

Board size and performance of small firms: a meta-analysis

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ABSTRACT

The extant literature has reached no consensus on the correlation of board size and performance in small firms. We applied a HOMA meta-analytic procedure based on 29 empirical articles, representing a maximum of 151 effect sizes and total of 279194 firm-year observations. Contrary to the literature for large corporations, we find a positive correlation between board size and firm performance. To count for methodological and multi-measure heterogeneity, we applied a Feasible Generalised Least Squares (FGLS) estimator in the Meta-analytic regression. Regression results show that four publication-related mediating factors, eg. published or not, cross-sectional or panel data, and survey or secondary data. Such findings can be used for the estimation of effect size between board size and performance in future research.

KEY WORDS

meta-analysis, board size, financial performance, small firm, FGLS

INTRODUCTION

Does “good corporate” principles and practice in the large listed companies apply to their smaller counterparts (Organisation for Economic Co-operation and Development. 2006; McCahery and Vermeulen 2008)? McCahery and Vermeulen (2008, p. 2) submitted that, though corporate governance reforms intends to address specific issues facing large corporations, government agencies and other external stakeholders are putting enormous pressure on small non-listed firms, requiring the non-listed firms to abide by the same requirements of the listed corporations, in order to be ascertained that the internal governance mechanisms of non-listed firms are of high reliability so that they can deliver information pertinent to the business performance on a timely manner. Such tall orders make small non-listed firms losers of the “corporate governance reform competition”, given their resource constraints. Worse still, the “one size fits all model” adopted by most of the corporations’ law frameworks and the “comply or explain” mentality incurred significant amount of

unnecessary compliance burdens to small businesses¹ (Clarke 2010; Clarke and Klettner 2010; Adams, Armstrong et al. 2011). Failing to adopt the corporate governance principles may jeopardise entrepreneurship and long-term economic growth, limiting the financing options on the equity and debt markets and intimidating the small firms from going IPOs or climbing to upper levels on the business life cycles (Filatotchev, Wright et al. 2006; McCahery and Vermeulen 2008; Filatotchev and Nakajima 2010).

Of all the corporate governance mechanisms, boards of directors have received much attention in the media and business community, in particular, board composition and board size (Adams, Hermalin et al. 2008; Brown, Beekes et al. 2011; van Essen, Oosterhout et al. 2012). However, a confirmative answer for the relationship between board size and performance of small firms is yet to be established. The widely cited negative relationship between board size and performance in large US firms (Yermack 1996) and small Finnish firms (Eisenberg, Sundgren et al. 1998) has continuously been challenged by counter-arguments from replicating studies in other contextual settings, eg. (Kiel and Nicholson 2003).

A most cited paper by Dalton et al (1999) meta-analysed the literature published before 1999 and they find that board size is generally negatively correlated with financial performance, albeit that firm size, serving as a moderating factor, may positively contribute to the correlation between board size and financial performance. But they failed to provide answers for the small firm cohort specifically (Dalton, Daily et al. 1999). Another paper by Bennedsen et al (2008) attempted to discover the causal impact of board size on performance in SMEs applying Instrumental Variable (IV) on cross-sectional survey data and confirms the negative relationship between board size and firm financial performance, supporting the precedents' argument that agency problems prevail in boards with seven or more members (Lipton and Lorsch 1992; Jensen 1993; Yermack 1996; Bennedsen, Kongsted et al. 2008). However, the explanatory power of the identified relationship in Bennedsen et al (2008) may be challenged because that the data collected in 1999 is somewhat outdated and their sample is only

¹Adams et al (2011) cited an estimation by OECD that the compliance cost for Australian businesses merely in 2005 is about 87 billion dollars, which amounts to approximately 13% of the national GDP in 2005. The report went on arguing that small businesses are bearing more compliance costs than their large counterparts given their limitation and total numbers.

based on one country – Denmark. Moreover, Lehn et al. (Lehn, Patro et al. 2005) reviews the literature on size and composition of the boards based on articles published between 1935-2000 and found no systematic relationship between board characteristics and performance if firms maximize value is seen to be validated for the great majority of firms.

