Social Capital, Human Capital and Board Appointments

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Abstract

In this study, we examine social capital and human capital and how they could contribute to appointment of directors to extra board seats. We measure director connectivity using the Social Network Analysis centrality measures (Wasserman & Faust, 1994) capturing multidimensional connections embedded in the social network. Human capital is proxied by a uniquely constructed index. We hand collect a novel dataset of New Zealand listed firms which includes 279 unique firms, over the period 2000 - 2015. We find stronger evidence that possessing greater human capital, rather than higher connectivity, results in directors receiving additional board appointments. All our results hold after conducting robustness tests and controlling for endogeneity issues.

Keywords: Corporate Governance, Director Appointments, Resource Dependence, Board of Directors, Social Network Analysis, Social Capital, Human Capital

JEL Classification: C33, G32, G34

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1. Introduction

The important role that the board of directors plays within a firm has resulted in considerable interest from both academics and practitioners around the best composition of a board. A stream of corporate governance literature focuses on the behaviour and attributes of directors that influence their appointments to new boards. It has been shown that CEO experience (Brickley, Linck, & Coles, 1999), better governance decisions (Coles & Hoi, 2003), expertise and prestige (Ferris, Jagannathan, & Pritchard, 2003), professional knowledge (White, Woidtke, Black, & Schweitzer, 2014) to be useful for directors to gain additional board appointments. On the contrary, directors perceived as having performed poorly obtain fewer additional board seats (Harford, 2003; Fich & Shivdasani, 2007; Ertimur, Ferri, & Stubben, 2010). The extant literature mainly concentrates on directors' human capital attributes (Khanna, Jones, & Boivie, 2014; Adams, Akyol, & Verwijmeren, 2018), being the skills and knowledge acquired through past experiences, training and education (Becker, 1964).

Another important and broader aspect that has been discussed in recent times is the idea of the connectivity and social interaction, generally known as social capital, that a director brings to a board (Johnson, Schnatterly, & Hill, 2013). Resource dependence theory (Pfeffer, & Salancik, 1978) suggests that such connections facilitate the flow of information to a firm and can assist the board by bringing in experience, expertise and knowledge that is lacking. The studies on interlocks among directors, a rough measurement of social connectivity, has shown that information sharing between boards do indeed occurs, including relevant strategic knowledge (Carpenter & Westphal, 2001), acquisition strategies (Haunschild, 1993), anti-takeover practises (Davis, 1991), corporate disclosure policies (Cai, Dhaliwal, Kim, & Pan, 2014), the design of executive compensation packages (Wong, Gygax, & Wang, 2015), and poor practises such as backdating stock options (Bizjak, Lemmon, & Whitby, 2009) and management earnings (Chiu, Teoh, & Tian, 2013).

In this study, we explicitly examine social capital and how it could contribute to appointment of directors to extra board seats. Social capital, in our study, 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 connections of directors to each other, which we refer to as directors' connectivity. Directors' connections facilitate information flows among firms, providing access to skills, experiences and knowledge beyond the human capital that the director brings as an individual (Pfeffer & Salancik, 1978). For instance, social connections can allow a director to learn about the business practices of other firms more quickly than learning from secondary sources (Carpenter & Westphal, 2001). This suggests that the connectivity of a director could be a potential source of value to the firm by assisting the board with their monitoring, counselling and advising duties. If the connectivity of a director is viewed as a positive attribute, then we would expect it would result in additional board seats for highly connected directors. In their study, Cashman, Gillan and Whitby (2013) distinguish between human capital and social capital and how each of them affect a directors appointment to a new board. They use a sample drawn from U.S companies for the period 2003 to 2008. Their results demonstrate that a director's social capital is far more important than her human capital in determining whether or not they are appointed to a board. Specifically, Cashman et al., (2013) find a highly connected director, regardless of their level of human capital, is more likely to gain a board seat. While a poorly connected director, regardless of their level of human capital, is less likely to gain a board seat.

Our objective in this paper is to examine the importance of social connectivity for obtaining additional board seats in an environment where the institutional settings and financial markets are very different from the U.S. The sample is drawn from companies listed on the New Zealand stock market, far smaller that the U.S. stock market, between 2000 and 2015. New Zealand offers an interesting setting within which to examine the value of director social capital. New Zealand culture is generally of a social nature (Legatum Institute, 2018). As such, New Zealand directors are likely

to tap into their connections, accessing the skill sets and knowledge of their peers on other boards (Statistics NZ, 2005, 2006; NZ Government, 2013; Legatum Institute, 2018).

