(2.50)	(2.10)	(2.50)	(2.10)
$AHCIt-1$	0.024	0.028*	0.024	0.029*
	(1.65)	(1.68)	(1.66)	(1.68)
$NZt-1$	0.047***	−0.019	−0.024	−0.019
	(7.90)	(−0.88)	(−1.24)	(−0.88)
$DIR+2t-1$		−0.158*** (−4.64)		−0.158*** (−4.63)
N Exec Appts			−0.032 (−0.25)	−0.024 (−0.20)
Observations	5930	5930	5930	5930
Adj R2	0.031	0.045	0.031	0.045
Director fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y

This table presents the director fixed effect regression results, where each observation represents a director for a given year between 2000 and 2015. The dependent variable is the number of board appointments. The t-statistics are reported in parentheses below coefficients and based on robust standard errors clustered at the director level. Year dummies are included but not shown. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. All variables are defined in Appendix I.

were more likely to acquire additional board seats irrespective of the level of their human capital. They conclude that director connectivity is far more important than human capital for US directors. Overall, our findings in Table 8 indicate that human and social capital are essential attributes in the New Zealand director labor market.

4.4. Robustness test

This section tests the robustness of our finding (social capital is an essential attribute for board appointments) by conducting a logit regression to investigate whether directors' connectivity is associated with the likelihood of a director gaining an additional board appointment. The dependent variable equals one if a director gains an additional board seat during the year and zero otherwise. We estimate the following logit regression equation:

$$ln\left(\frac{P(New_{Appt_{it}})=1}{1-P(New_{Appt_{it}}=1)}\right) = \alpha + \beta^1 AGG_{it-1} + \beta^2 \Delta AGG_{t-1-(t-2)} + \beta^3 HCI_{it-1} + \beta^4 \Delta HCI_{t-1-(t-2)} + \beta^5 FEM_{it-1} + \beta^6 NZ_{it-1}$$

$$+ \beta^7 DIR + 2_{t-1} + \beta^8 Exec\ Appt_{t-1} \sum_{y=1}^{Y} \beta^y Year_{t-1}^y + \varepsilon_{it} \tag{8}$$

where P is the probability that Director i in year t is appointed. AGG_{it-1} is the aggregate connectivity measure for Director i in year $t-i$, HCI_{it} represents the human capital index for Director i in year $t-i$, and all other variables are consistent with Eq. (2). Robust standard errors (s_{it}) are clustered at the director level (Petersen, 2009). To interpret the results, we report odds ratios, representing the change in the odds (or, in other terms, the likelihood) of being appointed arising from a one-unit change in the director attribute.[13]

We report the results for Eq. (2) in Column 1 of Table 9. The odds ratio on the level of $AGGt-i$ is positive and statistically significant, indicating that a one-unit increase in $AGGt-i$ (above the mean value of 0.07) increases the likelihood of receiving a new appointment by 14.6%. We observe no significant relationship between *New Appt* and $AAGGt-i$, further supporting the earlier findings that a recent gain in connectivity has no bearing on gaining an additional board appointment. We also find that a one-unit increase or change in the level of human capital increases the likelihood of receiving a board seat by just over 15%. Females are 1.8 times more likely to receive a new board position than men. Furthermore, living in New Zealand instead of overseas increases the likelihood of being appointed by 3.5 times. The results support the earlier findings in Table 5. Adding a measure to control for director busyness, Column 2 of Table 9 does not change the likelihood ratios. Although, unlike the earlier results, being busy does not increase the likelihood of a director receiving an additional appointment. Overall, we find strong evidence that greater human capital and higher connectivity result in directors receiving additional board appointments.

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[13] Additionally, the magnitude of this effect and all others reported are non-linear as the variables are log-transformed for the logit regression analysis. The effects are only valid for one-unit changes from the sample mean.

Table 8

Regressions for number of appointments on the relative importance of social and human capital.