Since Glass coined the term² in 1976, “Meta-analysis” has enjoyed enormous popularity owing to its objectivity and statistical power to draw a rigorous conclusion based on solid evidence. The main contribution of this paper is to systematically synthesize the extant evidence on the correlation of board size and firm performance and quantify the effect size using the standardised meta-analysis approach. We used Hedges and Olkin-type meta-analysis (HOMA) (Hedges and Olkin 1985) and meta-analytic regression modelling (METAREG) (White 2011) on a database of 28 published articles and 1 working papers, representing a maximum of 151 effect sizes and total of 279194 firm-year observation . The HOMA results show that board size generally positively correlates with the performance of small firms. The finer levels of focal relations indicates heterogeneity and thus seven mediating factors are introduced, covering published or not, year published/available, cross-sectional or panel data, survey or secondary data, county in which the data collected, year when the data collected and the average firm size of the study. The METAREG results find that four factors, eg. Published in a journal or not, cross-sectional or panel data, survey or secondary data, country of data explains the heterogeneity of the effect size.

The rest of the paper proceeds as follows; Section 2 reviewed the exiting literature and developed the hypotheses, Section three provides the specificity of the method, followed by Results in Section 4 and Discussion in Section 5. Section 6 concludes with a summary of results, acknowledging the limitations of this study and future research directions.

THEORY AND HYPOTHESIS

Small firms – a working definition

² Glass (1976) provides a widely accepted definition for meta-analysis: “Meta-analysis refers to the statistical analysis of a large collection of results from individual studies for the purpose of integrating the findings. It connotes a rigorous alternative to the casual, narrative discussions of research studies which typify our attempt to make sense of the rapidly expanding research literature.”

Yet consensus has to be reached in terms of a universal definition. The majority of the economies are using 200 full time equivalent employees (FTEs) as the cutting off point for SMEs (Ayyagari, Beck et al. 2007). Given the inconsistency of the definitions, we also adopted the “200 FTEs” definition, albeit that of this single measure alone is problematic in terms of its explanatory power. Thus, any small firms meeting the criteria, be it a non-listed firm, a family business, or a listed small business, are included in our sample.

The relevance of corporate governance to small firms

Board of directors has existed for more than four centuries since the inception of the Dutch East India Company in 1602. Only in the recent century, corporate scandals has been instrumental to priority corporate governance reforms on the policy agenda and institutionalised corporate governance into a day-to-day operation. The OECD defined Corporate governance as “a set of relationships among stakeholders, a structure and a process with the aim of setting objectives, establishing the means for attaining those objectives, and monitoring performance”(Co-Operation and Development 2004).

Unfortunately, the prevailing arguments and treatments focusing on separation of ownership and control seem to be irrelevant when it comes to small firms, in that small firms normally do not have the separation of ownership and control problem in the first place. The influential work by Adam Smith, *An Inquiry into the Wealth of nations*, as well as its “correctly” observed “separation of ownership and control” (Smith 1776) has earned dominance for prescriptions to the costs incurred by such a separation, which is further fuelled by the “agency problem” introduced in the well cited articles of Jensen and Meckling (Jensen and Meckling 1976; Jensen 1986; Jensen 1993; Jensen 1994). In practice, company laws normally fail to consider the particular needs of small firms, let alone to address it (Davis and Pett 2000; Hopt 2003; Farrar 2008). Company law in OECD countries intends to address three agency problems: owner and manager, controlling shareholders and minority shareholders, shareholders and non-shareholding stakeholders. Of these, the conflict between shareholders and non-shareholding stakeholders seems to be a promising relevance to small firms, albeit that the company law deals with two types of stakeholders – creditors and workers, while the protection for workers is only slightly addressed touched (Davis and Pett 2000). Thus, the “one-size

fits all vehicle” seems to be merely a regulatory burden for small firms. So are there any benefits for small firms to have a board of directors?

Given that all the organisations, be it large or small, has to deal with opportunism and bounded rationality, asset specificity, frequency and uncertainties (Williamson 1981), the board of directors as a “by-product” for small firms do have strategic and team work benefits in terms of its controlling, monitoring, service and legitimacy roles (Bennett and Robson 2004; Stevens 2011). Specifically, the role of the boards in SMEs focuses on providing strategic advice, extending the network of the management and mitigating distributional conflicts among owners (Bennedsen, Kongsted et al. 2008).