We hand collect a novel dataset and measure director connectivity using the Social Network Analysis centrality measures (Wasserman & Faust, 1994) which allow us to capture the multidimensional connections embedded in the social network. This approach goes beyond measuring simple board interlocks (Mizruchi, 1996; Zona, Gomez-Mejia, & Withers, 2018; Handschumacher, Behrmann, Ceschinski, & Sassen, 2019) by considering indirect connections as well. Prior literature has argued that directors who are more central in a network can access information faster and in greater quantities (Omer, Shelley, & Tice, 2014b). Additionally, we measure the aggregate connectivity of a director by using the Principal Components Analysis (PCA) and creating a factor of the centrality measures.

As for a director's human capital, we employ a self-constructed human capital index. Prior studies typically focus on one or another specific aspects of human capital, such as CEO experience (Fahlenbrach, Low, & Stulz, 2010). We provide a more complete measure that proxies for a director's overall toolkit which is based on nine important human capital attributes as identified by prior literature. Thus, our index captures human capital attributes more exhaustively.

We examine the value of director connectivity and their human capital in several ways. We start by regressing the number of board appointments on director connectivity, human capital and other control variables, to determine the average effect of director connectivity and their human capital on new board appointments. 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 clearly allow us to investigate whether firms value social capital or human capital when considering appointment of directors to boards.

Our results show a major difference with that of Cashman et al (2013) where they found positive and significant relationship between director connectivity and the number of new appointments gained in the following year, above and beyond their human capital. Our results clearly indicate that while both social capital as well as human capital are important contributing factors to new board appointments, human capital plays a more central role. As a result, the New Zealand director labour market rewards the value-contribution of those directors with high level of human capital as well as high level of connectivity for directors to be appointed to their board.

The rest of the study is structured as follows. Section 2 provides a background and the related literature and develops the hypotheses. Section 3 presents a description of the data and the variables employed in this study. Section 4 presents the empirical results, starting with univariate analyses, followed by the regression results for social and human capital and board appointments. Section 5 concludes the study.

2. Literature Review

Board appointments

Fama and Jensen (1983a) argue that the director labour market seeks directors with particular attributes that help them to effectively monitor and advise management, rewarding such directors with additional board appointments. This has been supported empirically by studies such as Brickley et al., (1999) who find that retired CEOs who performed well in their CEO role received more board appointments. Coles and Hoi (2003) find that directors of a firm that rejected anti-takeover provisions gained additional board positions in the following three years. Ferris, Jagannathan and Pritchard (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.

Connectivity and Social Capital

The extant literature on the value of the traditional measure of director connectivity for firms has produced mixed results. For instance, studies have shown that board networks can improve financial performance, (Horton et al., 2012), shareholder returns (Larcker et al., 2013), firm value (Omer et al., 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 to reduce information asymmetry for sophisticated investors (Akbas et al., 2016). Conversely, connectivity has been associated with negative outcomes such as weaker corporate governance (Barnea & Guedj, 2007) including managerial entrenchment (El-Khatib, Fogel, & Jandik, 2015), and result in poor firm performance (Andres, Bongard, & Lehmann, 2013), or spreading value-destroying corporate practices (Chiu et al., 2013). 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). Prima facie, it has also been found that connectivity has no effect on firm performance (Blanco-Alcántara, Díez-Esteban, & Romero-Merino, 2019). As a result, there is an open question regarding the value of director connectivity for firms, and by extension whether it is a desirable attribute of directors, especially when a wider measure of connectivity is based on social network analysis is employed

Recent studies have broadened the idea of connections to consider the implications of the wider networks that are established via the indirect connections that interlocks create. These network dimensions have been examined using Social Network Analysis (Wasserman & Faust, 1994) to measure a director's connectivity (Cashman, et al, 2012, Horton, Millo, & Serafeim, 2012). Social network analysis argues that companies exist within vast networks that are linked via chains of interlocked directors. For instance, companies A and B share a director, while companies B and C share a different director. Via the indirect connections of the interlocked directors there is a

connection between companies A and C that can allow the flow of information among these firms. These wider social networks should provide access to greater knowledge and expertise than just considering traditional measures of interlocks, with indirect connections serving boards more importantly (Renneboog & Zhao, 2020). However, the related literature is yet to provide substantive evidence about the effectiveness of a well-connected director joining the board.

Human Capital

The literature further 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). Johnson, Schnatterly, and Hill (2013) in their survey article identify a range of attributes considered to be those of an effective director including CEO experience, financial expertise, venture capital experience, acquisition experience, ties to other firms, affiliations, relationships and social status. These studies indicate that a broad range of attributes, spanning both social capital and human capital, are viewed as important.

Our study seeks to address whether human capital, or social capital, the connectivity among directors, or their interaction are important are important factors to secure additional board appointment.

Interaction between Human Capital and Social Capital

Theory suggests that directors who sit on multiple boards gain access to broader corporate networks and act as conduits for information, resource sharing and common practices. Appointing a better-connected director should enable the board to tap into a wider pool of skills, knowledge and experiences. However, the extant literature is sparse and provides limited evidence of such a relationship.

