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Meta-Analytic Evidence for Board Characteristics as Correlates of Firm Performance Among Saudi Arabian Businesses

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Abstract

Despite the steadily increasing volume of indexed studies on the critical importance of a board of directors towards firm performance, our understanding of their relationships at national levels remains unsettled and unsystematised. This is especially true of studies from geo-cultural niches like the Gulf Cooperation Council (GGC), of which Saudi Arabia is the dominant economy. To advance our understanding and synthesise the relevant literature, this study meta-analysed the extant studies on the board characteristics–firm outcomes relationships found among Saudi Arabian firms. Using a sample of 336 businesses and 2,098 firm-year observations, the study concluded that although the overall effect is small, the relationship between board characteristics and performance outcomes among Saudi firms is generally positive (z = 3.98, p <.001). The meta-analysis provides evidence for the correlation between several board characteristics (e.g., board size, board activity, board independence) and various firm performance metrics (e.g., return on assets, return on equity, Tobin's Q, and share price) at the national level while noting the deviations from this norm.

Keywords: Board Characteristics, Firm Performance, Saudi Arabian Businesses, Meta-Analysis.

Introduction

Several recent meta-analyses (e.g., Makkonen, 2022; Prashar and Gupta, 2021; Rhoades *et al.*, 2000; Zubeltzu-Jaka *et al.*, 2019) have highlighted the central role of board composition in corporate governance. Antwi *et al* (2021); Parente and Filho (2020) observed that a board of directors is one of the most studied constructs in corporate governance research as an antecedent of several important business outcomes. Six meta-analytic reviews show that gender, size, independence, and director status are some of the most commonly used indicators of board characteristics (Deutsch, 2016; Endrikat *et al.*, 2020; Makkonen, 2022; Prashar and Gupta, 2021; Sierra-Morán *et al.*, 2021; Zubeltzu-Jaka *et al.*, 2020). The importance of these board characteristics is usually tied to their relationship with firm

performance. To this end, several meta-analyses (Dalton *et al.*, 1998; Post and Byron, 2015; Prashar and Gupta, 2021; Rhoades *et al.*, 2000; Essen *et al.*, 2011) and reviews (Brogi and Lagasio, 2019; Fernandes *et al.*, 2018; Finegold *et al.*, 2007; Herrera-Echeverri *et al.*, 2018; James, 2020) have provided compelling evidence in favour of a positive relationship between board characteristics and firm performance.

However, while the meta-analyses and reviews mentioned above collectively provide a worldwide synthesis of the extant knowledge on board characteristics as correlates of firm performance, the global reach of the studies may mask characteristics and effects critical to the understanding of the relationships at regional or national levels. Indeed, several reviews (e.g., Nakata and Sivakumar, 1996; Srivastava *et al.*, 2020; Xu *et al.*, 2016) have drawn the attention of researchers to the relevance of culture on the performance of businesses. Researchers have responded to this need. For example, the "significant differences in board characteristics between the Chinese and Western contexts" (Liu and Fong, 2010, p. 163) motivated Liu and Fong (2010) to conduct their studies. Culture also plays a determining role in a firm's performance profile (Tan, 2019). Because of these imperatives, this study meta-analysed the relationship between board characteristics and firm performance at the national level, taking studies on Saudi Arabian businesses as samples to synthesise the correlations reported among the variables. The following research question guided the meta-analysis:
RQ: Do board characteristics correlate with firm performance among Saudi Arabian businesses?

Methods

The meta-analytic procedure suggested in Mikolajewicz and Komarova (2019) was followed. The four-step procedure consists of formulating a research question, identifying relevant literature, extracting the effects sizes (data), and analysing data. The first step has been addressed in the introduction. The second and third steps centred on systematic literature review and data extraction. The final step focused on effect size analysis, which was performed using Jamovi 2.3.9 (The Jamovi Project, 2022).