Board size

The number of board of directors, also known as board size, is a critical factor influencing the appointment of subcommittees and the board’s involvement with external directors (Brown, Vetterlein et al. 2010; Brown, Beekes et al. 2011). However, the endogeneity issue between the board size and firm performance is hampering researchers from making valid causality deductions. On top of the endogeneity debate flags a measurement issue for small business performance (Ayyagari, Beck et al. 2007; Ayyagari, Demirguc-Kunt et al. 2011; Beck, Demirgüç-kunt et al. 2011). Based on different theories, we developed five statistical hypotheses.

Financial performance

The boards of directors are valuable human capital, which enters into the production function as a factor (Bammens, Voordeckers et al. 2011). The Resource Dependency Theory (RDT) argues that the external environment as well as the interaction between the external and internal factors significantly influence the competitiveness of the firm, hence board of directors can serve as an internal-external nexus (Pfeffer and Salancik 2003; Dalziel, Gentry et al. 2011). The Resource Based View (RBV) suggests that a firm’s competitive advantage lies in the application of the bundle of valuable resources at the firm’s disposal, of which the directors are a unique form (Wernerfelt 1984).

Empirical research on the correlation between board size and financial performance of small firms are mixed. Arosa and colleagues examined the determinants of ROA of Spanish non-listed SMEs and found a positive correlation between board size and firm performance (Arosa, Iturralde et al. 2010). Calabro and Mussolino found a positive correlation between board size and export intensity (Calabrò

and Mussolino 2011). Bennedsen et al, on the contrary, used a larger dataset of 7,000 firms and an advanced Instrumental Variable technique, finds a negative relationship (Bennedsen, Kongsted et al. 2008). Huse reported negative impacts of board size on ROI and total task involvement (Huse, Minichilli et al. 2011). Thus, our first hypothesis assumes that there is no correlation.

Hypothesis 1 There is no correlation between board size and financial performance of small firms.

Financing advice

From the RDT theory, Hillman et al regards advising function as one of the key functions of board of directors (Hillman, Withers et al. 2009). Board of directors is also found to be a reflection of family power's and experience via their interaction with the family owners (Corbetta and Salvato 2004). Dalton et al reviewed empirical literature in the in the twentieth century and concluded that the advice function is positively correlated with board size (Dalton, Daily et al. 1998; Dalton, Daily et al. 1999). Aaboen et al found the board size is negatively correlated with financing from venture capitalist, as well as owner's advice on investment and loans, but positive with advice from the other sources (Aaboen, Lindelof et al. 2006). Bennett and Robson found that board size is positively correlated from advices received from banks, business links and customers, while negatively correlated with the other advice sources (Bennett and Robson 2004).

Hypothesis 2 The board size has no correlation with business advice.

Strategic performance

Board of directors, as the top management team in small firms, is in charge of strategic orientation, innovation, R&D, value-added, long-term growth and risk management (Golden and Zajac 2001; Machold, Huse et al. 2011). Golden and Zajac (2001) relates the board size to theories in demography, agency and power and supported the view that strategic change is negatively influenced by board size and the influence is stronger when the board of directors is more powerful. Adding to this, Pugliese and Wenstop suggested that the board size is negatively correlated with social strategy and competitive strategy(Pugliese and Wenstøp 2007). However, Pugliese and Wenstop (2007) found that strategic follow up is positively correlated with board size.

Hypothesis 3 The board size has no correlation with strategic performance.

Board characteristics

The Agency Theory argues that board are self-interest oriented and they intend to change the strategies to the directions that optimise their interests. Thus larger and diversified boards may increase the performance by fostering strategic change, improving chair leadership efficacy, and task effectiveness (Forbes and Milliken 1999; Zona and Zattoni 2007). Adding to this list is that larger boards have more frequent and longer meetings (Brunninge, Nordqvist et al. 2007; Wincent, Anokhin et al. 2009; Anokhin, Wincent et al. 2011). However, the flip side of having a large board is its efficiency in reaching consensus and the impact of the agreed decision, as reported by Fiegenger, the decision impact is negatively correlated with board size(Fiegenger 2005).

Small firms are typically characterised of scarcity of resources, thus external board members may be able to supplement the management's skills by bringing in firm-specific expertise (Machold, Huse et al. 2011). However, small firms may exhibit a dominance of entrepreneurship rather than managerialism, with emphasis on action decision and real-time strategies. Consequently, the CEOs or managers may not have the competency to consume the advices. Thus, the board size may be negatively correlated with characteristics of managers, eg. the insider ratio, shareholder ratio, duality and shareholder ratio (Lockett, Wright et al. 2008).