Directors with high human capital are likely to be highly sought after, resulting in more opportunities to gain additional board seats, and so increasing their social capital. Likewise, directors with greater social capital are likely to build up greater human capital by virtue of obtaining more opportunities to increase their skill sets. A number of studies have argued that social and human capital need to be considered as separate attributes (Kor & Sundaramurthy, 2009; Tian, Haleblian, & Rajagopalan, 2011; Sundaramurthy, Pukthuanthong, & Kor, 2014). We also contend that human capital and social capital, while related, are not the same and measure each separately. We investigate whether director connectivity and/or human capital are related to receiving additional board seats.

3. Data Description and Variables

Our sample of directors is drawn from the firms on the New Zealand Stock Exchange (NZX) covering the period 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 their country of residence, to determine where they are predominantly located. This information is cross-checked with annual reports and data provided by the New Zealand Stock Exchange. 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. Firm-level data are collected from Thomson Reuters Datastream and Eikon. All variables used in the analysis are described in Appendix I.

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.[1] We identify 2,341 new board appointments for 1,743 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 per year, around 18% of directors receive an extra appointment. Table 1 shows that a higher percentage of new directors were appointed to boards over the period 2001 to 2004, following 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 new appointed directors in 2008 (a drop from 79% to 59%) during the onset of the GFC. This 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).

[INSERT TABLE 1 HERE]

To investigate the importance of a director's social capital, we employ Social Network Analysis to measure directors' connectivity (Wasserman & Faust, 1994). Social Network Analysis allows us to use look through a director's public board seats to map out the full network of connections across all the publicly listed companies in each year. From this network, we can calculate four measures of connectivity that capture different aspects of a director's importance and influence in a network: Degree (hereafter "*DEG"*) (Nieminen, 1974), Closeness (hereafter "*CLO*") (Sabidussi, 1966), Betweenness (hereafter "*BET*") (Freeman, 1977), and Eigenvector (hereafter "*EIG*") (Bonacich, 1972, 1987).[2] In addition, we create a factor of the four connectivity measures using Principal Components Analysis (PCA). The PCA measure represents the overall connectivity of a director

[1] For a detailed description of the board appointment identification approach, please see Appendix I.
[2] Please refer to Appendix I for more detail on how each measure is calculated.

(hereafter denoted as *"AGG"*) that encompasses the common portion of the above-mentioned four individual connectivity measures. We rely primarily on *AGG* for the analysis in this paper. We relate a director's measure of connectivity at *t-1* to the board appointment at t=0. We do so to exclude any increase in connectivity as a result of the new board appointment(s) we are examining. We also remove those directors from the sample who were not a director of one of the sample firms in the prior year as we focus on directorships of public firms to measure connectivity. Applying these criteria, our final sample contains 9,620 director-year observations consisting of 507 director appointments.

The literature demonstrates that a director's human capital, defined as a director's knowledge, skills and experience acquired from their current and past positions and industry experiences (Burt, 1992; Nicholson & Kiel, 2004), is important for obtaining board appointments. We allow for human capital in our study, by using a self-constructed human capital index (denoted as *"HCI"*). We follow the human capital index developed in Andersen et al., (2020). Specifically, we score directors each year between 0 and 2 based on nine attributes and then we sum the individual scores to generate the *HCI* score, which has a maximum possible value of 18. The nine attributes we employ are based on the director attribute literature (e.g. Yermack, 2006; Johnson et al., 2013). These attributes are education, director experience, director expertise, prior CEO experience, international experience, merger and acquisition experience, professional skills, professional directors, and industry experience. For a detailed description of the *HCI* and its construction please see Appendix II.

We further control for a director's gender and country of residence. Globally, gender equality has been noted as a major area of interest in boards of directors with efforts being made to increase the proportion of female directors (Vinnicombe, Singh, Burke, Bilimoria, & Huse, 2008; Clydesdale & Hu, 2019; Grau, de Cabo, Gimeno, Olmedo, & Gabaldon, 2020). As a result, gender is likely to influence board appointments. We control for gender (denoted as *"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 on a New Zealand firm. We control for the place of residence (denoted as *"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" (denoted as *"DIR+2"*). Finally, we control for executive appointments as an insider is more likely to be appointed for their tacit knowledge of the firm that they obtained through their executive employment (Masulis & Mobbs, 2011). As a result, executives of the firm would not compete with the wider director labour market for the board seat. They are also potentially less active in looking for additional appointments.

