AUSTRALIAN BOARD COMPOSITION AND PERFORMANCE: META-ANALYSIS AND IMPLICATIONS FOR GOVERNANCE RESEARCH

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Abstract

This paper aims to inform the ongoing emphasis on board structure (Yu, 2023) by reconciling the Australian empirical evidence on firm performance-board structure links. While international findings are instructional, differences between governance systems across nations (Alabdullah et al., 2022; Outa & Kutubi, 2021) highlight the importance of understanding the salient nature of the Australian context compared to the UK and US (e.g., fewer listed companies with lower levels of institutional shareholding, higher agency costs and higher compliance to the prescribed governance practices. Meta-analysis was employed to reach an overall Pearson correlation for the association between firm performance and four board composition characteristics (i.e., board independence, CEO duality, board size, and female ratio on boards). The meta-analysis employed includes all empirical studies that used Australian data to investigate firm performance-board structure links. This research also provides guidance on improved theorizing, measurement, and modelling for boards' research. The results indicate that the correlation between each board's independence, CEO duality, and financial performance is almost zero. Moreover, board size and female ratio on board have a small positive correlation with financial performance. This paper highlights the importance of considering a specific theory and evidence before employing intermediary variables as controls.

Keywords: Australia, Board Composition, Corporate Governance, Firm Performance, Meta-Analysis

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1. INTRODUCTION

Practitioners, regulators, and academics have long theorised that board composition matters to corporate outcomes (ASX Corporate Governance Council, 2019; García-Ramos & Díaz, 2021). Boards' research has predominantly revolved around exploring the connections between the structure of boards and the performance of companies (Pucheta-Martínez & Gallego-Álvarez, 2020).

A prescription for a specific board structure is not, however, strongly supported by research findings. Instead, findings from empirical research into the links between board structure and firm performance are inconsistent. The aim of this study is to use a meta-analysis strategy in an attempt to reconcile the different array of results (i.e., correlation values) reported in prior research pertinent to Australia. Meta-analysis has been used in other national contexts, for instance, in the US three key meta-analyses for board-performance relationship concluded that the true population relationship between board independence and financial performance was near zero (Dalton et al., 1998), at most very small and positive (Rhoades et al., 2000) or curvilinear relationship in which performance is enhanced by the greater relative increase of inside or outside directors (Wagner et al., 1998).

While international findings are instructional, differences between national systems of corporate governance (Outa & Kutubi, 2021) highlight the importance of understanding the nature of any systematic relationship in the Australian corporate governance system leading to the overall research question:

RQ: Does the financial performance of Australian firms correlate with the structure of the board of directors?

Given the absence of evidence on board structure-performance links in corporate Australia, many researchers extrapolate their research conclusions in light of different contexts such as the contingency approach (Capezio et al., 2011), calling for a governance approach that balances the inside/outside presence on boards, the characteristics of the institutional investors, or recommendations for extending boards research to fields of organisational behaviour and social psychology (Kiel & Nicholson, 2003).

Yet despite a lack of empirical evidence supporting board composition policy and guidance, there appear to be significant moves to broaden composition prescriptions in the Australian context to include alternative attributes such as gender (ASX Australian Corporate Governance Council, 2019). This suggests that the assumed importance of board characteristics is likely to continue, and so, a review of the state of evidence and its implications is timely.

The meta-analysis provides a reconciliation to the Australian evidence on the links between firm performance and four key studied characteristics of board structure 1) board independence, 2) CEO duality, 3) board size, and 4) female ratio on board; then, it provides guidance on improved theorizing, measurement and modelling for boards' research. Meta-analysis was utilized to derive an overarching Pearson correlation that captures the relationship between firm performance and each of the four distinct aspects of board composition. This comprehensive meta-analysis encompassed all empirical studies that employed Australian data to explore the connections between firm performance and the structure of boards. The findings from the meta-analysis indicate that Pearson correlation between financial performance and each board's independence, CEO duality, is nearly negligible. Furthermore, there exists a minor positive correlation between financial performance and each of board size and females ratio on boards. Then the results were used to draw a number of implications for the future study of boards of directors. Specifically, this research highlights why using board composition variables provides important measurement and functional challenges for applying and developing theory in a corporate governance setting. Insights into how researchers might address these challenges are provided.