Hypothesis 4 The board size has no correlation with the board characteristics.

Trust and networking

The transactions of small firms, comparing with large corporations, have low asset specificity and high uncertainty, thus informal governance mechanisms, rather than formal governance rules and principles, should be adopted. Such informal governance mechanisms, including private ordering/contractual arrangements, social capital, trusts, relational norms, social networks, venturing capital and blockholding, may reduce transaction costs, improve social responsibility and sustainability (Borch and Huse 1993; Wincent, Anokhin et al. 2009; Clifton, Keast et al. 2010; Wincent, Anokhin et al. 2010; Kontinen and Ojala 2011).

Hypothesis 5 The trust and networking has no correlation with the board size.

The definition and measure of each variable is summarised in Table 1.

Insert Table 1 about here.

METHODS

To address the theoretical debates and to consolidate existing knowledge, this study systematically reviewed all the empirical evidence and quantified them using meta-analysis method. The

Sampling and coding

To identify the population of studies on board size and performance of small firms, we used five complementary strategies, suggested by (Van Essen and Van Oosterhout 2008; van Essen, Oosterhout et al. 2012). First, we searched six databases using key terms, “board”, “board of directors”, “board size”, “board characteristics”, “governance”, and “corporate governance”, married with “SMEs”, “small and medium-sized enterprises”, “small firm”, “small business”, “non-listed firm”, “non-listed business”, “family business”. The databases include (1) JSTOR; (2) ProQuest³; (3) ABI/INFORM Global; (4) EconLit; (5) SSRN; (6) Google Scholar. Second, we manually searched the most relevant journals in the fields of accounting, economics, finance and management, suggested by the Australian Research Council’s ERA Ranking⁴. Third, we searched top journals in the field of Entrepreneurship and Small Business Management, eg. Journal of Business Venturing, Entrepreneurship: Theory and Practice, International Small Business Journal, Entrepreneurship and Regional Development, Small Business Economics, Journal of Small Business Management and Family Business Review. Four, we searched top journals in the field of Governance, eg. Journal of Business Ethics, Corporate Governance: An International Review, Governance: An International Journal of Policy, Administration and Institutions. Five, after collecting an initial set of studies, we used a “snowballing” technique to cross-check the reference that cited the original journals using Scopus and Google Scholar. We yield an initial sample of 81 papers. Given that our research focus is on the correlation of board size and firm performance, we then checked each article against five criteria, specified as follows

- (1) The paper is not an earlier version of another paper included in our sample;
- (2) The paper is an empirical study that includes either a regression or a correlation analysis, as long as the impact size is estimable;

³ ProQuest has merged with ABI/INFORM now.

⁴ http://www.arc.gov.au/era/era_2012/review_of_era10_ranked_outlet_lists.htm.

- (3) The sample used in the empirical research must be a cohort of small firms⁵, or have a small firm cohort, whose effect size are reported separately and can be obtained. Thus, our sample includes small business, Small and Medium-sized Enterprises (SMEs) and family SMEs;
- (4) Board size must be a separate variable and must be identifiable;
- (5) The full text of the article must be obtainable.

Coding and analysis

Two main types of data are encountered in the sample: correlation coefficients with sample size and regression results (either a t-statistics or p-value) with sample size. We took advantage of a commercial coding package, Comprehensive Meta Analysis⁶. The build in functions and consistency in correcting estimation errors exempt the coding from human calculation errors. HOMA and the METAREG procedures are computed in STATA12SE⁷ environment. Observation with missing values is dropped.

HOMA procedure

Pearson product-moment correlation coefficient r and partial correlation coefficient $r_{xy,z}$ are commonly used in meta-analysis, given that they are scale-free, can be easily interpreted and computed, eg. using the HOMA procedure in STATA. Only studies in which performance variables are dependent variables are partial coefficients calculated⁸. In our study, when multiple measures of firm performance are provided, we included all the available measurements from the sample in our study. In order to account for the differences in precision across effect sizes and variability in the population, we adopted the HOMA procedure (Hedges and Olkin 1985), which treats the inverse variance weight w as the optimal measure of precision for a given effect size. These weights will help to produce appropriate estimate for the meta-analytic mean effect size (van Essen, Oosterhout et al. 2012). The HOMA procedure will be used to estimate Hypothesis 1-5.

METAREG procedure

⁵ The definition for different economies are generally inconsistent, here we are mainly rely on the definition and judgment of the individual author(s).