Descriptive statistics

Table 2 reports descriptive statistics of the sample and variables used in this study. We present the individual connectivity measures for the year prior to the appointment; *DEG*, *CLO*, *BET* and *EIG*, and our main variable of interest, the Aggregate Connectivity measure *AGG*. The average (median) *DEG* measure is 0.92% (0.78%) which suggests that the average director has 0.92% of the maximum possible degree centrality of the sample prior to being appointed. The average (median) closeness is 10.45% (12.90%) suggesting that the average director has 10.45% of the maximum possible closeness centrality prior to being appointed. We observe that the average director *HCI* score is 6.14 out of a possible 18. The minimum value is 0 while the maximum value is 15.2, indicating a director with a lot of highly desirable attributes. We observe that 8% of the directors are female, 72% resided in New Zealand prior to the new appointment, held 1.24 total directorships (*DIR*) with only 5% holding more than two. Looking at appointments, we observe that over 5% of the sample gained at least one new appointment and the greatest number gained in one year is three.

[INSERT TABLE 2 HERE]

4. Empirical Findings

Univariate analyses

We begin our analysis by looking at the univariate relationship between connectivity and subsequent board appointments. We first examine the Pearson pairwise correlations, presented 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 and social capital have a greater chance of gaining a new appointment.

[INSERT TABLE 3 HERE]

Table 4 compares the attributes of directors who gained an additional board seat to those that did not. In Panel A, we find that newly appointed directors are on average more connected overall based on all the centrality measures and *AGG*, irrespective of whether we consider the lagged connectivity measures, or the contemporaneous measure which includes the connections arising from the new appointment.[3] Looking at 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 both more connected and have higher human capital.

[INSERT TABLE 4 HERE]

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

Regression analysis

So far, the results suggest that well-connected directors and those with higher level 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 or human capital, following a similar approach to Cashman et al., (2013). We estimate OLS regressions using panel data of the following specification:

$$N\ Appts_{it} = \alpha + \beta_1 AGG_{it-1} + \beta_2 \Delta AGG_{it-1-(t-2)} + \beta_3 HCI_{it-1} + \beta_4 \Delta HCI_{it-1-(t-2)} + \beta_5 FEM_{it-1} + \beta_6 NZ_{it-1} + \beta_7 DIR + 2_{it-1} + \beta_8 N\ Exec\ Appts_{it} + \sum_{y=1}^{Y} \theta_y\ Year_{yt-1} + \varepsilon_{it} \quad (1)$$

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,* $\Delta AGG_{it-1-(t-2)}$ equals the one-year change in connectivity between year *t-1* and *t-2*, $HCI_{i,t}$ represents human capital for director *i* in year *t-1*, $\Delta HCI_{i,t-1-(t-2)}$ equals the one-year change in human capital between year *t-1* and *t-2*, $FEM_{i,t-1}$is a dummy variable that equals one if the director is a female and zero if a male, NZ is a dummy variable that equals one if the director resides in New Zealand and zero otherwise, $DIR + 2_{i,t-1}$ is a dummy variable that equals one if the director holds three or more other directorships, $N\ Exec\ Appts_{i,t-1}$ is the number of executive appointments and $Year_t$ is a set of year dummies to control for time-series trends. Robust standard errors ε_{it} are clustered at the director level (Petersen, 2009) assumed to be I.I.D over directors and time.[4]

[4] 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 suggests that the better-connected directors receive more additional director appointments. Furthermore, a positive relationship with the change in connectivity suggests that directors with recently acquired connectivity get 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 of which directors are connected to.[5] Similarly, a positive relationship between the number of new appointments gained and the level of human capital suggests that more experienced and knowledgeable directors get appointed to additional firms. A positive relationship with the change in human capital suggests that a director who recently improved their human capital, by for example gaining a university degree, will be more attractive to appointing firms. Including the first differences alleviates concerns about endogenous time invariant omitted variables that are correlated with either connectivity or human capital. We include multiple appointments of directors to the same firm as we are interested in the necessary attributes of the individual directors and not the characteristics of the firm itself.

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,[6] while a one standard deviation increase in *HCI* is associated with a 32.47% increase in the average number of new appointments for a director.[7] This finding suggests that firms may appoint directors based on both how much connectivity and human capital they have. We also observe a positive coefficient on Δ*HCI*, suggesting that firms may appoint directors based on recently accumulated human capital. Interestingly, we find no significant relationship between Δ*AGG* and *N*

[5]For instance, a firm that was previously isolated may gain a new director connecting them into the main network increasing the connectivity of the other directors.

[6] The percentage change in *N Appts* is calculated as (one standard deviation change in AGG × coefficient on AGG in Column 1)/Average N Appts for the sample = (1.57 × 0.013)/0.06 = 35.40%.

[7] The percentage change in *N Appts* is calculated as (one standard deviation change in HCI × coefficient on HCI in Column 1)/Average N Appts for the sample = (2.67 × 0.007)/0.06 = 32.47%.

