BOARD OF DIRECTORS, CAPITAL STRUCTURE, INVESTMENT DECISIONS AND FIRM-PERFORMANCE: AN EMPIRICAL STUDY OF NORDIC FIRMS

Shab Hundal [*], Anne Eskola [**]

* Corresponding author, JAMK University of Applied Sciences, Jyväskylä, Finland
Contact details: JAMK University of Applied Sciences, Rajakatu 35, 40200 Jyväskylä, Finland
** JAMK University of Applied Sciences, Jyväskylä, Finland

Abstract

Firms' financing, boards of directors' characteristics, investments, and firm-performance (financial and non-financial) occupy a pivotal place in corporate finance and corporate governance literature. The current study explores if causalities between the abovementioned four distinct albeit inter-related phenomena follow any pattern. The data comprising of 1240 firm-years belonging to Finland, Norway, Sweden, and Denmark for the period of 2003 to 2018 have been analyzed by applying multivariate linear regression and principal component analysis. The findings show that the impact of boards of directors' characteristics is stronger on capital structure, however, weaker on investments and financial performance. The major contribution of the article is creating a set orderly and sequential causalities between financing, boards of directors' characteristics, investments, and firm-performance.

Keywords: Financing, Investment, Capital Structure, Board of Directors, Firm Performance

Authors' individual contribution: Conceptualization – S.H.; Methodology – S.H.; Formal Analysis – S.H.; Investigation – S.H.; Resources – S.H. and A.E.; Writing – Original Draft – S.H.; Writing – Review & Editing – S.H. and A.E.; Visualization – S.H.; Project Administration – S.H. and A.E.

Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

1. INTRODUCTION

In the finance literature, the concept of optimum capital structure has been discussed extensively. Academic researchers and corporate managers have been seeking endlessly to formulate the optimal capital structure; however, there is no universal and across the board understanding of this concept and its dynamics. However, it is noticeable that the notion of firm-level optimum capital structure is a *mirage* due to ever-changing business, and firm-specific environment. Many scholars suggest that instead of striving to achieve the specific *point* of optimal capital structure, firms should aim to achieve the *range* of it (Myers, 1984). The total capital requirements underpin the financial resources of a firm, and these resources can be

utilized to acquire assets (investment), which are necessary to run firms. The capital structure underlines the relative share of debt and equity in the total capital of a firm. To find the right financing path a firm needs to balance the advantages of debt, for example, interest tax shield, and the risks associated with debt, for example, the financial distress costs. Thus, it is very important to study the *pros and cons* of different sources of finance. The choice of the capital structure depends on many factors such as the size of the company, industry/sector characteristics, profitability and corporate tax level, the tangibility of assets, and growth opportunities. However, corporate boards of directors play a major role in making decisions regarding the capital structure of firms they serve along with providing leadership and guidance to the

firms and at the same time participate in the monitoring and control activities. There are several determinants of the quality of corporate boards of directors, for example, independence of boards, human capital (education, experience, expertise) of directors, relational capital (multiple directorships) of directors, and board diversity (gender, nationality, ethnicity). Investments, including tangible, intangible, and financial assets, are the reflection of firms' future and they are undertaken to enhance the firm value through the generating of added cash flow. 'Like financing, like investment' as the nature and type of financing determine the nature and type of investment, *ceteris paribus* (Hundal, Sandstrom, & Uskumbayeva, 2018). The outcome of investment can be measured by various indicators of financial, and non-financial performance measures.

Since the concept of capital structure, the board of directors' characteristics, investments, and firm-performance are intertwined, therefore, an important research problem that needs to be addressed is whether the mutual relationships amongst the abovementioned four concepts follow a *sequential* pattern so that these concepts are placed in an *orderly* manner in relation to each other. The current study endeavors to solve this puzzle by exploring the following research questions:

• *Does the board of directors' characteristics impact the capital structure, investments, and firm-performance?*

• *Does the firm-level capital structure impact investments and firm-performance?*

• *Does firm-level investing affect firm-performance?*

• *Do the boards of directors, capital structure, investment expenditure, and financial performance, at the firm-level, follow an orderly and sequential pattern of causalities between them?*

The secondary data has been taken for the period 2003-2018. The data sources have been firms' official annual reports, corporate governance reports, financial statements, and the Nasdaq OMX database. The sample firms have been taken from Finland, Sweden, Norway, and Denmark. The empirical findings show that the causalities between the board of directors' characteristics, capital structure, investments, and firm-performance follow the orderly and sequential pattern. Although the unconstrained causalities are also observed, however, they are relatively sparse and less significant. The following sections include literature review, data and methodology, results and discussion, and conclusion.

Section 2 highlights the in-depth literature review, which has helped to form various hypotheses. Section 3 addresses various aspects of the research design including data, variables, research methods and analysis model. Section 4 presents the results and discussion, whereas Section 5 underlines the main conclusions of the study.

2. LITERATURE REVIEW

Economic and business situations play an important role to influence the corporate capital structure. The financing underpins the capital structure, which is an important strategic decision and it affects various aspects of firms including their operations, investments, performance, survival, growth, and solvency. The most common sources of firm financing are equity and debt. Firms having access to an abundance of capital at the minimum cost of capital experience more opportunities to grow, expand, and acquire larger market share. Nonetheless, the discussion is not merely confined to ascertaining low-cost finance in adequate quantity on favorable terms, but it goes beyond and includes more vital issues such as determining the optimum capital structure *per se* (Berk & DeMarzo, 2020). Firms endeavor to achieve financial stability, achieve the liquidity, and solvency benchmarks and generate a higher return on capital on a sustainable basis, and these objectives can be achieved when they attempt to obtain the optimal capital structure which provides impetus to sustainable growth in accordance with the firms' settings and protects firms from risks associated with financing (Graham & Leary, 2011). The process of determining an optimal capital structure involves several *exogenous* and *endogenous* phenomena as several macro-economic determinants, firm-management features, institutional settings, industry/sector characteristics, and regulatory requirements play the vital roles in this process, other things being equal (Salim & Yadav, 2012). Business and economic factors highlight the macro-economic scenario are often uncertain and resultantly the needs and requirements of firm-level financing also remain uncertain and difficult to foresee. Similarly, the firm management features including their leadership qualities, monitoring, control, and decision-making also influence optimal capital structure. The nature and composition of capital structure can also be influenced by corporate governance dynamics including board independence, discipline, and board of directors' characteristics (Aguilera & Crespi-Cladera, 2016; Basu & Sen, 2015). Similarly, institutional characteristics of firms influence the capital structure of firms. For example, the influence of founder members (also known as promoters), represents an institutional characteristic of firms, also affects the choice of firm financing (Hundal, 2016, 2017). The capital structure can play an important role in the investment decisions of firms since the type, nature, and amount of capital influences the investment and firm-level financial performance. The right amount, composition of financing, and cost of capital can play an important role in maximizing return on capital, given the financial risks (Kang, Wang, & Xiao, 2018).