⁶ Designed by Biostat, website: <http://www.meta-analysis.com/>.

⁷ STATA website: <http://www.stata.com/>.

⁸ This corresponds to the calculation from t-statistics or p-value coupled with sample size, as mentioned in the coding section.

In the event of the existence of heterogeneity between results of multiple studies due to the characteristics of these studies, meta-analysis regression is introduced, in order to evaluate the impacts of the study characteristics variables on the effect sizes (Harbord and Higgins 2008). Rhodes (2012) compared a number of regression estimators for meta analysis and concluded that Feasible Generalised Least Squares (FGLS) estimator produces the most efficient and consistent results (Rhodes 2012). Thus, we applied the FGLS approach, the METAREG procedure in STATA (Cameron and Trivedi 2009). Technical deduction can be found in (Greene 2008; Cameron and Trivedi 2009; Rhodes 2012).

The methodological bias/heterogeneity is associated with the publication characteristics at the study level (Rhodes 2012). Seven mediating factors, eg. published or not, publication year, cross-section or panel data, survey or secondary data, country of the sample, year of the sample and average firm size, are introduced to predict the effect size.

RESULTS

A total number of 29 articles are selected for the meta-analysis, producing 152 effect sizes. The sample covers studies of 15 countries, namely Bangladesh, Belgium, Denmark, Europe, Finland, Ghana, India, Malaysia, Norway, Norway and Sweden, Spain, Sweden, Turkey, UK, and USA. The detailed reference of all the 29 articles is listed below Table 2.

Insert Table 2 about here.

The descriptive statistics is provided in Table 3a for the whole sample and Table 3b with the breakdown by performance measures. Strategic performance enjoys more emphasis than the other measures.

Insert Table 3a-b about here.

HOMA results

The HOMA results using the whole sample show a positive correlation between board size and performance of small firms for both fixed effect and random effect models (Table 4). Table 5 calculates the HOMA results for each performance measure, Seven out of eight correlations are positive. Though the partial correlation between board size and financial performance is negative, the

number of effect sizes is small. Thus we reject all but the first of the hypotheses and accept the alternatives correspondingly.

Given the limitation of the sample size, only 9 correlations are estimated, three of which are negative. But the mixed results for small firms across countries preclude us from reaching a definite conclusion, which calls for a METAREG analysis.

Insert Table 4-6 about here.

METAREG results

Table 7 depicts the impact of publication characteristics on the conditional mean of effect size. The FGLS estimator produces efficient and consistent estimates. There are four findings: (1) Studies using cross-sectional data, *ceteris paribus*; (2) the effect size will be reduced comparing with those using panel data. (3) Studies using survey data may get a lower effect size comparing with those using secondary data, *ceteris paribus*; and (4) published article tends to have lower (or more likely negative) effect size comparing with the unpublished working paper. Year the article was published, the year data was last collected and the average firm size are not statistically significant.

Insert Table 7 about here.

DISCUSSION

An overall conclusion of our research is that the board size of small firms globally has a positive effect on firm performance, which contested the prevalent “negative effect” argument of the board size on the financial performance of large corporations. However, the partial correlation coefficient estimation for small firms is consistent with the large corporations’ argument. It may be because that for boards with seven or more directors, the agency prevails, which is supportive of the prediction by the previous empirical work (Lipton and Lorsch 1992; Jensen 1993; Yermack 1996). However, when the board size is smaller than seven, the performance is maximised and there is no correlation between board size and performance (Lehn, Patro et al. 2005).

The positive correlation between board size and advice, strategic management, board characteristics indicates that board of directors are unique resources which may compensate the scarcity of resources

and lack of expertise of small business managers. Supportive of the RBV and RDT, the board of directors in small firms may serve more “value-adding” functions in strategic management, R&D and export intensity (Gomez-Mejia, Cruz et al. 2011; Kamyabi and Devi 2011; Tanganelli and Schaan 2011; Tang and Tang 2012). The flexibility of small firms may enable it to increasingly engage with employees and other stakeholders. The positive correlation between board size and trust and network supports the Network Theories that the private arrangements and social networks serving as informal governance mechanisms may complement the formal governance mechanisms (Fadil 2012; Sheikh, Ahmed et al. 2012; Tang and Tang 2012; Wang, Wuebker et al. 2012; Zain, Ng et al. 2012).