The remaining structure of this paper is as follows. In Section 2, an overview of the theory and the gap to address is provided. Each of the four hypotheses is developed. Section 3 presents the strategy along with the protocol that sets the appropriate method and analysis employed. The results are reported in Section 4, followed by a discussion of the findings in Section 5. Finally, Section 6 concludes the research.

2. LITERATURE REVIEW

The majority of meta-analyses and review articles summarizing the board composition-firm performance link have been based on US data. While this is a useful starting point, there are important regulatory, market, and cultural differences between the US and other nations that mean these results may not be directly transferable (Alabdullah et al., 2022). For instance, the Australian corporate governance system has several important distinguishing features. Outside of financial institutions, Australian listed firms largely follow principles-based compliance or explain the approach to the question of board composition (ASX Corporate Governance Council, 2019). This can be contrasted with the traditional black-letter law approach to board composition requirements taken in the US. While much of the research precedes several of these legislative interventions, the differences in systems highlight differences in underlying philosophies within the two systems. More directly, Australian boards have traditionally followed independence recommendations more closely (Kiel & Nicholson, 2003; Rhoades et al., 2001).

Australian boards have also tended to be smaller than their US counterparts (Nicholson et al., 2004). Further, the difference in market liquidity may mean that board discipline is more important in the Australian context. Moreover, the Australian Securities Exchange (ASX) is considerably small when compared to the US and the UK securities exchange environments, e.g., the ASX includes fewer listed companies and lower levels of total institutional investment (Hsu & Koh, 2005).

In addition, although Australian boards resemble the prescribed governance practice, agency costs in Australian firms have been found to be larger than those evident in US firms (Henry, 2010). Yet, no clear solid evidence has been provided to support board structure-performance links in an Australian context. Given these myriad differences the relationship between board characteristics and firm performance warrants separate investigation in the Australian context.

2.1. Board independence and firm performance

The board of directors is considered the primary internal monitoring mechanism available to shareholders (Fama & Jensen, 1983). Specifically, directors who are independent of management

are thought to provide objective oversight of shareholders' interests (Dalton et al., 2007) as they are free from the potential conflicts of interest likely to plague inside directors. Outsiders are also thought to improve corporate performance through the important service or advice role as they are perceived to have a different knowledge base and network of contacts compared with insiders, thus allowing them to provide novel counsel as well as access supplemental resources to manage external linkages (Pfeffer, 1972).

Within the Australian context, empirical evidence does not support either of the two theories. Some studies report a positive correlation between board independence and firm performance (Le et al., 2022; Elsayih et al., 2021; Galbreath, 2018) while others report negative correlation (Khan & Mather, 2013; Bian et al., 2018). Given the ambivalent direction of the relationship, we hypothesize that:

H1: There is a statistically significant correlation between board independence and firm performance.

2.2. CEO duality and firm performance

CEO duality, where one person holds the role of both CEO and Chair, has been thought to increase the scope for managerial entrenchment (Krause et al., 2022; Le et al., 2023). Alternatively, a unitary structure is argued to provide "a unity of command at the top of the firm, with unambiguous leadership clarifying decision-making authority and sending reassuring signals to stakeholders" (Finkelstein & D'Aveni, 1994, p. 1080).

Internationally, "[t]here is no evidence of substantive, systematic relationships between financial performance and board leadership structure" (Dalton et al., 2007, p. 13). It is noted that CEO duality is notably lower in Australian companies compared to other Anglo systems (Rhoades et al., 2001).

Individual studies in the Australian context provide conflicting findings for the relationship. Several studies report a positive correlation between a separate leadership structure and both accounting-based performance (Enam et al., 2023; Krause et al., 2022; Kiel & Nicholson, 2003; Galbreath, 2018) and market-based performance (Capezio et al., 2011). In direct contradiction, other studies report that CEO duality is positively correlated with accounting-based performance (Bliss, 2011; O'Shannassy & Leenders, 2016) and market-based performance (Kiel & Nicholson, 2003; Adithipyangkul & Leung, 2016). Given the dichotomous correlation direction, we hypothesize that:

H2: There is a statistically significant correlation between CEO duality and firm performance.