Modigliani and Miller (1958), in the *modern theory of capital structure*, describe that the capital structure of a firm is irrelevant since it does not affect the firm value. The core idea of this theory is that the cash flows of a firm are generated by its assets only and capital structure is no more than a façade since in a perfect capital market debt and equity are the perfect substitute to each other. Therefore, the firm-management should remain indifferent between various combinations of debt and equity as it has no impact on the firm value. Nonetheless, corporate tax can make the debt more attractive since interest is tax-deductible and thus provides firms with interest tax shields (Modigliani & Miller, 1963). However, one should be careful in drawing any conclusions about the favorable

outcomes of debt. An over-leveraged firm not only signifies its poor corporate governance, but it can experience financial distress costs, which can expose it to imminent bankruptcy. Similarly, interest tax shields available to a firm due to debt financing can be overwhelmed by the extra burden of personal income tax falling on the debt income. Furthermore, over-leveraged firms invite added risk-premium from the investors, and consequently their cost of capital and risk exposure (market and firm-specific) increases and thus it can be difficult for such firms to initiate new investment projects and complete existing ones. Therefore, according to the *trade-off theory of capital structure*, a firm strives to achieve the optimum combination of financing (debt, equity and any other hybrid form) where the present value of additional interest tax shield gained through the marginal *dose of debt* is fully offset by the present value of financial distress costs arising through the additional borrowing (Myers, 1984). Any further increase in firm leverage can be counterproductive.

According to the *pecking order theory* (Myers & Majluf, 1984; Myers, 1984) firm managers prefer to finance their investment projects with the internal sources (for example, retained earnings) at the early stage. When the firms experience business expansion and need more projects to finance, they can start seeking external finance, however, the managers prefer to use debt first before raising external equity (common stock). The rationale of the preference of debt over equity is that the firm managers can feel the pressure of an increase in demand for dividends by the shareholders even amidst volatility of stock prices or instability of profits, and similarly, managers can experience a trade-off between giving dividends to shareholders and investing in highly promising investment projects. Another reason why corporate managers can prefer debt over equity can be attributed to the information asymmetries. The firm managers have more information than the outside shareholders and as a result, both can have different notions of the firm's stock price in the capital market. The corporate managers often have the perception that since financial markets are not perfect, therefore, the market value of the firm does not fully reflect the fair value of it. Owing to the information advantages that they have, corporate managers can ascertain the fair (intrinsic) value of the firm. On the other hand, outside shareholders have lesser information about the firms and, therefore, they are unable to, first, distinguish between good and bad projects, and second, ascertain the true value of the firm in the short, and long-term horizon. Owing to the information asymmetries between the firm managers and outside shareholders the firm's stock is often mis(under)priced. On the other hand, debt financing is subject to a lower risk of mispricing of the debt claims as well as *adverse selection* problems.

Dierker, Lee, and Seo (2019) find that firms prefer to issue equity capital following risk increases since any further incremental debt can add financial distress costs. They further find that firms prefer to issue debt after risk decreases since the firms having lower risk exposure are more capable of doing prudent debt management, and servicing without getting any adverse reaction of their investors. Therefore, the above findings are

following the trade-off theory, however, opposite to the key idea of the pecking order theory. Hundal et al. (2018) analyze a sample of Nordic companies and find that during the pre-financial crisis period (before 2007), firms producing a high accounting and market returns borrow less, to avoid higher fixed cash outflows of debt servicing thus the capital structure of such firms has been observed to be inclined in favor of equity financing. Therefore, the above finding contrasts with the gist of the pecking order theory of firm financing. However, during (2007-2011) and post-financial crisis (2012 and after) times the empirical evidence supports the idea of pecking order theory of firm financing as the sample firms giving a superior accounting and stock market performance start preferring debt to equity. Several factors are responsible for such financing patterns: high-risk premium demanded by equity investors during the adverse financial environment and the recovery period, falling interest rates, and accumulated non-performing assets with the financial institutions.

The genesis of the *agency theory* concerning the capital structure rests on the premise that debt can discipline managers due to the added pressure they feel to generate a minimum level of cash flows mandatory for debt servicing. The firm managers are often aware of the dire consequences that they can go through in the event the cash flows of the firm fall short of the minimum benchmark required to do the debt servicing. Consequently, the personal utility function of the managers can start aligning with that of the firm, and the discretionary behavior of managers starts diminishing too (Jensen & Meckling, 1976; Jensen, 1986). Therefore, debt can be used as a measure to minimize agency costs, and as a result, the firm-performance can improve. Nonetheless, any such generalization can be misplaced. At a lower level of debt, it is not difficult to understand the viewpoint that agency conflicts between shareholders and managers of a firm can diminish since managers have the motivation to increase the financial performance of firms to do the debt servicing. However, at a higher level of debt, managers can experience increased *performance pressure* and in the event of their failure to generate required cash flows to meet the debt repayment obligations there can be additional increased risk premium placed on the firm equity, which can force firm managers to borrow even more. Therefore, the firm can fall into the debt trap, and ultimately the agency costs can rise to an extent where the financial distress costs touch unprecedented heights and the fear of bankruptcy turns into reality (Jensen & Meckling, 1976).