The meta-analysis produced mixed results for the focal correlation by country, which may require institutional level mediators for future research (Loureiro 2012; Manjon and Merino 2012; Orlitzky 2012; Rubera and Kirca 2012). Judging from the limited number of empirical research, one may realise the vast opportunities of small firms – related research worldwide.

CONCLUSION

We meta-analysed the relationship between board size and performance in small firms based on 29 empirical researches. Our research found a positive relationship overall, which signals the difference of board of directors in small firms comparing with its larger counterparts. Future research should endeavour to unravel such positive connection based on firm-level and industry-level data.

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APPENDIX

Table 1 Definition of the variables

Variable	Definition
Board size	Number of board of directors
Financial performance	ROA, ROI, Tobin's Q
Financing advice	Sources of financing and financing advice
Strategic performance	The strategic aspects of the top management team, eg. strategic change.
Board characteristics	Components of board of directors other than the board size, eg. duality.
Trust and networking	Network and trust characteristics, eg. network age, network involvement.
Firm size	Average number of employees
Published	1 = The study is published in peer reviewed journal; 0 otherwise.
Published year	In which year the article is published.
Cross-sectional	1 = The data is cross sectional data; 0 otherwise.
Data collection	1 = Data is collected using survey instruments; 2 otherwise.
Country	Which country the study is focused
Year data collected	The latest year the data is collected.

Table 2 Studies included in the meta-analysis

Author (Year)	Performance measure	Published Year	Cross-sectional	Data collection	Country	Data-Year	
Aaboen et al. (2006)	Source of financing and financing advice	1	2006	1	Survey	Sweden	1999
Pugliese and Wenstop (2007)	Financial and strategic performance	1	2007	1	Survey	Norway	2004
Arosa et al. (2010)	Growth opportunity, ROA	1	2010	1	Survey	Spain	2007
Bennedsen et al. (2008)	ROA	1	2008	1	Survey	Denmark	1999
Bennett and Robson (2004)	Strategy	1	2004	1	Survey	UK	1994
Borch and Huse (1993)	Network involvement	1	1993	1	Survey	Norway and Sweden	1989
Brunninge et al. (2007)	# of board meetings, strategic change and top management	1	2007	0	Survey	Sweden	2000
Calabro and Mussolino (2011)	Trust, export intensity	1	2011	0	Survey	Norway	2006
Clarysse et al. (2007)	Board characteristics, VC	1	2007	1	Survey	Belgium	2005
Cowling (2003)	Outsider directorships held by CEOs	1	2003	1	Survey	UK	1995
Fiegenger (2005)	Board strategic participation	1	2005	1	Survey	USA	1988
Fiegenger et al. (2000a)	Director ratios	1	2000	1	Survey	USA	1988
Fiegenger et al. (2000b)	External ownership, outside director, succession	1	2000	1	Survey	USA	1988
Gabrielsson (2007)	Financial performance and board	1	2007	1	Survey	Sweden	2000
Gabrielsson and Huse (2002)	Board performance	1	2002	1	Survey	USA	2000
Gabrielsson and Winlund (2000)	Board performance	1	2000	1	Survey	Sweden	1997
Gul et al. (2011)	Stock price informativeness	1	2011	0	Database	USA	2007
Hansson et al. (2011)	ROI	1	2011	1	Survey	Finland	2009
Huse et al. (2011)	Board performance	1	2011	1	Survey	Norway	2004
Kula (2005)	Firm performance index	1	2005	1	Survey	Turkey	2003
Lockett et al. (2008)	Board performance and strategic involvement	1	2008	1	Survey	Europe	2002

Author (Year)	Performance measure	Published	Year	Cross-sectional	Data collection	Country	Data-Year
Minguez-Vera and Martin (2011)	Ratio of woman directors	1	2011	0	Database	Spain	2003
Raja and Kumar (2007)	Tobin's Q	1	2007	1	Database	India	2005
Wincent et al. (2009)	Board characteristics, compensation, networks and innovation	1	2009	0	Survey	Sweden	2004
Wincent et al. (2010)	Board characteristics, external funding and R&D spending	1	2010	0	Survey	Sweden	2004
Golden and Zajac (2001)	Strategic focus, efficiency, board characteristics	1	2001	0	Survey	USA	1990
Ibrahim and Samad (2011)	Financial performance and board characteristics	1	2008	0	Database	Malaysia	2005
Kyereboah-Coleman and Amidu (2008)	ROA	1	2012	0	Database + Survey	Ghana	2004
Rashid and Lodh (2011)	Financial performance, board characteristics and growth	0	2008	0	Database	Bangladesh	2008

Note: A detailed version of the reference is also available as follows:

List of articles included in the meta-analysis:

Aaboen, L., P. Lindelof, et al. (2006). "Corporate governance and performance of small high-tech firms in Sweden." *Technovation* 26(8): 955-968.