Data Collection

The search for and selection of relevant studies were conducted in the Web of Science (WoS) and Scopus databases. The search and selection activities were conducted on the 20th of May 2022 based on the PRISMA 2020 guidelines (Page *et al.*, 2021). The PRISMA 2020 was followed in part to minimise publication bias during the study selection process (Knobloch *et al.*, 2011). Two search strings were used in the study identification: *"board of directors" OR "board characteristics" OR board (topic) AND "saudi arabia" (topic) AND "firm performance" OR "firm value" OR "firm effectiveness" OR "organi*ational effectiveness" OR "board effectiveness" (topic)* (Scopus) and *TITLE-ABS("board of directors" OR "board characteristics" OR board) AND TITLE-ABS("saudi arabia") AND TITLE-ABS("firm performance" OR "firm value" OR "firm effectiveness" OR "organi*ational effectiveness" OR "board effectiveness")* (WoS). The initial 56 documents found using these two search strings from both WoS and Scopus were ultimately trimmed down to the 14 journal articles included in the study. The procedure and descriptions of the relevant stages are illustrated in Figure 1.

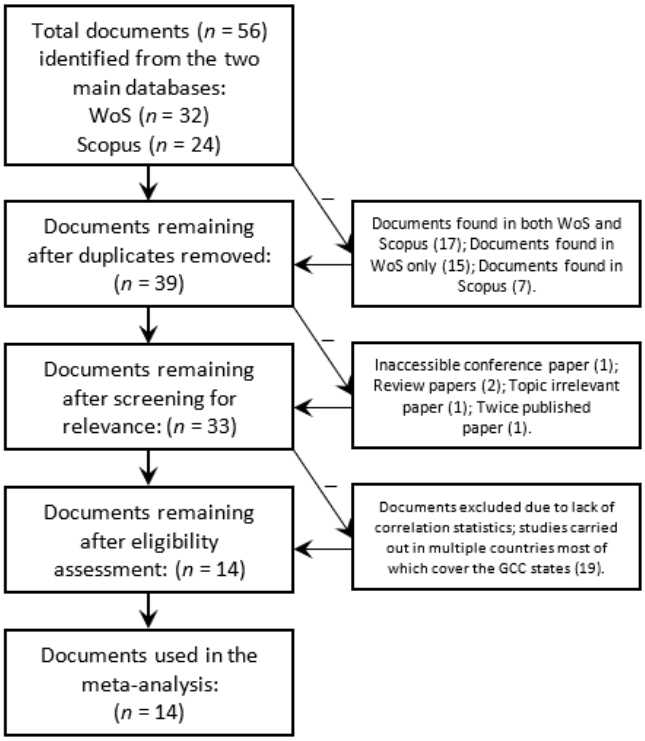


Figure 1. Study Selection Process

The data collected from the studies are correlation statistics (effect sizes, the raw data for meta-analysis) and sample sizes. Table 1 shows the studies included and the samples they contained. The Table shows that some of the studies provided the number of companies studied (samples) and the firm-year observations, while others only provided either. This study used "number of companies studied" only where firm-year observations were not provided. It is noteworthy that some of the studies involved multiple performance outcomes and or multiple board characteristics together with the relevant effect sizes. The multiple effect sizes from such studies were distinguished by adding numbers (1, 2, …, *n*), yielding 43 samples. All studies were carried out in Saudi Arabia.

Table 1
Studies Used in the Meta-Analysis

SN	Studies	Sample	FYO	*n*
1.	Al Nasser (2020)	99	491	491
2.	Al-Dubai *et al* (2015)	75	375	375
3.	Al-Faryan (2021)	126	NA	126
4.	Aljaaidi *et al* (2021)	NA	195	195
5.	Aljaaidi and Hassan (2020)	4	56	56
6.	Almoneef and Samontaray (2019)	48	NA	48
7.	Al-Matari (2022)	44	195	195
8.	Bazhair (2021)	7	NA	7
9.	Buallay *et al* (2017)	171	513	513
10.	Habtoor (2021)	12	NA	12
11.	Habtoor (2020)	NA	93	93
12.	Hamdan *et al* (2019)	131	NA	131
13.	Omer *et al* (2020)	NA	180	180
14.	Sulimany *et al* (2021)	12	NA	12

FYO = firm-year observations; NA = Not available; *n* = Sample used.