Dawar (2014) finds that for the sample of Indian firms there exists a negative relationship between debt (both short term and long term) and the accounting performance of firms. This result underpins the inability of the financial institutions, mainly state-owned banks, to check the discretionary actions of corporate managers. Similarly, Sheikh and Wang (2011) find a negative relationship between leverage and firm-performance (profitability and liquidity) by analyzing a sample of firms in Pakistan. A corollary follows from the above two studies that firms can finance their projects with the retained earnings at the initial stages, however, with the growing investment needs the

firms can start financing them with the debt. Nonetheless, such a pattern of financing can affect firm-performance unfavorably. Therefore, the financing pattern suggested by the pecking order theory of firm financing does not fully align with the empirical findings. On the other hand, increased leverage exposes the firms to the enhanced agency costs, which in turn reduces the firm-performance.

The agency theory suggests that enhanced board independence can reduce agency costs in the form of managerial discretionary behavior and adverse selection, among others. Diminished agency costs can motivate managers to choose the most suitable capital structure of firms. However, Fan, Jiang, Kao, and Liu (2020) analyze the sample of Taiwanese firms and find that when firms replace non-independent directors with independent ones, the firm value declines in both the short and long run. This finding implies that the abovementioned replacement does not add anything to the board capital of firms since both non-independent, and independent directors have the same qualifications and other credentials. On the other hand, such replacements can be value-reducing to the firms because of two main reasons-first, regulatory requirements of enhanced independence of boards have made independent directors busier and thus costlier in the labor market of corporate directors, and second, independent directors have lesser knowledge and skills to tackle the firm-specific issues and challenges, therefore, they are not able to make any real contribution to the firms.

The current study explores the following hypotheses:

H1: Board of directors' characteristics impact capital structure.

H2: Board of directors' characteristics impact investments.

H3: Board of directors' characteristics impact firm-performance.

H4: Firm-level capital structure influences investments.

H5: Firm-level capital structure influences firm-performance.

H6: Firm-level investing affects firm-performance.

3. RESEARCH DESIGN

In the current study, a sample of as many as 93 non-financial publicly traded firms listed on the Nasdaq OMX Nordic Stock Exchange has been selected to test the hypotheses. Twenty-eight firms have been chosen from Finland and Sweden each, whereas twenty and seventeen firms represent Denmark and Norway, respectively. The unbalanced pooled data covers a period of sixteen years (2003 to 2018). Due to the unavailability of data a final sample of 1240 firm-years and the country-wise classification is 353 firm-years (Finland), 352 firm-years (Sweden), 291 firm-years (Denmark) and 244 firm-years (Norway). The market data have been obtained from the two indexes of the Nasdaq OMX Nordic Stock Exchange: OMX Nordic Large Cap EUR GI (OMXNLCEURGI – 640 companies) and OMX Oslo 20 (OMXO20PI – 20 companies) as well as respective central banks, whereas, data related to the accounting and corporate governance variables have been extracted from the annual reports (especially financial statements and corporate governance reports) of the sample firms.

Table 1 highlights the description of variables falling in the ambit of multiple *phenomena*. These phenomena are termed as *corporate governance and board of directors' characteristics*, *capital structure*, *investment*, and *performance* (including '*return*' variables: accounting, market, and hybrid; '*cost of capital*' variables; and '*risk exposure*' variables) in the current study.

Table 1. Description of variables (Part 1)

Variables	Label	Definition/Formula
Phenomenon 1: Performance		
Return on assets	*ROA*	*ROA* is a measure of profitability on the assets invested by firms. It is calculated by dividing the net profit of the firms by their total assets in a year.
Earnings per share	*EPS*	*EPS*, a measure of profitability, is calculated by dividing the firm's net profit by its outstanding shares of its common equity in a year.
Return on capital employed	*ROCE*	*ROCE* measures the firms' profitability and efficiency of the total capital employed (debt, equity and preferred). It is calculated by dividing the net profit of the firms by their total capital employed in a year.
Market to book value ratio	*MBVR*	*MBVR* is a financial valuation measure that determines if the current market price of the firm is over- or undervalued in comparison with its book value. It is calculated by dividing the market capitalization of a firm with its book value of net assets in a year.
Tobin's Q ratio	*TQ*	*TQ* ratio measures if the market value of a firm (debt plus equity) is over- or undervalued in comparison with the replacement cost of its assets. Generally, the market value of debt is difficult to obtain, therefore, the proxy *TQ* can be calculated by dividing the sum of the market value of equity plus book value of debt of the firm by its book value of total assets in a year.
Operating cash flow to total assets ratio	*OCFA*	*OCFA* ratio, a measure of profitability and efficiency, highlights the extent of the contribution made by operating cash flow of firm towards its book value of assets. It is calculated by dividing the operating cash flow of a firm by its total assets in a year.
Cost of equity	E_c	E_c is proxied by applying the Capital Asset Pricing Model (CAPM) on a yearly basis as below: $E_c = R_f + \beta*(R_m - R_f)$ R_f is the risk-free rate on ten-year bond issues by the treasury, R_m is the observed market return (Nasdaq OMX Nordic Stock Exchange Index), β is the measure of market (systematic) risk that a firm is exposed to.
Cost of debt	D_c	D_c represents the average tax-adjusted cost of debt, which is calculated by dividing the interest expense (1 - tax rate) by the total finance (interest bearing) debt in a year.
Weighted average cost of capital	*WACC*	*WACC* represents the total cost of capital employed by firms. The product of cost of equity and relative share of equity in the firm value and the product of cost of debt and relatively share of debt in the firm value have been added.
Annualized stock return	*Ret*	*Ret* represents the market performance of firms. The average daily stock return of firms is annualized by applying the following formula: $Ret = (1 + daily\ stock\ return)^{365} - 1$

Table 1. Description of variables (Part 2)