2.3. Board size and firm performance

An important consideration for this study was the recognition that national institutional characteristics may affect any systemic relationship between board size and firm performance (McLeod et al., 2021). In Australia, boards are, for instance, smaller than in the US. While most individual studies of US data report a negative association, research in different jurisdictions tends to report a positive association. For instance, data from South Africa (Ntim et al., 2015) and in the Indonesian banking context (Tulung & Ramdani, 2018) all report a positive association.

While the studies of Australian data have often contained limited data, they have reported both positive (Lim et al., 2007; Galbreath, 2018) and negative (Kiel & Nicholson, 2003; Appuhami & Bhuyan, 2015) relationships. Given the competing logic and empirical evidence, proposing that:

H3: There is a statistically significant correlation between board size and firm performance.

2.4. Female ratio on board and firm performance

Board gender diversity emerged around the turn of the century to become, arguably, the board structural variable of most current research and regulatory interest (Elsayih et al., 2021). What is somewhat unusual about this component of board structural research is the widely varied scope of research in terms of both antecedents and consequences of board gender diversity (Kirsch, 2018).

While some argue for increased board gender diversity for individual and social justice reasons (Kumar & Zattoni, 2016); our interest lies in the proposed business case for increasing the proportion of women on boards. The business case relies on the proposition that women serving on boards are substantially different from men, and this difference would bring a variety of benefits to the board decision-making process. First, foundational psychology literature has established that there are substantial differences between men and women at the population level on attributes such as risk profile and values (Adams, 2016). Second, it is anticipated that differing life experiences would bring varied perspectives and different approaches to problems (Anderson et al., 2011). Finally, given the low numbers of women serving on boards, women who are appointed are thought to be less likely to be insiders; hence increasing board independence (Kumar & Zattoni, 2016).

Reviews of the gender diversity literature (Kirsch, 2018) generally conclude that the relationship between women on boards and performance across studies "is inconclusive overall, with different studies finding positive, negative or no effects" (Kirsch, 2018, p. 353).

An important difference in the gender diversity literature lies in the possible differences in national-level effects, for instance, Post and Byron (2015) report the relationship between gender diversity and performance varies systematically with national context. Given the soft and hard regulatory interventions to increase the proportion of women on boards, there has also been substantial research into these national effects. In perhaps the most studied jurisdiction, Norway, the effect of a 40% women quota has led to a reported negative (Ahern & Dittmar, 2012) or no effect (Eckbo et al., 2015). Gender quotas have similarly been associated with a negative or no effect in Belgium, France, and Spain (Comi et al., 2017). Other researchers report a positive effect in Spain (Reguera-Alvarado et al., 2017) and Italy (Gordini & Rancati, 2017).

Given the potential difference that the national context makes, undertaking a synthesis of findings in the Australian system is a worthwhile endeavour. And thus, we propose that:

H4: There is a statistically significant correlation between the female ratio on board and firm performance.

3. RESEARCH METHODOLOGY

This research employs meta-analysis; meta-analysis is a procedure of achieving cumulative knowledge by combining the differing results across all studies on related issues (Hunter & Schmidt, 2004). Meta-analysis produces evidence on a controversial topic and is well suited to a topic whose empirical work, though large, has resulted in different outcomes (Cumming, 2011). Statistically, meta-analysis relies on combining an effect size (ES) (e.g., correlation) reported in a range of comparable studies as a point estimate and develops confidence intervals (CI) as a scale for estimated uncertainty around that point estimate. This research employs the Pearson product-moment correlation coefficient between each of the four board composition characteristics and financial performance.

As an alternative method to answer the overall research question, a large-scale study of all listed Australian firms could have been conducted. Such a study could employ regression analysis over a long period of time (e.g., 10 years) where firm performance is the dependent variable and board structure characteristics are the independent variable of the study.

3.1. Criteria for inclusion and search strategy

To be included in this analysis, a study had to be 1) published by 25 of July 2021, 2) based on Australian data, and 3) include a relevant effect size (i.e., correlation) or data that help obtain the effect size.