Data Analysis

A total of *k* = 43 correlation coefficients from 14 studies were included in the analysis. Studies with more than one effect size (correlation coefficient) are marked by adding numbers to the author names. The Jamovi 2.3.9 (MAJOR – Meta-Analysis module) was used in this study to perform the Fisher *r*-to-*z* transformation and Q-test, calculate the I^2 statistic and fail-safe number, and determine the outliers and/or influential observations (The Jamovi Project, 2022). A recent review of several meta-analytic software placed Jamovi ahead (Eser and Aksu, 2022). Jamovi is an amazingly easy-to-use statistical software increasingly used by researchers [e.g., Konig *et al* (2022); Vieira *et al* (2021)] to execute core statistical procedures and carry out tests (Sahin and Aybek, 2019).

The analysis was carried out using the Fisher *r*-to-*z* transformed correlation coefficient (Fisher, 1915) as the outcome measure. A random-effects model was fitted to the data. The amount of heterogeneity (i.e., τ^2) was estimated using the restricted maximum-likelihood estimator (Viechtbauer, 2010). In addition to the estimate of τ^2, the Q-test for heterogeneity (Cochran, 1954) and the I^2 statistic (Higgins and Thompson, 2002) are reported. In case any amount of heterogeneity is detected (i.e., $\tau^2 > 0$, regardless of the results of the Q-test), a prediction interval for the true outcomes is also provided. Studentised residuals and Cook's distances are used to examine whether studies may be outliers and/or influential in the context of the model (Cook and Weisberg, 1982). Studies with a studentised residual larger than the 100 x (1 - 0.05/(2 X k))*th* percentile of a standard normal distribution are considered potential outliers. Studies with a Cook's distance larger than the median plus six times the interquartile range of the Cook's distances are considered to be influential. The rank correlation test and the regression test, using the standard error of the observed outcomes as predictors, are used to check for funnel plot asymmetry (Sterne *et al.*, 2011).

Results and Discussion

Board Characteristics and Firm Performance Metrics Used in the Study

Board characteristics is a construct operationalised by several elements. In their meta-analysis, Endrikat *et al* (2020) used the most commonly studied elements: board size, board independence, female board representativeness, and CEO-Chair duality. This study found eleven (11) board characteristics elements in the included studies, as shown in Table 2. Similarly, firm performance is also operationalised using several proxies broadly classed into financial (objective) and non-financial (subjective) groups (Dawes, 1999). The included studies in this meta-analysis measured firm performance using the four financial metrics, including return on assets (ROA), return on equity (ROE), Tobin's Q and Audit committee effectiveness, as indicated in Table 2.

Table 2
Operationalisation of Study Variables

Variables	Defining Elements
Board Characteristics	Board Composition; Board Size; Board Activity/Meeting; Independent Directors; Board Competence; Family Board Members; Board Independence; Executive Board Members; Non-Executive Board Members; Royalty on Board; Family Representation.
Firm Performance	Return on Assets (ROA); Return on Equity (ROE); Tobin's Q; Share Price.

Outliers and Influential Case Diagnostics

An examination of the studentised residuals revealed that one study [Al-Matari (2022)3] had a value larger than ± 3.2479 and, according to the 3 *SD* rule (Welc and Esquerdo, 2018), may be a potential outlier (see Figure 2a) in the context of this model [i.e., using a Bonferroni correction (Curtin and Schulz, 1998) with two-sided alpha = 0.05 for *k* studies included in the meta-analysis]. This result is confirmed in the Q-Q plot with the outlier circled in red (Appendix 1). The other 42 cases in the model showed studentised residual values within the acceptable ± 2.000 limits (see Figure 2a). Also, one study [Al-Matari (2022)3] could be considered to be overly influential according to Cook's (1977) distances (see Figure 2b).