Variables	Label	Definition/Formula
Phenomenon 1: Performance		
Total risk	*R*	R represents the total risk (volatility) that the stock market performance of firms is exposed to. The average daily volatility (measured by standard deviation) of the stock return of firms is annualized.
Total systematic risk	*SysR*	$SysR$ represents the portion of total risk exposure of a firm arising due to the market risk and is measured as the product of β and annualized standard deviation of market return (Nasdaq OMX Nordic Stock Exchange Index).
Total unsystematic risk	*UnsysR*	$UnsysR$ represents the portion of total risk exposure of a firm arising due to the firm-specific risk. It is a residual risk derived after subtracting SysR from R.
Phenomenon 2: Corporate governance and board of directors' characteristics		
Board independence	*Ind-Dir*	$Ind\text{-}Dir$ is the ratio of the number of independent directors to the board size of a firm in a year.
Performance of pay of CEO	*CEO-Pay*	The ratio of the performance-based pay to the total pay of the CEO of the firm in a year.
Board discipline	*Discipline*	The median ratio of board of directors' meetings attendance to total meetings held in a year.
Directors' share ownership	*Ownership*	The ratio of share owned by directors (outside and executive) to the total share outstanding.
Education of independent directors	*Edu-BoI*	The median level of education of independent directors on a firm board of directors on a scale 0-4 in a year: no education (0), up-to high school (1), bachelor level (2), master level (3), doctorate (4). The education is horizontally additive by '+ 1', for example, if a director has two bachelor degrees the score will be $2 + 1 = 3$, and a master level educated directors with two bachelor degrees gets the score $3 + 1 = 4$.
Education of executive directors	*Edu-BoE*	The median level of education of executive directors on a firm board of directors on a scale 0-4 in a year. The calculation process is the same as in the case of *Edu-BoD*.
Education of board of directors	*Edu-BoD*	The sum of *Edu-BoI* and *Edu-BoE*.
Experience of independent directors	*Exp-BoI*	The median number of years (natural logarithm) of experience of independent directors on a firm board of directors in a year.
Experience of executive directors	*Exp-BoE*	The median number of years (natural logarithm) of experience of executive directors on a firm board of directors in a year.
Experience of board of directors	*Exp-BoD*	The sum of *Exp-BoI* and *Exp-BoE*.
Phenomenon 3: Capital structure		
Debt-equity (book value) ratio	D/E_{BV}	The leverage ratio of the firm is obtained by dividing the finance debt (current and non-current) by its book value of equity (a.k.a. net assets, net worth) in a year.
Debt-equity (market value) ratio	D/E_{MV}	The leverage ratio of the firm is obtained by dividing the finance debt (current and non-current) by its median market capitalization during a year.
Current debt-equity (book value) ratio	CD/E_{BV}	The short-term leverage ratio of the firm is obtained by dividing the current finance debt by its book value of equity in a year.
Current debt-equity (market value) ratio	CD/E_{MV}	The short-term leverage ratio of the firm is obtained by dividing the current finance debt by its market capitalization during a year.
Non-current debt-equity (book value) ratio	NCD/E_{BV}	The long-term leverage ratio of the firm is obtained by dividing the non-current finance debt by its book value of equity in a year.
Non-current debt-equity (market value) ratio	NCD/E_{MV}	The long-term leverage ratio of the firm is obtained by dividing the current finance debt by its market capitalization during a year.
Effective corporate tax rate	*ETR*	The ratio of the actual amount of corporate tax paid by a firm to its profit before tax (gross profit), in a year.
Phenomenon 4: Investment		
Total investments to assets (book value)	I/A_{BV}	Total investments (including tangible, intangible, financial and those in joint ventures and associates) divided by book value of assets (firm).
Tangible investments to assets (book value)	TI/A_{BV}	Total tangible investments divided by book value of assets (firm).
Intangible investments to assets (book value)	ITI/A_{BV}	Total intangible investments (current and non-current) divided by book value of assets (firm).
Financial investments to assets (book value)	FI/A_{BV}	Total financial investments (current and non-current) divided by book value of assets (firm).
Control variable		
Total asset	*LnA*	The natural logarithm of total assets.

Several econometric techniques including multivariate linear regression (MLR) and principal component analysis (PCA) have been applied to analyze the data. In a typical MLR model, the explanatory variables are represented by the X-matrix with the order $M \times N$, whereas the explained variable is represented by a single vector, Y, an $M \times 1$ vector, so that the model can be written as $Y = Xb$. The solution vector 'b' is ascertained by solving $b = (X'X)^{-1}X'Y$, that is by multiplying the inverse of the product of explanatory variable and its transpose with the product of transpose of explanatory variable and explained variable. The variance of the estimated solution is given by $V(b) = (X'X)^{-1}S^2_E$, that is the variance of the solution vector 'b' is obtained by multiplying the inverse of the product of explanatory variable and its transpose with the variance of standard error (Jolliffe, 1987). Theoretically, the columns of X-matrix must be mutually exclusive implying that covariance between two explanatory variables to be zero. In simple words, the columns of X-matrix are uncorrelated. However, in reality, the columns of X-matrix are often correlated, and it is not even a *problem* as long as the coefficients of correlation are moderate and not significant.

In the current study, multiple measures of the various phenomena have been taken in order to make in-depth analysis, however, due to mutual association between the explanatory variables the problem of multicollinearity can arise, which can jeopardize the reliability of variables. In Table 1, various phenomena are comprising of multiple variables, which can be correlated with one another. For example, *Edu-BoD*, *Edu-BoI*, and *Edu-BoE* are likely to be mutually correlated and so are *Ind-Dir*, *CEO-Pay*, *Discipline*, and *Ownership* variables. In a situation where there is a *high* likelihood of a *high* correlation between variables falling under the same phenomenon, not only some explanatory become redundant but the high correlation between them can lead to multicollinearity problems in the MLR analysis, which can adversely affect the reliability of empirical findings.

To avoid such a precarious situation in the empirical analysis, the PCA technique has been applied to analyze the data in the current study (Cadima & Jolliffe, 1995). The PCA, which essentially is a dimension reduction technique, filters-out lesser important variables so that relatively important variables, known as principal components or factors (*Zs*, hereafter), stay in the analysis and provide unbiased and reliable results.