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 the busyness of directors and for executive appointments. Of note, we find that busy directors, holding two or more directorships, receive more new appointments despite the theory that directors sitting on more boards are less able to add value due to time constraints. Fama and Jensen (1983b) and Ferris et al. (2003), in contrast, argue that 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 a greater number of new appointments. Overall, the results, within the New Zealand context, indicate that receiving a board appointment is positively related to director connectivity as well as their level of human capital.

[INSERT TABLE 5 HERE]

Relative importance of human capital and connectivity

The previous empirical analysis provides evidence that human capital and social capital are both positively related to the number of new appointments. However, Cashman et al., (2013) suggests that in their sample of U.S firms social capital is particularly 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. To conduct the analysis, we group directors into terciles each year based on the rankings of their HCI_{t-1} and AGG_{t-1} variables. From these groups, we create four dummy variables to identify directors in the extreme groupings of human and social capital. $LowHCI_{t-1}\_LowAGG_{t-1}$ (Group 1,1), $LowHCI_{t-1}\_High\ AGG_{t-1}$ (Group 1,3), $HighHCI_{t-1}\_LowAGG_{t-1}$ (Group 3,1), and $HighHCI_{t-1}\_HighAGG_{t-1}$ (Group 3,3). We then replace the standard human capital and connectivity measures in *Equation 1* with these dummy variables to investigate the number of new appointments a director gains based on their relative human and social capital.

The results presented in Table 6 suggest that in our sample of New Zealand firms both human and social capital are equally important attributes for gaining a board seat. We find that low human capital and low connectivity significantly decreases the number of subsequent new appointments, while high human capital and high connectivity significantly increases the number of subsequent new appointments. When we consider the less clear-cut situations, $LowHCI_{t-1}\_High\ AGG_{t-1}$ and $HighHCI_{t-1}\_LowAGG_{t-1}$, we observe insignificant coefficients. 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 clearly contrasts with Cashman et al. (2013) who find that director connectivity is far more important than human capital in their study of the U.S. directors. Overall, our findings in Table 6 provide additional evidence that both human and social capital are important attributes in the New Zealand director labour market.

[INSERT TABLE 6 HERE]

4.3 Robustness Test

In this section, we test the robustness of our finding that social capital is an important 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:

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

$$\beta^4 \Delta HCI_{t-1-(t-2)} + \beta^5 FEM_{it-1} + \beta^6 NZ_{it-1} + \beta^7 DIR + 2_{t-1} +$$

$$\beta^8 Exec\ Appt_{t-1} \sum_{y=1}^{Y} \beta^y Year_{t-1}^{y} + \varepsilon_{it} \quad (2)$$

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-1*, HCI_{it} represents the human capital index for Director i in year *t-1* and all other variables are consistent with Equation (2). Robust standard errors $\varepsilon_{i,t}$ are clustered at the director level (Petersen, 2009). To interpret the results, we report odds ratios which represent the change in the odds (or in other terms the likelihood) of being appointed arising from a one-unit change in the director attribute.[8]

In Column 1 of Table 7, we report the results for equation 2. The odds ratio on the level of AGG_{t-1} is positive and statistically significant and indicates that a one-unit increase in AGG_{t-1} (above the mean value of 0.07) increases the likelihood of receiving a new appointment by 14.6%.[9] We observe no significant relationship between *New Appt* and ΔAGG_{t-1} further supporting the earlier findings that a recent gain or loss in connectivity has no bearing on gaining an additional board appointment. We also find that a one-unit increase in the level of, and change in human capital, increase 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 and living in New Zealand increases the likelihood of being appointed 3.5 times. The results support the earlier findings in Table 5. Adding in a measure to control for director busyness, Column 2 of Table 7, does not change the likelihood ratios. Although, unlike the earlier results, being busy does not increase the likelihood of a director receiving an additional director appointment. Overall, we find stronger evidence that possessing greater human capital, rather than higher connectivity, results in directors receiving additional board appointments.

[INSERT TABLE 7 HERE]

[8] 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.

5. Conclusion

This study provides new empirical evidence on whether social capital and/or human capital are important attributes for directors to obtain additional seats on boards in the New Zealand context. We measure director connectivity using the Social Network Analysis centrality measures (Wasserman & Faust, 1994) capturing multidimensional connections embedded in the social network. Human capital in our study is a unique self-constructed human capital index. We hand collect a novel dataset of firms listed on the New Zealand stock exchange over the period 2000 - 2015. Overall, We observe that human capital plays a more important role than higher connectivity for directors receiving additional board appointments.