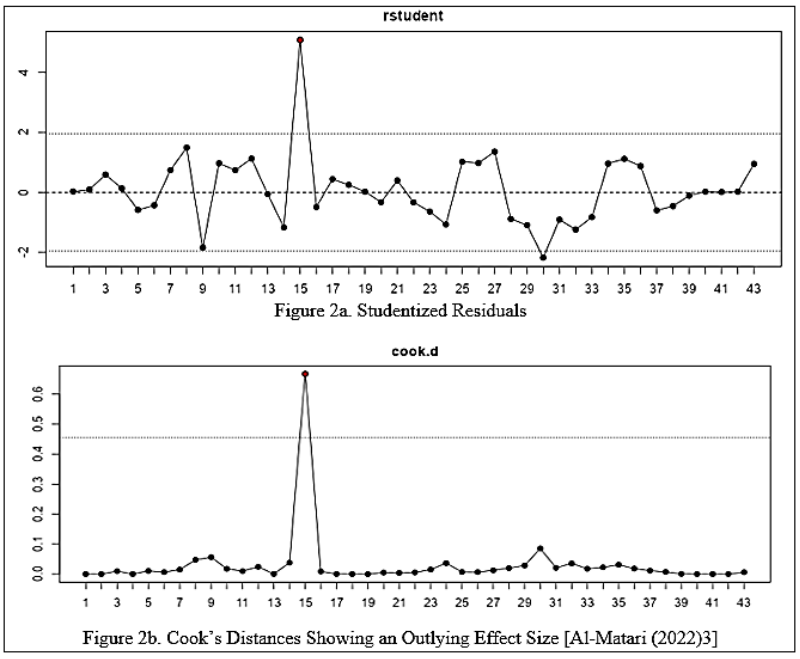


Figure 2a. Studentized Residuals

Figure 2b. Cook's Distances Showing an Outlying Effect Size [Al-Matari (2022)3]

Figure 2. Outlying and Influential Case Diagnostics

Publication Bias

According to Dickersin (1990), publication bias arises due to the tendency among researchers and publishing outlets alike to favour the publication and dissemination of results with positive outcomes, thereby leading to the preponderance of positive studies in the literature. These adverse research tendencies may affect meta-analyses by tilting the meta-analytic outcome favouring positive outcomes (Song *et al.*, 2009). In this study, we tested for publication bias using Kendall's (1938) Tau test and Egger's (1997) test for funnel plot asymmetry, adjusted based on the trim and fill method (Duval and Tweedie, 2000). The results revealed that neither the rank correlation (p = 0.533) nor the regression test (p = 0.060) indicated any funnel plot asymmetry, as depicted in Figure 3. The funnel plot met the > 10 studies required to make valid inferences (Sterne *et al.*, 2011). The statistics are given in Appendix 2, together with the fail-safe number calculated using Rosenthal's (1978) approach.