	1	2	3	4
	NAPPTS	NAPPTS	NAPPTS	NAPPTS
	OLS	OLS	OLS	OLS
Constant	0.043***	0.044***	0.040***	0.040***
	(3.69)	(3.69)	(3.45)	(3.46)
LowHCI_LowAGGt−1	−0.033***	−0.031***	−0.032***	−0.030***
	(−5.25)	(−4.91)	(−5.33)	(−4.97)
LowHCI_HighAGGt−1	−0.008	−0.008	−0.006	−0.006
	(−0.83)	(−0.83)	(−0.61)	(−0.61)
HighHCI_LowAGGt−1	−0.005	−0.005	−0.003	−0.003
	(−0.56)	(−0.55)	(−0.35)	(−0.34)
HighHCI_HighAGGt−1	0.045***	0.026***	0.046***	0.026***
	(4.89)	(2.70)	(5.11)	(2.84)
FEMt−1	0.029**	0.027**	0.029**	0.027**
	(2.31)	(2.33)	(2.33)	(2.32)
NZt − 1	0.047***	0.041***	0.046***	0.040***
	(8.77)	(8.00)	(8.95)	(8.15)
DIR + 2 t − 1		0.102***		0.103***
		(4.39)		(4.53)
N Exec Appts			1.108***	1.110***
			(16.02)	(16.24)
Observations	9620	9620	9620	9620
R2	0.020	0.026	0.076	0.083
F Stat	6.43	8.36	17.38	18.93
p(F)	0.000	0.000	0.000	0.000
AIC	931.58	869.04	365.32	297.08
Year fixed effects	Y	Y	Y	Y

This table presents results for OLS regressions where each observation represents a director for a given year between 2000 and 2015. The dependent variable is the number of board appointments at time t, and the t-statistics are reported in parentheses below coefficients and are based upon robust standard errors clustered at the director level. Year dummies are included but not shown. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. All variables are defined in Appendix I.

4.5. Additional testing

One possibility is that firms might have different preferences for human and social capital depending on their circumstances. We examine this in two ways; by looking at industry differences on the basis that the features of different industries may make human or social capital more valuable than in other industries and by considering the current situation of the board concerning its level of human and social capital. Specifically, a board with low social capital might be expected to appoint directors with higher social capital to improve the board's social connections. We conducted this analysis by focusing on those director-year observations where a director received one new board appointment. We exclude the small number of directors who receive two or more new appointments as the appointing firms may have differing reasons for the appointment that might confound our analysis.

We start by looking at the human and social capital of directors appointed in different industries. We collect the ICB industry codes for each firm and then average the social and human capital of the appointed directors in the year before their appointment. We also compute the average social and human capital of all directors appointed over the sample period. We then categorize those industries that generally appoint directors with higher than average human capital but lower than average social capital as preferring human capital. Firms that appoint directors with lower than average human capital and higher than average social capital are determined to prefer social capital.

The results, containing both the mean and median values, are presented in Table 10. Based on mean and median values, we observe several industries that prefer high human capital directors, including financials and technology firms. In contrast, industrial firms show evidence in the mean values, and basic materials and telecommunications firms show evidence in the median values. In contrast, only oil and gas firms show a preference for social capital in the mean, and no industries show a social capital preference based on the median values. These results suggest that firms in the financial and technology sectors apparently have a greater need for human capital, possibly driven by these industries having higher confidentiality requirements around strategic plans making social capital less relevant. This result also supports the earlier finding that human capital appears more relevant in New Zealand, given the greater number of industries preferring high human capital directors.

We also consider the human and social capital resources already available to the firms appointing directors. Specifically, we measure the average human and social capital of an appointing firm's board the year before the appointment, which measures the board's position without the new director, and categorize firms into tercile groups based on average human and social capital each year. We then consider four groups of firms and examine the average and median human and social capital of the directors appointed. The four groups we consider are 1) low human and low social capital firms, 2) low human and high social capital firms, 3) high human and low social capital firms, and 4) high human and high social capital firms. Interestingly, as shown in Table 11, despite a prior expectation that firms might prefer to appoint directors who would improve a firm's situation, i.e., firms with low social capital

Table 9
Logit regressions for number of appointments on director social capital.