The search strategy proceeded in three stages. First, the search strategy started by searching for all studies that investigated board structure in all available databases. This search strategy employed combinations of keywords and terms commonly used in studies that investigated the different aspects of board composition and financial performance. Second, we manually searched the reference lists of the studies obtained in the first stage to locate further studies. Finally, following Post and Byron (2015), we via email contacted authors whose studies investigate the variables of interest but do not report correlations (12 studies), and requested from them the correlation values if they were available; we received eight replies, two of which provided the requested correlation values.

The search process identified effect sizes for 45 studies for board independence-performance; 27 studies for CEO duality-performance; 29 studies of board size-performance; and 11 studies for female ratio on board performance.

3.2. Analysis strategy

Data obtained from the included studies were organized and coded using a Data Abstraction Form (DAF) operationalized in an Excel spreadsheet to improve efficiency, reliability, and aid replication (Chen & Peace, 2013). The form is organized to collate all information required: title of the study, author(s) name(s), year of publication, sample, measure(s) of board composition and corresponding definition(s), leadership structure measure, performance measure(s) and corresponding definition(s), the year to which the data for different variables pertained, coefficient or correlation (measure of the relationship), and control or other variables collected in the study. so that it is readily available when needed. In addition to the time-saving that DAF offers whenever a piece of information is needed, DAF can also be used by future researchers if an update on these current meta-analyses is needed and/or for replication (Chen & Peace, 2013).

Analyses were conducted using Comprehensive Meta-Analysis 2.0 (CMA, version 2.2.027; Biostat; USA — see Borenstein et al., 2006). Since our meta-analytic techniques assume statistically independent samples (Hunter & Schmidt, 2004), a conservative procedures are followed to avoid violating this key assumption.

First, many of the studies identified for inclusion employed multiple measures of performance (e.g., the return on assets (ROA) and market-to-book value of equity (MBE)), multiple research designs (i.e., *cross-sectional design:* where both board independence and performance are measured for time *t*; and *lagged design:* where board independence is measured at time *t*, while financial performance is measured at time beyond time *t*), and/or multiple measures of board independence (i.e., ratio of non-executive directors, and ratio of independent directors). Consistent with Rhoades et al. (2000, 2001), the various estimates reported in any individual study are combined into one estimate by averaging both the sample size and effect size of the multiple measures. For example, if a study reports an effect size of, say, board independence on both ROA and MBE, these effect sizes are combined for the overarching analysis (board independence-performance) but maintain separate measures for the moderator effects. This shifting unit of analysis approach allowed us to retain as much data as possible while avoiding violating independence assumptions (Cooper, 1998).

Second, a data set is only included once when more than one study reported results based on the same data set. Third, following Rhoades et al. (2000, 2001), the number of unique firms associated with a correlation estimate is used rather than the number of firm-year observations as our sample size (e.g., if a correlation estimate reported in a given study is provided for 100 firms over 10 years, the sample size is considered a 100 firms rather than 1000 firm-years).

4. RESULTS

4.1. Board independence and financial performance

There were 45 studies reporting a correlation between independence and performance; a total of 90 correlations in 16,450 Australian firms. The overall meta-analysis indicated a small negative mean correlation between board independence and financial performance: [r = -0.002, with 95% CI (-0.028: +0.024)]. This resultant mean estimate is statistically non-significant ($p > 0.05$) and practically non-significant ($r < 0.10$). Small, medium, and large ESs are, respectively, $r = 0.10$, $r = 0.30$, and $r = 0.50$ (Cohen, 1992, p. 99).

4.2. CEO duality and financial performance

There were 27 studies reporting a correlation between CEO duality and performance; a total of 59 correlations in 9,960 Australian firms. The overall meta-analysis indicated a small negative mean correlation between CEO duality and financial performance: [r = -0.006, with 95% CI (-0.029: +0.016)]. This resultant mean estimate is statistically non-significant ($p > 0.05$) and practically non-significant ($r < 0.10$).

4.3. Board size and financial performance

There were 29 studies reporting a correlation between board size and performance; a total of 60 correlations in 8,720 Australian firms. The overall meta-analysis indicated a small positive mean correlation between board size and financial performance: [r = +0.066, with 95% CI (+0.026: +0.106)]. This indicates that the correlation between board size and financial performance is statistically significant ($p < 0.05$), yet practically non-significant. A positive correlation of 0.066 is associated with just 0.44% of the variation — leaving some 99.56% unexplained.