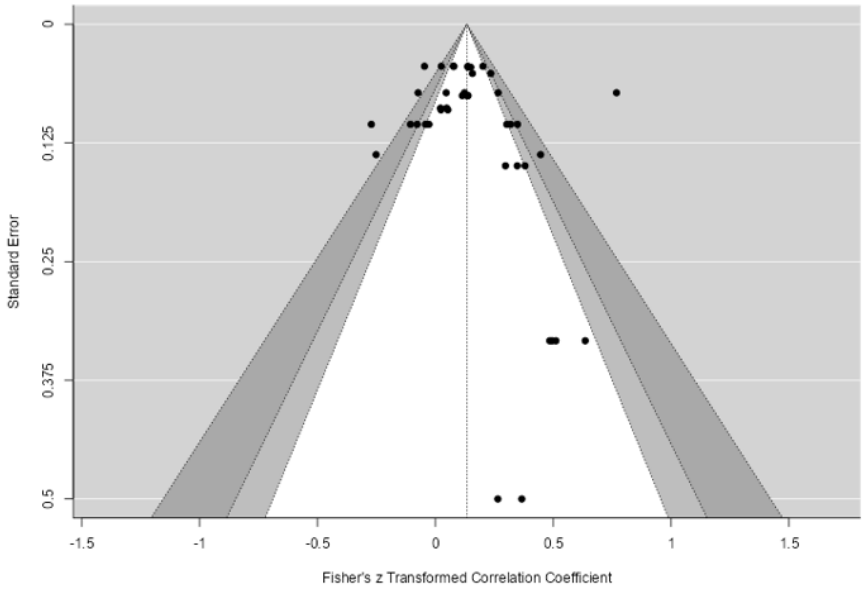


Figure 3. Contour-Enhanced Funnel Plot of Fisher's *z* Transformed *r*

Meta-Analytic Model Test

The meta-analytic test revealed that the observed Fisher *r*-to-*z* transformed correlation coefficients ranged from -0.2715 to 0.7684, with the majority of estimates (79%) being positive. As shown in Table 3, the estimated average Fisher *r*-to-*z* transformed correlation coefficient based on the random-effects model was $\hat{\mu}$ = 0.1335, *p* <.001 (95% CI: 0.0746 to 0.1925)., The model fit statistics in this study (Appendix 3) are acceptable, according to Burnham *et al.*'s (2010) criterion where Δ is in the 2–7 range. The average outcome differed significantly from zero (*z* = 4.4427, p < 0.0001). Further, according to the Q-test, the true outcomes appear to be heterogeneous (Q_{38} = 192.9224, *p* < 0.0001, τ^2 = 0.0272, I^2 = 83.2843%), meaning that the effect sizes of the included studies vary significantly. A 95% prediction interval for the true outcomes is given by -0.1949 to 0.4620. Hence, the study concludes that although the average outcome is estimated to be positive (*z* = 3.98, *p* <.001). Nevertheless, the pooled effect size and the pooled confidence interval of the random effect model (0.13 [0.07 to 0.19]) are statistically significant.

Table 3
Random-Effects Model (k = 38)

					Confidence Interval	
Intercept	**Estimate**	**SE**	***z***	***p***	**Lower Bound**	**Upper Bound**
	0.1335	0.0340	3.98	<.001	0.0746	0.1925

Note. T^2 Estimator: Restricted Maximum-Likelihood

However, an examination of the forest plot (Figure 4) indicates that Bazhair (2021); Bazhair (2021); Habtoor (2021); Habtoor (2021); Habtoor (2021); Sulimany *et al* (2021) have wider 95% confidence intervals, meaning that the studies have less precision than the others. The predictors in these studies were board size and family-member board membership. This suggests interrogating the reliability of these variables as direct predictors of firm performance, or the relationship could be resolved by introducing moderating variables as other studies using the same predictors returned significant correlations. Another issue

regarding Sulimany *et al* (2021) may be the tenuous association between board size and share prices.