	1	2
	NEW APPT	NEW APPT
	LOGIT	LOGIT
Constant	0.005***	0.005***
	(−14.95)	(−14.95)
AGGt−1	1146***	1.115***
	(4.90)	(2.92)
AAGGt−1	0.989	0.990
	(−0.22)	(−0.19)
HCIt−1	1.153***	1.151***
	(6.12)	(5.97)
AHCIt−1	1.154**	1.159**
	(2.11)	(2.17)
FEMt−1	1.843***	1.843***
	(2.98)	(3.04)
NZt − 1	3.487***	3.434***
	(6.89)	(6.79)
DIR + 2 t − 1		1.317 (1.07)
Observations	7559	7559
Pseudo R2	0.075	0.075
Log	−1355.6	−1354.8
Wald Chi2	203.4	223.8
p(F)	0.000	0.000
Year fixed effects	Y	Y

This table presents results for logit regressions where each observation represents a director for a given year between 2000 and 2015. The dependent variable equals one if a director gained an additional appointment at time t; otherwise, it is zero. Odds ratios represent the likelihood of a change in the dependent variable arising from a one-unit change in the independent variable. Z-statistics, displayed in parenthesis below each odds ratio estimate, are based upon robust standard errors clustered at the director level. Year dummies are included but not shown. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. All variables are defined in Appendix I.

Table 10
Social and human capital by industry of appointing company.

		Mean	Mean		Median	Median	
	Appointments	AGG	HCI	Preference	AGG	HCI	Preference
Oil & Gas	79	1.099	4.823	Social	−0.028	4.400	
Basic Materials	87	−0.610	4.807		−1.088	5.200	Human
Industrials	333	0.271	5.068	Human	−0.105	4.600	
Consumer Goods	375	0.078	4.150		−0.254	4.200	
Health Care	104	0.140	5.094		−0.055	4.400	
Consumer Services	273	0.498	5.009		−0.051	5.200	
Telecommunications	76	0.172	5.737		−0.290	6.200	Human
Utilities	85	0.162	5.569		−0.023	5.400	
Financials	414	−0.148	5.088	Human	−0.481	5.200	Human
Technology	79	−0.043	5.268	Human	−0.329	5.200	Human
Total	1905	0.140	4.920		−0.250	5.000	

This table presents results for industry average and median human and social capital of newly appointed directors. Firms are categorized based on the ICB industry classification. We only consider directors who received one new appointment in a year.

appointing high social capital directors, we observe the opposite. Firms appear to match directors to their existing position, such that group 1 firms appoint directors with the lowest human and social capital. Group 2 firms appoint high social capital but low human capital directors, group 3 firms appoint directors with high human capital and low social capital, while group 4 appoints directors with high human and social capital. These results suggest that firms perhaps select human or social capital based on the firm's needs. It could also suggest that firms appoint directors with similar levels of human and social capital as the currently appointed directors, rather than necessarily valuing both equally or showing a clear preference for one over the other.

5. Conclusions

A considerable amount of research has investigated the factors behind the selection of new directors. Much of the research has focused on the knowledge, experience, and skills that a director personally brings to the table, i.e., their so-called human capital;

Table 11

Social and human capital based on average social and human capital of appointing firms.

	Low Social Capital		High Social Capital	
	AGG	*HCI*	*AGG*	*HCI*
Low Human Capital				
Mean	−1.003	3.625	1.084	3.982
Median	−1.236	3.200	0.589	3.400
Observations	376		90	
High Human Capital				
Mean	−0.665	5.332	1.280	6.269
Median	−0.804	5.200	0.398	6.200
Observations	71		334	

This table presents the average and median human and social capital for newly appointed directors based on the average board human and social capital. We create yearly terciles for firms based on the board's average human and social capital and then consider four groups: low/low, low/high, high/low, and high/high.

however, social capital is an area of recent interest. Social capital is defined as the knowledge, skills, and expertise that directors can access from their personal relationships, particularly with their peers. Directors with high social capital can access larger pools of knowledge and experience, making them increasingly attractive as the range of business challenges continues to increase. It becomes increasingly difficult to cover the firm's resource requirements through the board alone; however, while a few studies have considered the value of director connectivity, a confounding factor is that social capital is intimately associated with human capital. For example, high human capital likely leads to high connectivity, while high connectivity allows a director to acquire greater human capital. This raises questions regarding the validity of prior findings regarding social capital.