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Table 3a Descriptive statistics for the whole sample

Variable	Obs	Mean	Std. Dev.	Min	Max
analysis type	152	1.171053	0.3777998	1	2
sample size	152	1942	9148.78	39	80310
correlation	152	0.0859776	0.218095	-0.409	0.72
standard error	152	0.0510431	0.029163	0.00353	0.1559146
fisher's z	152	0.0933671	0.237937	-0.4344097	0.907645
standard error for z	152	0.0547654	0.0326362	0.00353	0.1666667
published	152	0.9210526	0.270548	0	1
year published	152	2006.191	3.737644	1993	2012
Cross sectional	152	0.5855263	0.4942595	0	1
firm size	115	26.71283	27.99125	3.11	99.74
data collection	152	1.164474	0.3893292	1	3
country	152	10.18421	4.423629	1	15
year data collected	152	2000.066	5.989694	1988	2009
firm age	70	19.36664	11.22073	3.81	32.6

Table 3b Descriptive statistics by performance measure

Performance measure	Advice			Financial performance			Strategic performance			Strategic performance			Trust and networking		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
analysis type	19	1.474	0.513	32.000	1.219	0.420	35.000	1.029	0.169	52.000	1.058	0.235	14.000	1.429	0.514
sample size	19	984.895	837.377	32.000	818.281	1314.995	35.000	1196.743	1237.726	52.000	3910.788	15465.170	14.000	359.929	823.709
correlation	19	0.026	0.175	32.000	0.049	0.189	35.000	0.075	0.165	52.000	0.113	0.266	14.000	0.179	0.232
standard error	19	0.047	0.023	32.000	0.050	0.026	35.000	0.041	0.019	52.000	0.049	0.028	14.000	0.091	0.039
fisher's z	19	0.026	0.181	32.000	0.056	0.213	35.000	0.078	0.172	52.000	0.125	0.294	14.000	0.190	0.248
standard error for z	19	0.049	0.026	32.000	0.052	0.027	35.000	0.043	0.020	52.000	0.054	0.030	14.000	0.102	0.049
published	19	1.000	0.000	32.000	0.813	0.397	35.000	0.914	0.284	52.000	0.942	0.235	14.000	1.000	0.000
year published	19	2005.105	1.100	32.000	2007.844	2.653	35.000	2006.029	4.018	52.000	2005.654	4.115	14.000	2006.286	5.045
Cross sectional	19	1.000	0.000	32.000	0.438	0.504	35.000	0.514	0.507	52.000	0.596	0.495	14.000	0.500	0.519
firm size	10	10.000	0.000	23.000	10.417	8.329	28.000	31.236	31.678	46.000	36.466	32.138	8.000	22.544	5.759
data collection	19	1.000	0.000	32.000	1.438	0.564	35.000	1.114	0.323	52.000	1.135	0.345	14.000	1.000	0.000
country	19	12.842	1.214	32.000	8.688	4.700	35.000	10.343	4.518	52.000	10.346	4.458	14.000	9.000	4.867
year data collected	19	1996.895	3.035	32.000	2003.594	4.634	35.000	1998.971	6.675	52.000	1999.346	6.126	14.000	2001.714	5.954
firm age	0	0.000	0.000	15.000	16.999	9.573	18.000	21.662	10.154	33.000	20.865	11.988	4.000	5.558	3.495

Table 4 HOMA Results for all the performance measures as a whole

Total effects	No. of effect size	Point estimate	Lower limit	Upper limit	z-value	p-value
Fixed effects	152	0.0432	0.0396	0.0468	23.4344	0.0000
Random effects	152	0.0894	0.0657	0.1129	7.3831	0.0000
Q-value	df (Q)	P-value	I-squared			
4918.630379	151	0	96.9300397			
Tau Squared	Standard Error	Variance	Tau			
1.91E-02	9.81E-03	9.62E-05	0.13822352			