4.4. Female ratio on board and financial performance

There were 11 studies; 19 correlation estimates; 3,117 Australian firms. The overall meta-analysis indicated a small positive mean correlation between the female ratio on board and financial performance: [r = +0.052, with 95% CI (+0.008: +0.096)]. Despite this statistically significant ($p < 0.05$) result, it is practically non-significant ($r < 0.10$), with the point estimate's lower boundary very close to zero. A correlation of 0.052 is associated with 0.27% of the variation in firm financial performance (i.e., 99.73% of the variation remains unexplained).

4.5. Robustness check

As a robustness check, different methodological approaches to handling "sample independence" and "sample size" are employed. As for "sample independence": whether to combine the various correlation estimates reported in one study into one averaged estimate or to treat each of the various estimates as one "independent sample"; while for "sample size": whether to use a number of firms or a number of firm-years as a "sample size". All different approaches provided similar results for the four aspects of board composition; Table 1 shows these results.

Table 1. Results when employing different approaches to sample size, and independence of sample decisions in the literature

Approach to sample size and independence of the sample	*Board composition characteristics*	*Mean correlation r*	*95% CI*		*P-value*	*Sample size (Total)*
			Lower limit	*Upper limit*		
Results when a number of unique firms is used as a sample size. Multiple correlations from one study are averaged (i.e., combined). Sample size associated with the multiple correlations is also averaged (Rhoades et al., 2000, 2001; Post & Byron, 2015). (The approach employed for this research as it shows in Section 4)	*Board independence*	-0.002	-0.028	+0.024	0.873	16,450
	CEO duality	-0.006	-0.029	+0.016	0.592	9,960
	Female ratio on board	+0.052	+0.008	+0.096	0.020	3,117
	Board size	+0.066	+0.026	+0.106	0.001	8,720
Results when a number of unique firms is used as a sample size. Multiple correlations from one study are analyzed as independent samples (Dalton et al., 1998, 1999; Wagner et al., 1998).	*Board independence*	-0.003	-0.024	+0.019	0.813	33,725
	CEO duality	-0.005	-0.025	+0.016	0.651	21,537
	Female ratio on board	+0.061	+0.022	+0.101	0.002	4,920
	Board size	+0.034	-0.007	+0.075	0.108	19,336
Results when a number of firm year-observations is used as a sample size. Multiple correlations from one study are averaged (i.e., combined). The sample size associated with the multiple correlations is aggregated (Pletzer et al., 2015).	*Board independence*	-0.007	-0.032	+0.018	0.559	117,414
	CEO duality	-0.002	-0.021	+0.016	0.817	62,132
	Female ratio on board	+0.045	+0.011	+0.080	0.011	16,750
	Board size	+0.053	+0.018	+0.088	0.003	72,031

Moreover, to address any potential overrepresentation of those studies with large sample sizes (Hunter & Schmidt, 2004), a "one study removed" analysis was run; the removal of any given study did not affect the results in any meaningful way.

4.6. Moderating effects of measurement differences

Since studies included in the analysis used different measures of the same constructs, measurement differences were a potential concern for validity (Dalton & Aguinis, 2013). Moreover, heterogeneity statistics (i.e., Tau squared (τ^2) and Q-value) from each of the four overall meta-analyses suggested a significant variation in the studies that underlie the resultant mean correlation between performance and each of the four aspects of board composition. As explained in subsection 3.2 above, different moderating analyses based on the operationalization of the different constructs were undertaken.

For the board independence-performance meta-analysis, three key moderating analyses were undertaken based on the operationalization of 1) financial performance measures, 2) board independence measures, and 3) the research design of each study included in the analysis. Yet, for the rest of the three meta-analyses, for each meta-analysis, two key moderating analyses were undertaken based on the operationalization of 1) financial performance measures and 2) the research design of each study included in the analysis.