On the left side of the Figure 1, the influence of X can be ascertained on Y by applying the MLR method. However, in case there is multicollinearity problem, X variables of the order $M \times N$ can be reduced to Z principal components of the order $M \times A$ by applying PCA, and subsequently, the influence of Z can be ascertained on Y by applying MLR method (on the right side of the Figure 1). It is important to note that $N > A$, implying the filtration of unnecessary variables. Therefore, the solution vector 'b' can be obtained by solving the following equation:

$$b = (Z'Z)^{-1}Z'Y \qquad (1)$$

Thus, the MLR model applied in the current study is as below:

$$Y_{it} = \alpha_{it} + \sum_{k=1}^{p} \beta_k Z_{it} + \beta_r R_{it} + \varepsilon_{it} \qquad (2)$$

where, Y_{it} – explained variable of a firm 'i' in period 't', α_{it} – intercept term, Z_{it} – corresponds to the ith principal component, R_{it} – control variable of a firm 'i' in period 't', ε – the random error-term.

Figure 1. Comparison between multiple linear regression and principal component analysis
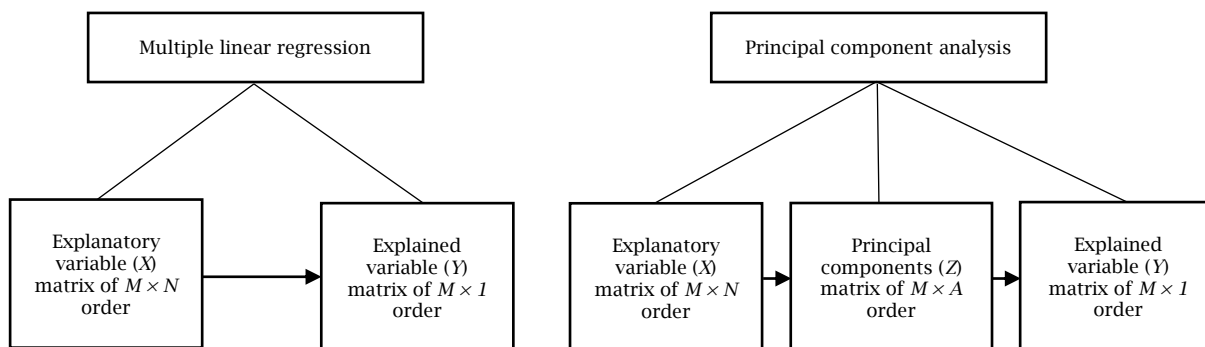
Table 2. Principal components derived from explanatory variables representing various phenomena

Phenomena	Principal components/factors
Corporate governance and board of directors' characteristics	Z_1 = Education of executive directors Z_2 = Education of independent directors Z_3 = Experience of executive directors Z_4 = Experience of independent directors Z_5 = Board discipline Z_6 = Board independence
Capital structure	Z_7 = Total leverage Z_8 = Long-term leverage Z_9 = Short-term leverage
Investment	Z_{10} = Total investment Z_{11} = Financial investment Z_{12} = Intangible investment

4. RESULTS AND DISCUSSION

Descriptive statistics are given in Table 3. The mean board-level independence is 54.3%, whereas the highest and the lowest independence are 64.3% and 32%, respectively. Similarly, the median performance-based pay of the CEO of the sample firms is 61.6%, whereas the highest level is 89%. The mean values of education and experience of independent directors have been more than those of their executive director colleagues. The level of discipline, as measured by the median ratio of board of directors' meetings attendance to total meetings held in a year, is well over 90%. The highest level of share ownership of directors is 47.2%, whereas, the

mean value is 3.8%. About the capital structure variables, it is found that the mean debt-to-equity (book value) ratio is 0.575 whereas, the mean debt-to-equity (market value) ratio is 0.252. Similarly, the mean *ETR* is 32.4% and the highest *ETR* is observed to be 86.6%. The mean I/A_{BV} is 23.5% and the highest and lowest values of I/A_{BV} are 9.1% and 88% respectively. Regarding the performance variables, mean values of *ROA*, *ROCE*, *MBVR* and *TQ* are 10.9%, 13.1%, 1.414 and 1.269, respectively. The mean cost of debt, cost of equity and *WACC* are 6.3%, 4.1% and 5.7%, respectively. Furthermore, the mean systematic risk exposure of the sample firms is nearly four times more than the mean unsystematic risk faced by the sample firms.

Table 3. Descriptive statistics of key variables

	Mean	*Median*	*Standard deviation*	*Range*	*Minimum*	*Maximum*
Ind-Dir	0.543	0.568	0.059	0.323	0.320	0.643
CEO-Pay	0.578	0.616	0.205	0.890	0.000	0.890
Edu-BoI	2.874	2.883	0.176	1.729	1.554	3.283
Edu-BoE	2.103	2.111	0.226	2.216	1.443	3.659
Edu-BoD	2.687	2.666	0.190	1.890	1.528	3.418
Exp-BoI	3.306	3.338	0.203	3.020	0.745	3.765
Exp-BoE	3.132	3.101	0.257	2.899	0.654	3.553
Exp-BoD	3.162	3.164	0.181	2.861	0.704	3.565
Discipline	0.967	0.972	0.029	0.239	0.761	1.000
Ownership	0.038	0.047	0.122	0.469	0.003	0.472
D/E_{BV}	0.575	0.569	57.426	74.923	0.058	74.981
D/E_{MV}	0.252	0.263	14.115	33.724	0.042	33.766
CD/E_{BV}	0.138	0.172	6.329	23.748	0.018	23.766
CD/E_{MV}	0.135	0.121	7.985	13.209	0.012	13.221
NCD/E_{BV}	0.437	0.397	13.666	51.174	0.041	51.215
NCD/E_{MV}	0.117	0.142	9.933	20.515	0.030	20.545
ETR	0.324	0.336	0.976	1.198	-0.332	0.866
I/A_{BV}	0.235	0.244	0.127	0.789	0.091	0.880
FI/A_{BV}	0.056	0.054	0.151	0.255	0.018	0.273
ITI/A_{BV}	0.076	0.076	0.124	0.679	0.009	0.688
TI/A_{BV}	0.104	0.114	0.040	0.170	0.002	0.172
ROA	0.109	0.111	0.201	0.565	-0.078	0.487
ROCE	0.131	0.137	0.232	0.664	-0.093	0.571
MBVR	1.414	1.330	0.918	12.664	0.639	13.303
TQ	1.269	1.177	1.704	19.112	0.020	19.132
OCFA	0.239	0.267	11.401	1.122	-0.332	0.790
E_c	0.063	0.055	0.147	0.339	0.000	0.339
D_c	0.041	0.076	0.017	0.193	-0.016	0.177
Ret	0.088	0.092	0.111	0.932	-0.394	0.538
UnsysR	0.021	0.028	0.115	0.100	0.006	0.106
SysR	0.082	0.093	0.204	0.214	0.006	0.220
R	0.103	0.121	0.120	0.314	0.012	0.326
WACC	0.057	0.062	0.207	25.478	-0.008	25.470