Table 5 HOMA Results by performance measures

Predictor	Bivariate correlations							Partial correlations						
	K	N	Mean	z	p	CI 59%	Q test	K	N	Mean	z	p	CI 59%	Q test
Financial performance	25	15886	0.099***	12.456	0.000	0.083/0.115	701.462 (0.000)	7	10299	-0.041	-2.089**	0.037	-0.079/-0.003	12.245 (0.057)
Financing advice	20	2144	0.039*	1.812	0.070	-0.003/0.082	103.336(0.000)	9	16569	-0.006	-0.717	0.474	-0.021/ 0.01	22.608 (0.004)
Strategic performance	34	41039	0.093***	18.882	0.000	0.084/0.103	711.595 (0.000)	1	847	0.067	-	-	-	-
Board characteristics	49	42702	0.088***	18.045	0.000	0.078/0.097	2837.144(0.000)	3	160659	0.021	8.599***	0.000	0.017/0.026	10.122(0.006)
Trust and networking	8	4431	0.101***	6.699	0.000	0.071/0.130	43.473 (0.000)	6	608	0.175	4.24***	0.000	0.094/0.255	25.477(0.000)

Table 6 HOMA Results by sample country

Country	Bivariate correlations							Partial correlations						
	K	N	Mean	z	p	CI 59%	Q test	K	N	Mean	z	p	CI 59%	Q test
Bangladesh	11	7690	0.159***	14.102	0.000	0.137/0.181	499.090(0.000)	2	1538	0.008	0.296	0.767	-0.042/0.058	0.143 (0.705)
Belgium	0	0	-	-	-	-	-	5	195	0.365***	4.381	0.000	0.202/0.528	0.284(0.963)
Denmark	0	0	-	-	-	-	-	1	6850	-0.047	-	-	-	-
Europe	9	1400	-0.098***	-3.427	0.001	-0.153/-0.042	19.733(0.011)	0	0	-	-	-	-	-
Finland	0	0	-	-	-	-	-	1	404	-0.147	-	-	-	-
Ghana	0	0	-	-	-	-	-	1	241	-0.10395	-	-	-	-
India	0	0	-	-	-	-	-	1	40	-0.121	-	-	-	-
Malaysia	7	2030	-0.073***	-3.271	0.001	-0.117/-0.029	49.909(0.000)	0	0	-	-	-	-	-
Norway	18	6290	-0.025*	-1.891	0.059	-0.051/0.001	195.349(0.000)	0	0	-	-	-	-	-
Norway and Sweden	1	86	-0.047	-	-	-	-	0	0	-	-	-	-	-
Spain	2	738	0.131***	3.554	0.000	0.059/0.204	3.719(0.054)	2	160620	0.021***	8.573	0.000	0.017/0.026	7.422(0.006)
Sweden	47	15653	0.202***	25.071	0.000	0.187/0.218	884.479(0.000)	1	847	0.067	-	-	-	-
Turkey	1	386	-0.06	-	-	-	-	0	0	-	-	-	-	-
UK	0	0	-	-	-	-	-	10	16935	-0.002	-0.278	0.781	-0.017/0.013	31.535(0.000)
USA	29	72096	0.078***	20.976	0.000	0.071/0.086	2320.278(0.000)	1	1226	-0.011	-	-	-	-

Table 7 Meta analysis regression results

Dependent variable: effect size	Model 1	Model 2	Model 3
published	-0.166 (-1.91)		-0.304* (-2.43)
publication year	0.0068 (1.33)		-0.00463 (-0.36)
cross-sectional data	-0.104* (-2.45)		-0.215** (-2.70)
data collection method	-0.221*** (-3.32)		-0.244** (-2.95)
country of sample		0.0189** (2.6)	0.0203 (1.94)
year of data		0.00712 (1.06)	-0.00559 (-0.66)
firm size		-0.000465 (-0.47)	-0.00193 (-1.58)
constant	-27.39 (-1.27)	-14.32 (-1.07)	21.13 (0.79)
N	152	115	115
Adjusted R2	6.88%	3.28%	17.83%
Q	4623.56	3105.73	2412.32
p_Q	0.00	0.00	0.00
Chibar2	4008.74	2650.99	1991.46
p_Chibar2	0.00	0.00	0.00

t statistics in parentheses

* p<0.05, **p<0.01, *** p<0.001