Most of the moderating analyses provided statistically and practically non-significant results. In the few cases, where the statistical significance was obtained, the results were practically non-significant. Finally, following Rhoades et al. (2000) moderating analyses were run based on a cross-moderation analysis (considering the different moderators together, for instance, moderation of performance measure and study design). Results mostly reflected those for the overall meta-analysis and the individual moderators' analyses.

4.7. Conclusion for hypotheses of the study

Results indicate that *H1* and *H2* are not supported. Moreover, results do not provide strong support for *H3*; however, researchers would be wise to consider the use of board size when employing accounting-based measures of firm performance. Finally, given the few studies included for female ration-performance analysis, any support for *H4* is weak and so there is insufficient evidence to support *H4*.

5. DISCUSSION

5.1. Theory, modelling, and board composition studies

The failure to identify relationships embedded in the literature suggests a series of fundamental concerns: 1) Is the nature of the relationship between constructs misspecified? and/or 2) Is there too great a measurement error in current research efforts? and/or 3) Are contingencies inhibiting the identification of the relationship? and/or 4) Is the theory used wrong?

It is noted that most quantitative governance research provides little detail on the theoretical reasoning for the nature (or shape) of the relationship between board composition and firm performance being modelled. Most studies use a single theory to suggest a simple approach where more of variable *A* is associated with more (or less) of variable *B*; for instance, the classical agency argument is operationalized such that greater independencies are thought to lower agency costs and so better financial performance. At best, some researchers perform a log transformation of one or both variables, with little *theoretical* justification. Board composition studies using linear predictions run the risk of ignoring other important effects of the variable on *different* board roles that may result in quite different, non-linear relationships. For instance, Brown et al. (2017) provide evidence of a classic curvilinear relationship between board tenure and investor reaction based on opposing theoretical impacts of tenure on firm performance. Synthetic theoretical articles highlight the possible opposing (Nicholson & Kiel, 2004) or reinforcing effects of board roles on firm performance. Even when examining a single role, it is suspected that a re-examination of the theoretical roots of governance studies may provide additional insights into the nature of composition-performance relationships. For instance, a close reading of Fama and Jensen's (1983) classic treatise on agency theory highlights they did not advocate for a simple linear relationship between independent directors and firm performance. Instead, they expected "the board … to include several of the organization's top managers… [who can be] protected from reprisals from other top managers" (Fama & Jensen, 1983, p. 314). Even the log-form relationship may not capture a possible drop-off in effectiveness as independence acts to crowd out the positive effects provided by inside information evident in executive directors.

A separate but related issue arises in specifying the relationship and measurement of constructs when researching multi-level phenomena. Commentary is increasingly highlighting the multi-level nature of governance research (Dalton & Dalton, 2011) and our nascent understanding of the individual-group connection for the board of directors' research is likely inhibited by simple modelling of quite complex relationships. In the case of traditional board composition studies, there is often minimal explanation about the relationship between individual-level attributes (e.g., director independence), the group-level measure (e.g., board independence), and the translation that occurs in any expected composition-performance relationship. It would seem questionable to assume that any such transformation (from individual to group) would be linear itself and then also linearly related to a firm-level dependent variable.

The lack of emphasis on the multi-level nature of boards-of-directors research is somewhat surprising given the rich literature investigating group composition effects more generally, for instance, the extensive literature on group process loss (Steiner, 1972). At one level, it is symptomatic of a general disconnect between the findings in groups literature and the overarching direction of the governance literature. For instance, four separate meta-analyses or reviews (Bell et al., 2011; Horwitz & Horwitz, 2007; Jehn et al., 2008) all report no robust evidence of a relationship between group gender diversity and a wide range of group performance measures. This would suggest a need for a very strong theoretical reason for expecting a different result in a governance setting. A further result of this inattention is that where well-known effects are present, they are likely to be misspecified. Take the well-known sociological effect of social loafing (or free-riding for those economists), which suggests that "people exhibit a sizable decrease in individual effort when performing in groups as compared to when they perform alone" (Latané et al., 1979, p. 822). While broadly acknowledged as a well-supported group-level effect, social loafing appears to be quite contextual/contingent in nature and often adheres to what would best be modelled as a log effect (Karau & Williams, 1993). This would be quite complex to apply in a governance study. Despite this complexity, it is needed to better understand the precise way we think the individual attributes will contribute or coalesce to produce a group outcome to advance the field. Emerging areas of interest such as fault lines research (Lau & Murnighan, 1998) may be particularly useful in developing our understanding of how individual-level attributes transfer to group-level effects in important but non-linear ways and provide us with new measures or relationships in future work.