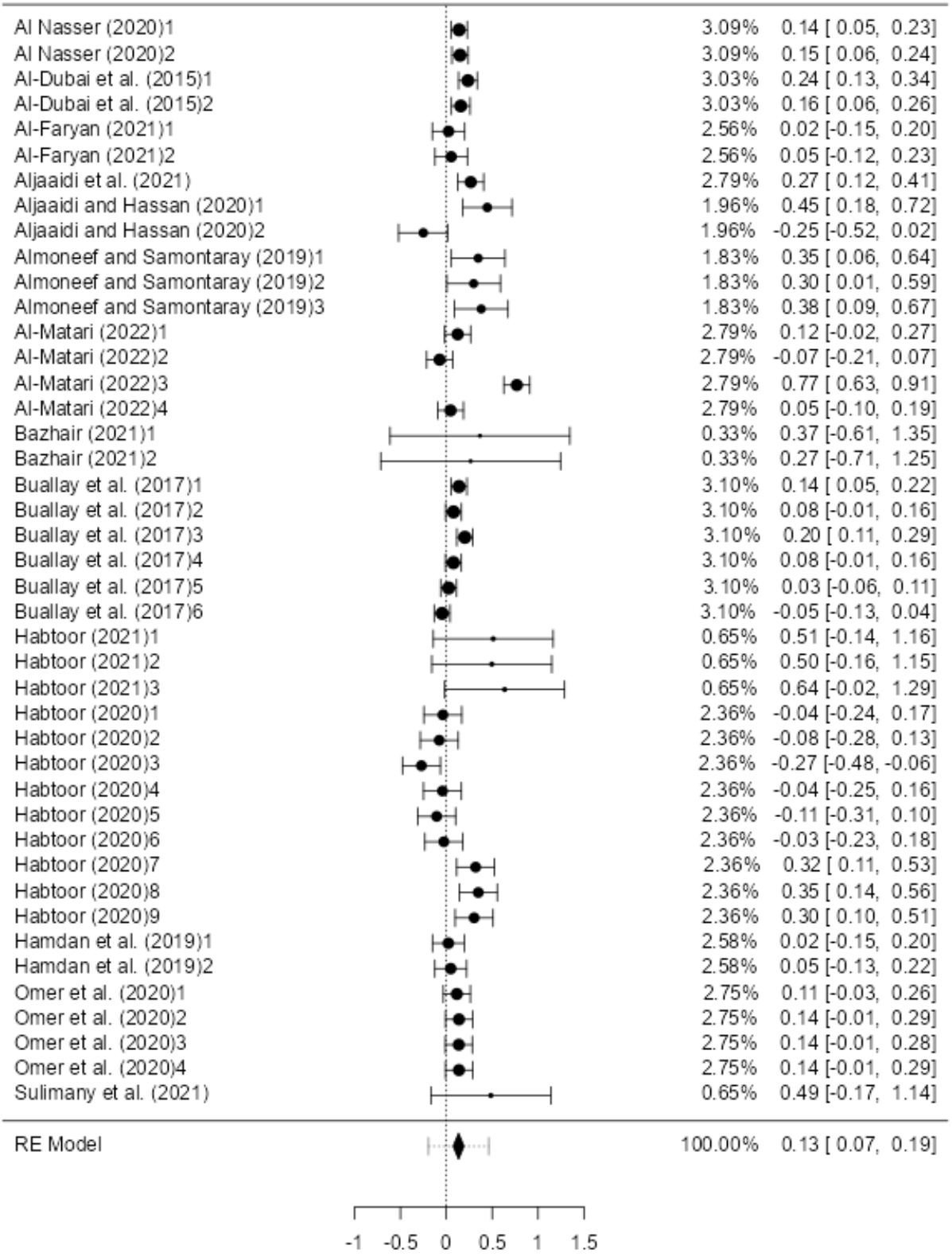


Figure 4. Forest Plot

Evidential Value

In the words of Carbine and Larson (2019, p. 320), "a set of studies is said to contain evidential value if it is more likely that significant results are due to a true underlying effect as opposed to selective reporting, as indicated by a p-curve analysis". The forest plot (Figure 4) indicates that in 15 studies, the correlations between board characteristics and firm performance were positive and significant. Only one study Habtoor (2020)3) returned a negative but significant relationship between board independence and firm performance measured using Tobin's Q. These results were depicted in the *p*-curve plot (Figure 5). The observed *p*-curve includes 16 statistically significant ($p < 0.05$) results, of which 15 are $p > 0.025$. There were 27 additional results entered but excluded from *the p*-curve because they were $p > 0.05$.