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Appendix I: Description of Variables

Variable	Type	Definition
Social Capital Measures		
Degree (DEG)	Continuous, Ratio	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 network).
Closeness (CLO)	Continuous, Ratio	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 network).
Betweenness (BET)	Continuous, Ratio	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	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 to.
Aggregate Connectivity (AGG)	Continuous, Interval	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	Self-constructed index consisting of 9 different human capital attributes. The individual categories form a human capital index which has a maximum possible value of 18. See Chapter 3 for a detailed description of the index construction.
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 honours, 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 NZ database (years counted concurrently).
Directorships (DIR)	Count, Discrete	Number of current directorships the director holds at listed firms in NZ.
Director Expertise		
NZX10	Dichotomous	Dummy variable equal to one if a director at an NZX10 firm, zero otherwise. NZX firm is defined as one that has been part of the index at any time during the respective year.
NZX50	Dichotomous	Dummy variable equal to one if a director at an NZX50 firm, zero otherwise. NZX firm is defined as one that has been part of the index at any time during the respective year.
CEO Experience		

Prior CEO Experience	Dichotomous	Dummy variable equal to one if the director has been a CEO of a listed or non-listed firm either 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 (if information given) director is currently a CEO of an NZ listed firm, or another listed firm abroad.
Current CEO (non-listed)	Dichotomous	Dummy variable equal to one if (if information given) director is currently a CEO of another non-listed firm.
Other Significant Experience		
International Experience	Dichotomous	Dummy variable equal to 1 if the director had international exposure (sales), who lived or worked abroad, or who are foreigners. Foreigners exclude those who have lived in NZ for most of their life.
M & A Experience	Count, Discrete	Cumulative number of completed deals a director has been associated with for the sample of NZ firms between 1993 and 1 - the respective year. Deals include directing firms that have acquired, sold, or were the target.
Professional Expertise		
Accountant	Dichotomous	Dummy variable equal to one if the director's occupation is classified as an accountant or financial controller (experience as a CA, CPA, CFO).
Banker	Dichotomous	Dummy variable equal to one if the director's occupation is classified as a banker (experience as an investment banker, commercial banker, fund manager, stock-broker, finance industry experience, CFA).
Consultant	Dichotomous	Dummy variable equal to one if the director's occupation is classified as a consultant (management, IT, marketing, strategy, Industry-specific).
General Executive	Dichotomous	Dummy variable equal to one if the director's occupation is classified as a general executive/businessperson (not classified into another occupation group).
Financial Expert	Dichotomous	Dummy variable equal to one if the director has any of the following qualifications: CA, ACA, CMA, CPA, CFA/CSA.
Lawyer	Dichotomous	Dummy variable equal to one if the director's occupation is classified as a lawyer (experience as a practicing lawyer).
Prof Director	Dichotomous	Dummy variable equal to one if the director is identified as a professional director (often a retiree or corporate governance expert).
Industry Experience		
Banking	Dichotomous	Dummy variable equal to 1 if the director has significant experience with a banking/savings/loan firm (GIC code 04 / ICB Code 8300).
Basic Materials	Dichotomous	Dummy variable equal to 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	Dummy variable equal to 1 if the director has significant experience in the consumer goods industry (ICB Code 3000).
Consumer Services	Dichotomous	Dummy variable equal to 1 if the director has significant experience in the consumer services industry (ICB Codes 5000).
Finance	Dichotomous	Dummy variable equal to 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	Dummy variable equal to 1 if the director has significant experience in the health industry (ICB Code 4000).

Industrial	Dichotomous	Dummy variable equal to 1 if the director has significant experience with an industrial /transportation firm (GIC code 01 & 03 / ICB Code 2000).
Oil & Gas	Dichotomous	Dummy variable equal to 1 if the director has significant experience in the oil and gas industry (ICB Code 0001).
Technology	Dichotomous	Dummy variable equal to 1 if the director has significant experience in the technology industry (ICB Code 9000).
Telecommunications	Dichotomous	Dummy variable equal to 1 if the director has significant experience in the telecommunications industry (ICB Code 6000).
Utilities	Dichotomous	Dummy variable equal to 1 if the director has significant experience in the utility industry (GIC code 02 / ICB code 7000).
Industry Experience	Count, Discrete	Cumulative number of ICB industries a director has significant experience in. 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.
N APPTS	Count, Discrete	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	Number of new executive director appointments gained at listed companies in NZ.