This paper investigated the importance of social capital for director appointments while comprehensively controlling for human capital. Using companies listed on the NZX between 2000 and 2015, we collected information on directors' human capital across nine attributes that the prior literature highlighted as crucial to creating a HCI. Additionally, we use SNA to measure four aspects of director connectivity and use PCA to derive a connectivity factor that measures the social capital from a director's connections to other directors. We then investigate the importance of human and social capital in directors receiving additional board appointments in the subsequent year. Unlike Cashman et al. (2013), who find that social capital is far more important in the US than human capital, we find that human and social capital are equally important in New Zealand. Additionally, upgrading a director's human capital can increase the chance of further board appointments, whereas enhancement in social capital has no relationship with additional directorships. This suggests that in New Zealand, directors should seek to improve their human capital attributes to improve their chances of obtaining additional board seats rather than social capital. Our results also raise several questions with direct implications for shareholders. Our finding that firms appoint directors with similar characteristics to their existing directors raises the question of whether firms (especially low social or human capital firms) would be better to appoint directors to address their weaknesses, i.e., appointing a higher social capital director on a board with low social capital. A possible explanation for the relatively low importance placed on social capital may be that shareholders and other stakeholders struggle to evaluate the benefits of social capital to the firm and the social capital that a potential director can bring. While a director's history and qualifications are easily seen and assessed, the depth and breadth of their connections are not. Therefore, firms may need to explore ways to articulate a director's social capital.

CRediT authorship contribution statement

Angela Andersen: Conceptualization, Investigation, Formal analysis, Writing – original draft, Writing – review & editing. **Alexandre Garel:** Conceptualization, Writing – original draft. **Aaron Gilbert:** Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing. **Alireza Tourani-Rad:** Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix I Description of variables

Variable	Type	Definition
Social Capital Measures		
Degree (DEG)	Continuous, Ratio	The number of unique direct connections for Director i to all other j directors in the network at FYE, scaled by $n - 1$ (n = total directors in the network).
Closeness (CLO)	Continuous, Ratio	The sum of the inverse of the shortest distance between Director i and all other directly and indirectly connected j directors in the network at FYE, scaled by its maximum possible value $n - 1$ (n = total directors in the network).

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(*continued*)