5.2. Measurement, data ranges, and implications for board composition studies

A separate but important issue that may be inhibiting our understanding lies in the nature of measurement and data that is employed by governance researchers. The most significant researcher-led decision made during this study was how to treat the broad range of measures used to study the same theoretical constructs — which should be included in the analysis and which omitted? This is not a new problem for the field. Nearly 25 years ago Daily et al. (1999) identified "over two dozen operationalizations" of board independence and their confirmatory factor analysis of these measures suggesting the range of "operationalizations do not constitute a single construct". It should not be discouraged by this challenge as measurement is a tricky issue facing both management scholars and social scientists in general. For instance, Cote and Buckley's (1987) meta-analytic review of 70 studies in the social sciences suggested that "[m]easurement error, on average, accounts for most of the variance in a measure" (p. 317). Similarly, Boyd et al.'s (2005) classic review of methodological issues facing the strategic management field highlighted that "there has been little emphasis placed on measurement concerns … our replication study demonstrates the consequences of this inattention — including the underreporting of effects and potential for Type II errors" (p. 250). If the measures employed are largely noise and little attention is paid to measurement validity, it would come as no surprise that a robust relationship between board composition and firm performance is not detected. Changes in this area are vital to advancing the field but will require significant effort. As a discipline, what is needed is a greater emphasis on construct validity and measure reliability and this will likely require us to rely less on measures used in the literature and more on the development of appropriately tested indexes and scales (Boyd et al., 2005).

Samples included in this research are highly skewed and likely exhibit floor or ceiling effects which can become particularly problematic when trying to identify linear relationships. For instance, historically only some 8.3% of directors were women as recently as 2009 (Irvine, 2016), thus making it highly unlikely there will be substantial variation in board-level gender diversity measures. Without a broad variation in the construct of interest, it becomes even more important to have precision in measurement and thoughtful reflection when specifying the anticipated nature of any relationship. These patterns of data distribution are common in board-level variables analysed here (board independence, CEO duality, and board size) most often being highly skewed.

5.3. Deep thinking and novel approaches: A potential path forward

Table 2 provides a summary of some key questions researchers may choose to consider when conducting or reviewing a board composition study. They are designed to focus the researcher on the specific measurement and modelling assumptions that all too often go unasked.

Table 2. Sample methodological questions for board composition research

	Measurement challenges		*Functional challenges*		
	Noisy data	***Floor/Ceiling effects***	***Nonlinear relationship***	***Individual-group measurement***	***Contingency/Context effects***
Applying extant theory	• How well supported is the relationship in the literature? • What was the effect size in other research? • What measures appear accurate in other literature, and what evidence is there for this accuracy?	• Were there any challenges with floor or ceiling effects in extant literature? • Is there enough variation in boardroom data (does it match variation in extant non-board research)?	• What is the nature of the relationship in the extant literature? • What is the level of support for this relationship? • How would this relationship apply to the variation expected in the IV-DV measures?	• Does the extant theory apply at the group or individual level? • Does the application match the theory? • If not, is there a reason I think it should apply? • What are the assumptions behind this?	• How generalizable is the used theoretical application? • What is different about boards — would this affect the theory? • What assumptions could be made in applying the theory? • Are there any expected variations in the board's context? • Is there another performance effect of the variables used?
Developing new theory	• Is the effect size likely to be sufficiently large to detect? • Are the measures accurate enough?	• Does the new theory suggest the sensitivity of the DV to the IV — a likely effect size? • How likely it is to get a variation on the IV?	• Are there theoretical reasons for non-linearity? • How this relationship would be specified in a model?	• Is my theory group or individual level in focus? • If levels are crossed, how is this reflected in my model? • Have the individual-group measurement issues been considered? • What is left unsaid in my theoretic logic?	• How generalizable is the theory proposed? • What issues of context or contingency might matter? • How to control or adapt these? • Will other roles/theories interact with the mechanism studied?