Table 4. Pairwise correlation of variables (Panel A)

	Ind-Dir	*CEO-Pay*	*Discipline*	*Ownership*	*Edu-BoI*	*Edu-BoE*	*Edu-BoD*	*Exp-BoI*	*Exp-BoE*	*Exp-BoD*	D/E_{BV}	D/E_{MV}	CD/E_{BV}	CD/E_{MV}	NCD/E_{BV}	NCD/E_{MV}	*ETR*
Ind-Dir	1	-.218**	-0,050	-.101**	.415**	-.633**	-.210**	.419**	-.464**	-.104**	-0,033	-0,033	-0,029	-0,009	-0,034	-0,037	-0,037
CEO-Pay	-.218**	1	-0,025	0,003	.171**	.403**	.428**	.179**	.318**	.307**	0,014	0,002	0,029	0,023	0,001	-0,012	-0,013
Discipline	-0,049	-0,025	1	-.497**	-.238**	-.097**	-.185**	.105**	0,023	.058*	-0,023	0,020	-0,034	0,028	-0,013	-0,022	0,031
Ownership	-.101**	0,003	-.497**	1	0,004	.098**	.089**	-.429**	-.088**	-.301**	0,003	0,011	0,000	0,015	0,005	-0,020	-0,001
Edu-BoI	.415**	.171**	-.238**	0,004	1	.284**	.639**	.535**	.273**	.487**	-0,005	-0,047	0,012	-0,036	-0,018	-0,015	-0,012
Edu-BoE	-.633**	.403**	-.097**	.098**	.284**	1	.807**	0,025	.835**	.593**	0,038	0,009	0,050	-0,004	0,027	0,022	0,023
Edu-BoD	-.210**	.428**	-.185**	.089**	.639**	.807**	1	.245**	.674**	.562**	0,026	-0,013	0,041	-0,017	0,012	-0,002	0,007
Exp-BoI	.419**	.179**	.105**	-.429**	.535**	0,025	.245**	1	.236**	.706**	0,000	-0,020	0,017	0,015	-0,013	0,007	-0,023
Exp-BoE	-.464**	.318**	0,023	-.088**	.273**	.835**	.674**	.236**	1	.839**	0,040	0,003	0,055	-0,020	0,025	0,027	0,023
Exp-BoD	-.104**	.307**	.058*	-.301**	.487**	.593**	.562**	.706**	.839**	1	0,027	-0,006	0,046	-0,009	0,009	0,028	0,006
D/E_{BV}	-0,033	0,014	-0,023	0,003	-0,005	0,038	0,026	0,000	0,040	0,027	1	.207**	.945**	.086**	.967**	.520**	-0,005
D/E_{MV}	-0,033	0,002	0,020	0,011	-0,047	0,009	-0,013	-0,020	0,003	-0,006	.207**	1	.202**	.818**	.196**	.328**	-0,009
CD/E_{BV}	-0,029	0,029	-0,034	0,000	0,012	0,050	0,041	0,017	0,055	0,046	.945**	.202**	1	.091**	.830**	.434**	-0,006
CD/E_{MV}	-0,009	0,023	0,028	0,015	-0,036	-0,004	-0,017	0,015	-0,020	-0,009	.086**	.818**	.091**	1	.075**	.099**	-0,004
NCD/E_{BV}	-0,034	0,001	-0,013	0,005	-0,018	0,027	0,012	-0,013	0,025	0,009	.967**	.196**	.830**	.075**	1	.548**	-0,004
NCD/E_{MV}	-0,037	-0,012	-0,022	-0,020	-0,015	0,022	-0,002	0,007	0,027	0,028	.520**	.328**	.434**	.099**	.548**	1	-0,018
ETR	-0,036	-0,013	0,031	-0,001	-0,012	0,023	0,007	-0,023	0,023	0,006	-0,005	-0,009	-0,006	-0,004	-0,004	-0,018	1

Table 4. Pairwise correlation of variables (Panel B)