Variable	Type	Definition
Betweenness (BET)	Continuous, Ratio	The sum of the proportions of all the shortest paths linking two directors, which pass through Director i at FYE, scaled by its maximum possible value $((n^2 - 3n + 2)/2)$.
Eigenvector (EIG)	Continuous, Ratio	The sum of Director i's first-degree connections to all other directors in the network, weighted by the connectedness of the firms to which it is connected.
Aggregate Connectivity (AGG)	Continuous, Interval	The Principal Component Analysis of Degree, Closeness, Betweenness, and Eigenvector to reduce the dimensions into one principal factor of social capital.
Human Capital Index		
HCI	Count, Discrete	The self-constructed index consists of nine different human capital attributes. The individual categories form a HCI with a maximum possible value of 18.
Director Characteristics		
Age	Count, Discrete	Directors' age in years.
Female (FEM)	Dichotomous	Dummy variable equal to one if the director is a female.
New Zealand (NZ)	Dichotomous	Dummy variable equal to one if the director is an NZ citizen/resides in NZ.
Education		
Undergraduate	Dichotomous	Dummy variable equal to one if the director's highest degree is a bachelor's degree or LLB.
Postgraduate	Dichotomous	Dummy variable equal to one if the director's highest degree is a postgraduate-level qualification including honors, JD, postgraduate cert/dip, masters, MBA, and PhD.
No Degree	Dichotomous	Dummy variable equal to one if no degree qualifications (minimum degree level is a bachelor's degree).
Director Experience		
Director Experience	Count, Discrete	Number of prior years' experience as a director of firms in the NZ database (years counted concurrently).
Directorships (DIR)	Count, Discrete	Number of current directorships the director holds at listed firms in NZ.
Directorships (DIR + 2)	Dichotomous	Dummy variable equal to one if the director has two or more other directorships at NZ listed firms.
Director Expertise		
NZX10	Dichotomous	This dummy variable equals one if a director at an NZX10 firm, zero otherwise. An NZX firm is defined as one that has been part of the index at any time during the respective year.
NZX50	Dichotomous	This dummy variable equals one if a director at an NZX50 firm, zero otherwise. An NZX firm is defined as one that has been part of the index at any time during the respective year.
CEO Experience 1 1		
Prior CEO Experience	Dichotomous	This dummy variable equals one if the director has been a CEO of a listed or non-listed firm in NZ or abroad in prior years. Note that a director with prior CEO experience may still be a current CEO.
Current CEO (listed)	Dichotomous	Dummy variable equal to one if the director is currently a CEO of an NZ listed firm or another listed firm abroad (if the information was provided).
Current CEO (non-listed)	Dichotomous	Dummy variable equal to one if the director is currently a CEO of another non-listed firm (if the information was provided).
Other Significant Experience		
International Experience	Dichotomous	This dummy variable equals 1 if the director had international exposure (sales), lived or worked abroad, or was a foreigner. Foreigners exclude those who have lived in NZ for most of their lives.
M & A Experience	Count, Discrete	This is the cumulative number of completed deals a director has been associated with for the sample of NZ firms between 1993 and the respective year. Deals include directing firms that have acquired, sold, or were the target.
Professional Expertise		
Accountant	Dichotomous	This dummy variable equals 1 if the director's occupation is classified as an accountant or financial controller (experience as a CA, CPA, or CFO).
Banker	Dichotomous	This dummy variable equals 1 if the director's occupation is classified as a banker (experience as an investment banker, commercial banker, fund manager, stockbroker, finance industry experience, or CFA).
Consultant	Dichotomous	This dummy variable equals 1 if the director's occupation is classified as a consultant (management, IT, marketing, strategy, or industry-specific).
General Executive	Dichotomous	This dummy variable equals 1 if the director's occupation is classified as a general executive/businessperson (not classified into another occupation group).
Financial Expert	Dichotomous	This dummy variable equals 1 if the director has any of the following qualifications: CA, ACA, CMA, CPA, or CFA/CSA.
Lawyer	Dichotomous	This dummy variable equals 1 if the director's occupation is classified as a lawyer (experience as a practicing lawyer).
Prof Director	Dichotomous	This dummy variable equals 1 if the director is identified as a professional director (often a retiree or corporate governance expert).
Industry Experience 1 1		
Banking	Dichotomous	This dummy variable equals 1 if the director has significant experience with a banking/savings/loan firm (GIC code 04/ICB Code 8300).
Basic Materials	Dichotomous	This dummy variable equals 1 if the director has significant experience in the basic materials industry, including mining, chemicals, and forestry (GIC code 02/ICB code 7000).
Consumer Goods	Dichotomous	This dummy variable equals 1 if the director has significant experience in the consumer goods industry (ICB Code 3000).
Consumer Services	Dichotomous	This dummy variable equals 1 if the director has significant experience in the consumer services industry (ICB Codes 5000).
Finance	Dichotomous	This dummy variable equals 1 if the director has significant experience with a financial or insurance firm, including banks, insurance or real estate firms, and other financial firms (GIC codes 05 and 06/ICB Codes 8500 & 8700).
Health	Dichotomous	This dummy variable equals 1 if the director has significant experience in the health industry (ICB Code 4000).
Industrial	Dichotomous	This dummy variable equals 1 if the director has significant experience with an industrial /transportation firm (GIC code 01 & 03/ICB Code 2000).
Oil & Gas	Dichotomous	This dummy variable equals 1 if the director has significant experience in the oil and gas industry (ICB Code 0001).

(*continued*)

NZX50	Dichotomous	This dummy variable equals one if a director at an NZX50 firm, zero otherwise. An NZX firm is defined as one that has been part of the index at any time during the respective year.
Technology	Dichotomous	This dummy variable equals 1 if the director has significant experience in the technology industry (ICB Code 9000).
Telecommunications	Dichotomous	This dummy variable equals 1 if the director has significant experience in the telecommunications industry (ICB Code 6000).
Utilities	Dichotomous	This dummy variable equals 1 if the director has significant experience in the utility industry (GIC code 02/ICB code 7000).
Industry Experience	Count, Discrete	This is the cumulative number of ICB industries in which a director has significant experience. The total number of industries equals 10: banking and finance, basic materials, consumer goods, consumer services, health, industrial, oil & gas, technology, telecommunications, and utilities.
Board Appointments		
NEW APPT	Dichotomous	Dummy variable equal to one if the director gained a new appointment at a listed company in NZ.
NAPPTS	Count, Discrete	The number of new appointments gained at listed companies in NZ.
Exec Appt	Dichotomous	Dummy variable equal to one if the director gained a new executive director appointment at a listed company in NZ.
N Exec Appts	Count, Discrete	The number of new executive director appointments gained at listed companies in NZ.

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