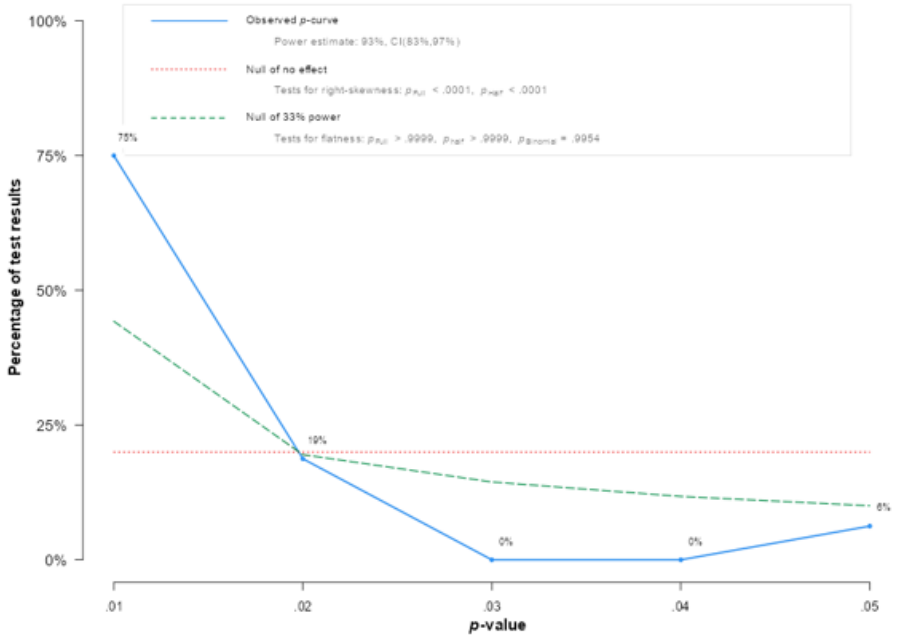


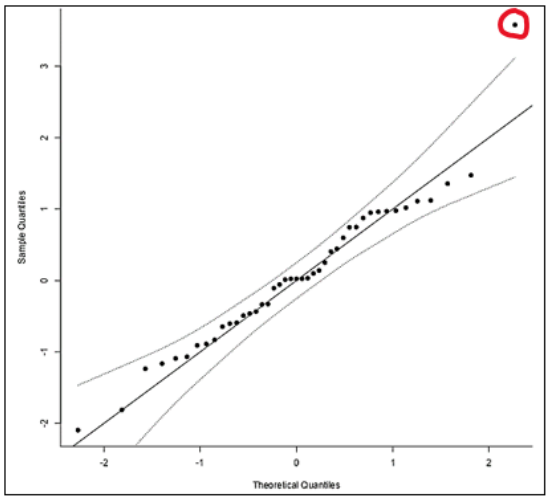
Figure 5. *p*-Curve Plot

Conclusion

In this study, we systematically reviewed evidence from previous studies conducted in Saudi Arabia on the impact of board characteristics on the performance outcomes of Saudi businesses. The outcomes of the systematic literature review were meta-analysed to establish the overall effect board characteristics and firm performance using correlation coefficients as effect sizes and the number of firms/firm-year observations as the sample. Our study included 336 businesses and 2,098 firm-year observations from fourteen Saudi Arabian studies. The outcome revealed that although the overall effect is small, the relationship between board characteristics and performance outcomes among Saudi firms is generally positive.

However, the study also showed that several studies, especially ones with wide confidence intervals, are negative, and they accounted for most of the heterogeneity in the study. Accordingly, it is recommended that future studies capture more of the other elements of board characteristics and firm performance and compute and compare separate meta-analyses for positive and negative correlations.

Appendix 1. Q-Q Plot



Appendix 2. Publication Bias Assessment

Test Name	Value	*p*
Fail-Safe N	1707.000	<.001
Begg and Mazumdar Rank Correlation	0.069	0.533
Egger's Regression	1.881	0.060
Trim and Fill Number of Studies	8.000	.

Appendix 3. Model Fit Statistics and Information Criteria

	Log-Likelihood	Deviance	AIC	BIC	AICs
Maximum-Likelihood	6.278	107.781	-8.556	-5.033	-8.256
Restricted Maximum-Likelihood	5.573	-11.146	-7.146	-3.670	-6.838

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