Appendix II: Human Capital Index

Category and Classification	Score
Director Education – highest degree	**MAX 2**
No Degree	0
Undergraduate Degree	1
Postgraduate Degree or Higher	2
Director Experience – total experience over all boards	**MAX 2**
New Director or 1 years' experience	0
One to three years' experience	1
Four years or more experience	2
Director Expertise – most prestigious board they sit on	**MAX 2**
Currently sitting on an NZX10 Board	2
Currently sitting on an NZX50 Board	1
Currently sitting on non-NZX50 Board	0
CEO experience – have they had prior/current CEO experience	**MAX 2**
CEO of public firm	2
CEO of private firm	1
No CEO Experience	0
International Experience – via sales or work experience abroad	**MAX 2**
International Experience	2
No International Experience	0
M&A Experience – cumulative number of deals involved with	**MAX 2**
3 or more deals	2
1-2 deals	1
No M&A Experience	0
Specialist Skills – either financial or legal expertise	**MAX 2**
Both Financial and Legal Expertise	2
Either Financial or Legal Expertise	1
Neither Financial nor Legal Expertise	0
Professional Directors	**MAX 2**
Yes	2
No	0
Industry Experience – Count of number of ICB level 1 industries they have substantial experience in	**MAX 2**
Per industry	.2

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	2,473	12,211	2,227	2,341	1,501
Unique	108	279	2,432	1,743	271	1,501

This table presents annual summary statistics for the sample of 2,341 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 number of firms and directors in the sample each year, respectively. Column 4 reports the number of unique directors in each year that were appointed by firms. 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 2,341 appointments were to 271 different boards.

Table 2: Descriptive Statistics of Board Appointments

Panel A: Descriptive statistics								
Variable	Obs	Mean	Median	SD	Min	P25	P75	Max
Director Attributes - Prior Year								
DEG_{t-1}	9,620	0.92%	0.78%	0.54%	0.13%	0.62%	1.07%	6.70%
CLO_{t-1}	9,620	10.45%	12.90%	6.93%	0.13%	1.05%	15.73%	26.19%
BET_{t-1}	9,620	0.31%	0.00%	1.11%	0.00%	0.00%	0.00%	18.07%
EIG_{t-1}	9,620	1.26%	0.01%	4.96%	0.00%	0.00%	0.27%	52.92%
AGG_{t-1}	9,620	0.07	-0.24	1.57	-1.78	-0.83	0.31	17.70
HCI_{t-1}	9,620	6.14	6.20	2.67	0.00	4.20	8.00	15.20
FEM_{t-1} (0/1)	9,620	0.08	0.00	0.28	0.00	0.00	0.00	1.00
NZ_{-1} (NZ) (0/1)	9,620	0.72	1.00	0.45	0.00	0.00	1.00	1.00
DIR_{t-1}	9,620	1.24	1.00	0.61	1.00	1.00	1.00	6.00
$DIR+2_{t-1}$ (0/1)	9,620	0.05	0.00	0.22	0.00	0.00	0.00	1.00
Age_{t-1}	5,892	56.17	56.00	9.33	24.00	50.00	63.00	87.00
Appointments								
New Appt (0/1)	9,620	0.05	0.00	0.22	0.00	0.00	0.00	1.00
N Appts	9,620	0.06	0.00	0.26	0.00	0.00	0.00	3.00
Exec Appt (0/1)	9,620	0.00	0.00	0.05	0.00	0.00	0.00	1.00
N Exec Appts	9,620	0.00	0.00	0.05	0.00	0.00	0.00	1.00

This table presents descriptive statistics for the main variables employed in the ordinary least square and logit regression analysis to investigate the relationship between board appointments and director connectivity. Director attributes are measured at time *t-1*. All variables are defined in Appendix I. We report age for descriptive purposes, however, we do not include age in the empirical analysis because the number of observations is only 5,892. We capture experience more fully with the human capital index.

Table 3: Pearson Pairwise Correlations

	DEG_{t-1}	CLO_{t-1}	BET_{t-1}	EIG_{t-1}	AGG_{t-1}	HCI_{t-1}	FRM_{t-1}	NZ_{t-1}	$DIR+2_{t-1}$	New Appt	N Appts	Exec Appt	N Exec Appts
DEG_{t-1}	1												
CLO_{t-1}	0.47	1											
BET_{t-1}	0.71	0.33	1										
EIG_{t-1}	0.44	0.27	0.22	1									
AGG_{t-1}	0.91	0.66	0.80	0.59	1								
HCI_{t-1}	0.33	0.22	0.26	0.07	0.31	1							
FEM_{t-1}	0.02	0.01	0.02	0.00	0.02	0.00	1						
NZ_{-1}	0.00	0.11	0.13	0.01	0.08	-0.16	-0.04	1					
$DIR+2_{t-1}$	0.61	0.23	0.66	0.16	0.59	0.22	0.02	0.11	1				
New Appt	0.12	0.09	0.10	0.05	0.12	0.08	0.03	0.07	0.11	1			
N Appts	0.12	0.09	0.10	0.05	0.12	0.07	0.02	0.07	0.11	0.97	1		
Exec Appt	-0.01	0.01	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.34	0.33	1	
N Exec Appts	-0.01	0.01	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.34	0.33	1.00	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