	I/A_{BV}	FI/A_{BV}	ITI/A_{BV}	TI/A_{BV}	*ROA*	*EPS*	*ROCE*	*MBVR*	*TQ*	*OCFA*	E_e	D	*WACC*	*Ret*	*UnsysR*	*SysR*	*R*
I/A_{BV}	1	.059*	.332**	.241**	.427**	0,052	.346**	-.064*	-0,020	.087**	-.161**	0,033	-0,002	-.061*	0,027	.089**	.064*
FI/A_{BV}	.059*	1	.065*	-.135**	-.434**	.143**	-.287**	-0,021	0,027	.174**	-.058*	.075**	0,007	-.091**	.181**	0,045	.141**
ITI/A_{BV}	.332**	.065*	1	.698**	0,040	-.089**	0,017	0,000	0,042	0,012	-.067*	-.060*	-0,042	-.123**	.101**	.116**	.127**
TI/A_{BV}	.241**	-.135**	.698**	1	0,048	-.082**	0,028	0,018	-0,026	-.073*	-0,010	-.078**	0,002	-.071*	.144**	.079**	.135**
ROA	.427**	-.434**	0,040	0,048	1	.193**	.845**	-0,021	0,011	-0,003	-.118**	-0,045	-.093**	.085**	-.085**	.069*	-0,019
EPS	0,052	.143**	-.089**	-.082**	.193**	1	.256**	-.076**	-.064*	.063*	-.095**	0,037	0,016	-0,039	0,029	0,002	0,020
ROCE	.346**	-.287**	0,017	0,028	.845**	.256**	1	0,001	0,001	0,019	-.125**	-0,010	-0,046	.084**	-0,050	.065*	0,002
MBVR	-.064*	-0,021	0,000	0,018	-0,021	-.076**	0,001	1	.175**	-0,016	0,031	-0,006	-0,015	0,003	-0,002	0,023	0,011
TQ	-0,020	0,027	0,042	-0,026	0,011	-.064*	0,001	.175**	1	.078**	-0,039	0,006	-0,003	0,026	0,031	0,050	0,047
OCFA	.087**	.174**	0,012	-.073*	-0,003	.063*	0,019	-0,016	.078**	1	-0,006	.082**	0,029	-0,030	0,045	0,005	0,032
E_e	-.161**	-0,058*	-.067*	-0,010	-.118**	-.095**	-.125**	0,031	-0,039	-0,006	1	.104**	.361**	.094**	-0,040	-.266**	-.167**
D	0,033	.075**	-.060*	-.078**	-0,045	0,037	-0,010	-0,006	0,006	.082**	.104**	1	.472**	.062*	0,006	-.095**	-0,047
WACC	-0,002	0,007	-0,042	0,002	-.093**	0,016	-0,046	-0,015	-0,003	0,029	.361**	.472**	1	0,048	0,052	-.095**	-0,017
Ret	-.061*	-.091**	-.123**	-0,071*	.085**	-0,039	.084**	0,003	0,026	-0,030	.094**	.062*	0,048	1	-.093**	-.300**	-.219**
UnsysR	0,027	.181**	.101**	.144**	-.085**	0,029	-0,050	-0,002	0,031	0,045	-0,040	0,006	0,052	-.093**	1	.436**	.879**
SysR	.089**	0,045	.116**	.079**	.069*	0,002	.065*	0,023	0,050	0,005	-.266**	-.095**	-.095**	-.300**	.436**	1	.812**
R	.064*	.141**	.127**	.135**	-0,019	0,020	0,002	0,011	0,047	0,032	-.167**	-0,047	-0,017	-.219**	.879**	.812**	1

*Note: Significant at ** $p < 0,01$; * $p < 0,05$. Total number of observations are 1240.*

Table 4 shows two panels, (A) and (B), depicting the pairwise coefficients of correlation of various explanatory variables. In the current paper, explanatory variables that have been investigated belong to four key phenomena: corporate governance and board of directors' characteristics, capital structure, and investment. It is evident in Table 4 (Panel A) in the top-left quadrant that there is a high correlation between the variables representing the phenomenon of corporate governance and board of directors' characteristics. For example, *Edu-BoI* and *Ind-Dir* are highly positively correlated. Similarly, in the same table, a high correlation between various variables underpinning the phenomenon of capital structure has been observed in the bottom-right quadrant. For example, the correlation between D/E_{MV} and CD/E_{MV} is positive and significant.

In Table 4 (Panel B), in the top-left quadrant (I/A_{BV}, TI/A_{BV}, ITI/A_{BV} and FI/A_{BV}), it can be observed that there is a high correlation between the variables representing the phenomenon of investment. For example, I/A_{BV} and ITI/A_{BV} are highly positively correlated. Similarly, in the same table, a high correlation between various variables underpinning the firm-performance has been observed in the rest of the table. For example, *ROA* and *ROCE* are significantly positively correlated. Due to the high correlation between the variables within the various phenomena, it was considered to apply the PCA to filter-out lesser important variables and obtain key factors, which have been used as explanatory variables in the MLR analysis.

The results of MLR analysis have been given in Tables 5 to 10. Table 5 shows that Z_1 (education of executive directors) affects D/E_{BV} and NCD/E_{MV} positively, whereas it affects CD/E_{BV}, CD/E_{MV} and *ETR* negatively. Similarly, Z_2 (education of independent directors) influences D/E_{BV} positively, whereas it affects CD/E_{BV} negatively. The Z_3 and Z_4, the underlying experience of executive and independent directors, respectively, affect the capitals structure variables positively except for the *ETR* which shows the negative effect. The Z_5 and Z_6, representing board discipline and independence, show mixed effects on capital structure variables, negative on total debt and non-current debt variables and positive on current debt.

Table 5. Effects of factors (Z_1 to Z_6) representing corporate governance and board of directors' characteristics on capital structure variables

Explained variables (a) to (g)	(a) D/E_{BV}	(b) D/E_{MV}	(c) CD/E_{BV}	(d) CD/E_{MV}	(e) NCD/E_{BV}	(f) NCD/E_{MV}	(g) ETR
Intercept	-0.119	0.221	-0.831	-23.222	21.164	3.534	1.121
Z_1	1.011** (2.122)	-0.611 (-1.122)	-1.811** (-2.032)	-9.687*** (-31.692)	0.484 (1.292)	0.547*** (11.887)	-0.711*** (-8.887)
Z_2	1.117** (2.246)	-0.217 (-1.487)	-4.796** (-2.032)	-1.234 (-1.132)	-0.919 (-1.492)	-0.351 (-1.187)	-0.098* (-1.687)
Z_3	1.564** (2.534)	2.564*** (9.534)	8.564** (2.332)	-0.893 (-1.109)	3.875*** (9.653)	0.897** (2.281)	-0.717* (-2.189)
Z_4	4.882*** (6.667)	8.008*** (16.293)	14.931*** (11.132)	23.056*** (47.998)	4.678*** (11.887)	1.476*** (9.881)	-2.623*** (-13.172)
Z_5	-12.004*** (-19.224)	-7.116*** (-9.737)	41.712*** (23.114)	7.786** (1.997)	-26.341*** (-27.109)	-4.221*** (-9.887)	-0.221 (-1.512)
Z_6	-1.343*** (-5.963)	1.721*** (9.987)	0.783*** (2.997)	11.083** (2.132)	-1.902*** (-17.454)	-2.282** (-2.388)	-0.082 (-0.988)
LnA	0.223* (1.793)	0.423** (2.356)	0.398* (1.747)	0.532*** (7.132)	0.585 (1.099)	0.171* (1.787)	0.112 (1.587)
Durbin-Watson test	1.845	1.923	2.018	1.994	2.012	1.951	1.912
Pseudo-R^2	0.178	0.189	0.123	0.119	0.097	0.145	0.111
F-statistic	6.592***	6.723***	1.735*	1.712*	1.667*	6.044***	1.744*