We believe new approaches for studying phenomena of interest exist. For instance, Tuggle et al. (2010) provide an interesting case for quantitative studies of boardroom composition effects and their approach directly addresses several of the issues we raise.

1. Tuggle et al. (2010) reduce the problems associated with noisy data by accessing data closer to the phenomenon of interest (i.e., they access primary data from the boardroom).

2. The study focuses on an intermediary outcome (discussion of entrepreneurial issues) rather

than a distal and highly noisy outcome such as firm financial performance.

3. The authors specify quite complex relationships, including fault lines that result from the multi-level nature of the board's work.

6. CONCLUSION

A valid meta-analysis hinges on the inclusion of all studies conducted regarding the relationship being studied (Hunter & Schmidt, 2004). One well-recognized form of bias that can affect this process is referred to as "publication bias", as defined by Hunter and Schmidt (2004). Publication bias occurs when published studies, as opposed to unpublished ones, tend to predominantly exhibit statistical significance (Rosenthal, 1979) and more substantial practical importance (Rosenthal & Rubin, 1982). To illustrate, if the academic publishing process tends to favor research results that reject the null hypothesis, a major concern in any meta-analysis is the potential for publication bias. This bias could lead to an overrepresentation of datasets reporting statistically significant results, inadvertently omitting non-significant findings (Rosenthal, 1979; Cumming, 2011). A similar issue arises regarding practical significance when academic publishing tends to favor results with larger effect sizes (Rosenthal & Rubin, 1982).

There are several concerns related to publication bias. Firstly, there is the worry that my search may have missed out on studies that are actually relevant to the topic. Secondly, there is the issue that some of the studies we did find may not have reported their correlation results. It is possible that the authors of these studies calculated correlations for their analysis, but these values are not accessible because they were not included in the published versions of the studies. Lastly, when it comes to publication bias, there is a chance that some pertinent studies with the desired correlation might not have been published because their results were not statistically significant. This phenomenon is often referred to as the "file drawer" effect (Rosenthal, 1979).

Government, business, and the community continue to be interested in the role of boards in overseeing corporations. Governance structures and board demography are seen by regulators and practitioners, such as institutional investors, as important influencers of corporate outcomes. The results from this study indicate that there is no association between firm performance and each of board independence and CEO duality. In addition, there is a very small positive association between firm performance and each board size and female ratio on board.

The results from this research findings indicated that there is no link (i.e., correlation) between the independence attributes of Australian boards (such as board composition and leadership structure) and firm performance. If we assume that the correlations sampled in the meta-analysis represent the broader population of correlations between board independence traits and firm performance, we might conclude, in accordance with international meta-analysis evidence (Dalton et al., 1998; Rhoades et al., 2000, 2001), that the actual population of such correlations is close to zero.

Such a no-relationship argument challenges the validity of existing theoretical frameworks for board structure, such as agency theory and stewardship theory. It prompts a call for the development of a new theoretical framework addressing board structure and performance. However, the most prominent recent development in this theoretical realm, the contingency approach to boards (Muth & Donaldson, 1998), does not offer a clear framework on how board structure may influence performance within the specific context of firms' needs.

The results from this study must be taken cautiously as the absence of evidence for the current investigated association should not be interpreted as evidence for the absence of association. These presented results from four separate meta-analyses generated little insight to guide policy or practice. Instead, the results suggest that any such relationships are likely nuanced and contingent.

The floor effect indicated in subsection 5.2 highlights three important implications for future research into boards and corporate governance:

1. Further investigations into the association between the board structure of Australian firms and other variables (e.g., performance) might be misleading, at least given the current level of board characteristics of Australian firms. However, future research may consider employing purposive samples within which enough variation in board structure variables is present and investigating the association between board structure and non-financial performance measures (competitiveness, sustainability, etc.).

2. The documented results from the performance measure moderating analysis have implications for research into the interactions between the different aspects of board structure. Thus, along with controlling for performance measures, board structure might need to be measured by a combination of different aspects of board structure (e.g., board independence and board leadership structure) rather than individuality.

In summary, the findings of this study raise the level of questioning the validity, or at least the adequacy, of one single theory (e.g., agency theory) in explaining how board structure impacts performance.

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