	Obs	New Appt = 1 (Mean)	Obs	New Appt = 0 (Mean)	Mean Difference		T/z stat
Panel A: Prior year director connectivity							
DEG_{t-1}	507	1.19%	9,113	0.90%	**0.29%**	***	(8.53)
CLO_{t-1}	507	13.10%	9,113	10.30%	**2.80%**	***	(8.99)
BET_{t-1}	507	0.77%	9,113	0.28%	**0.48%**	***	(6.74)
EIG_{t-1}	507	2.40%	9,113	1.20%	**1.20%**	***	(3.91)
AGG_{t-1}	507	0.90	9,113	0.03	**0.872**	***	(8.95)
Panel B: Director attributes							
HCI_{t-1}	507	6.99	9,113	6.09	**0.903**	***	(7.43)
$Female_{t-1}$	507	0.11	9,113	0.08	**0.03**	**	(2.47)
Age_{t-1}	365	55.05	5,527	56.24	**-1.19**	**	(2.40)
New $Zealand_{t-1}$	507	0.86	9,113	0.72	**14%**	***	(7.05)
$Directorships_{t-1}$	507	1.58	9,113	1.23	**0.358**	***	(8.82)
$Directorships+2_{t-1}$	507	0.15	9,113	0.04	**10%**	***	(10.31)

This table reports the social capital, human capital and other attributes for 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 versus directors who were not appointed, and the statistical significance based on a two-tailed two-sample t/z test with unequal variances. ***, ** indicates statistical significance at the 1% and 5% level, respectively. All variables are defined in Appendix I.

Table 5: OLS Regressions for Number of Appointments on Connectivity

	1 N APPTS OLS	2 N APPTS OLS	3 N APPTS OLS	4 N APPTS 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)
ΔAGG_{t-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)
ΔHCI_{t-1}	0.010**	0.010**	0.008**	0.009**
	(2.32)	(2.40)	(1.98)	(2.06)
FEM_{t-1}	0.035**	0.034**	0.033**	0.032**
	(2.42)	(2.45)	(2.31)	(2.31)
NZ_{t-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	7,559	7,559	7,559	7,559
R2	0.031	0.0326	0.076	0.077
Adj R2	0.029	0.03	0.073	0.074
F Stat	8.42	8.86	13.19	13.56
p(F)	0.000	0.000	0.000	0.000
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. 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. ***, ** indicates statistical significance at the 1% and 5% level, respectively. All variables are defined in Appendix I.

Table 6: OLS Regressions for Number of Appointments on the Relative Importance of Connectivity and Human Capital

	1 N APPTS OLS	2 N APPTS OLS	3 N APPTS OLS	4 N APPTS OLS
Constant	0.043***	0.044***	0.040***	0.040***
	(3.69)	(3.69)	(3.45)	(3.46)
LowHCI_LowAGG$_{t-1}$	-0.033***	-0.031***	-0.032***	-0.030***
	(-5.25)	(-4.91)	(-5.33)	(-4.97)
LowHCI_HighAGG$_{t-1}$	-0.008	-0.008	-0.006	-0.006
	(-0.83)	(-0.83)	(-0.61)	(-0.61)
HighHCI_LowAGG$_{t-1}$	-0.005	-0.005	-0.003	-0.003
	(-0.56)	(-0.55)	(-0.35)	(-0.34)
HighHCI_HighAGG$_{t-1}$	0.045***	0.026***	0.046***	0.026***
	(4.89)	(2.70)	(5.11)	(2.84)
FEM$_{t-1}$	0.029**	0.027**	0.029**	0.027**
	(2.31)	(2.33)	(2.33)	(2.32)
NZ$_{t-1}$	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	9,620	9,620	9,620	9,620
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*. 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. ***, ** indicates statistical significance at the 1% and 5% level, respectively. All variables are defined in Appendix I.

Table 7: Logit Regressions for Number of Appointments on Director Connectivity

	1 NEW APPT LOGIT	2 NEW APPT LOGIT
Constant	0.005***	0.005***
	(-14.95)	(-14.95)
AGG_{t-1}	1.146***	1.115***
	(4.90)	(2.92)
ΔAGG_{t-1}	0.989	0.990
	(-0.22)	(-0.19)
HCI_{t-1}	1.153***	1.151***
	(6.12)	(5.97)
ΔHCI_{t-1}	1.154**	1.159**
	(2.11)	(2.17)
FEM_{t-1}	1.843***	1.843***
	(2.98)	(3.04)
NZ_{t-1}	3.487***	3.434***
	(6.89)	(6.79)
$DIR+2_{t-1}$		1.317
		(1.07)
Observations	7,559	7,559
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*, and zero otherwise. Odds ratios are reported representing 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. ***, ** indicates statistical significance at the 1% and 5% level, respectively. All variables are defined in Appendix I.