Note: OLS MLR estimates are shown in above table (t-statistics appear in parentheses), significant at *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. Total number of observations are 1240.

Overall, the experience and education of executive directors affect total and non-current debt positively, and the possible reason for this finding is that such directors place a high value on the interest tax shield and at the same time they are confident to minimize any financial distress cost related to the additional leverage. Noticeably, relatively educated executive (independent) directors are averse of short-term borrowing due to a higher debt-repayment pressure, nonetheless, the experience of both types of directors can persuade them to enhance the current debt. Interestingly, *disciplined*, and *independent* boards of directors show their favorable reaction to the current debt due to the importance of liquidity requirements. Similarly, such boards avoid non-current debt to minimize *managerial slack* associated with long-term debt contracts.

In Table 6, the experience of both types of directors and education of executive directors positively influences most of the firm-investment variables. Furthermore, independent, and disciplined boards have a positive impact on each type of investment, which is tangible, intangible, and financial. It is pertinent to note that the impact of factors representing corporate governance and board of directors' characteristics on investment variables though the impact is limited and *uneven*.

Table 6. Effects of factors (Z_1 to Z_6) representing corporate governance and board of directors' characteristics on investment variables

Explained variables (a) to (d)	(a) I/A_{BV}	(b) TI/A_{BV}	(c) ITI/A_{BV}	(d) FI/A_{BV}
Intercept	-0.101	0.121	-0.234	-11.987
Z_1	0.011 (0.645)	-0.223 (-1.122)	0.069** (2.421)	0.113* (1.903)
Z_2	0.109 (1.046)	-0.023 (-0.982)	-0.096 (-1.232)	-0.117 (-1.119)
Z_3	1.112* (1.834)	0.089* (0.834)	1.564* (1.726)	0.893** (2.519)
Z_4	0.882* (1.767)	0.238 (1.193)	0.931 (1.132)	1.056* (1.823)
Z_5	0.064 (1.224)	1.116* (1.737)	1.012* (1.714)	0.981* (1.797)
Z_6	-0.343 (-0.963)	0.721 (1.117)	0.783* (1.826)	1.026* (1.832)
LnA	0.117* (1.691)	0.087* (1.756)	0.026 (0.654)	0.532* (1.832)
Durbin-Watson test	1.911	1.987	1.888	1.923
Pseudo-R^2	0.098	0.087	0.097	0.112
F-statistic	1.597*	1.623*	1.535*	1.512*

Note: OLS MLR estimates are shown in above table (t-statistics appear in parentheses), significant at *** p < 0.01, ** p < 0.05, and * p < 0.10. Total number of observations are 1240.

Overall, the impact of explanatory factors is largely confined to intangible, and financial investments. A possible explanation of these findings is that investments in intangible and financial assets not only need human capital (for example, education and experience) of senior directors but also require board discipline and effective monitoring and control by independent directors, whereas, decisions regarding investment in the tangible assets are less complex, relatively predictable and largely based on the similar investment experiences acquired in the past.

Table 7 highlights the effects of factors representing corporate governance and board of directors' characteristics on performance variables. The performance variables have been categorized as: accounting return, market return, hybrid performance, cost of capital and risk exposure. Overall, the explanatory factors have low-level favorable effects on the firm-performance variable. In other words, the impact of corporate governance and board of directors' characteristics on performance variables is either favorable (higher return, low cost of capital and low risk exposure) albeit not highly significant or non-existent.

Table 7. Effects of factors (Z_1 to Z_6) representing corporate governance and board of directors' characteristics on performance variables (Part 1)

Explained variables (a) to (g)	(a) ROA	(b) EPS	(c) ROCE	(d) MBVR	(e) TQ	(f) OCFA	(g) E_c
Intercept	0.121	0.089	0.125	-3.119	1.197	-0.534	0.123
Z_1	0.711* (1.822)	-0.534 (-1.161)	-0.129 (-1.432)	0.187* (1.692)	0.332 (1.492)	0.209 (1.587)	-0.711 (-1.427)
Z_2	1.009 (1.326)	-0.211 (-1.323)	-1.327 (-1.554)	0.754 (1.552)	-0.733 (-1.523)	0.098 (1.109)	-0.054 (-0.687)
Z_3	1.564* (1.799)	0.622 (1.534)	0.578* (1.732)	-0.093 (-1.109)	0.227 (1.453)	0.234* (1.881)	-0.543 (-1.389)
Z_4	0.976 (1.327)	0.776 (1.456)	1.231 (1.532)	0.873 (1.567)	0.534 (1.587)	0.776 (1.581)	0.623 (1.272)
Z_5	1.204* (-1.884)	0.156* (1.789)	0.967 (1.114)	0.867 (1.597)	0.045 (1.369)	0.221* (1.687)	-0.746* (-1.682)
Z_6	0.872 (1.372)	0.981* (1.766)	0.783* (1.897)	0.093 (1.132)	0.623** (1.754)	-0.134 (-.675)	-0.042 (-0.558)
LnA	0.457* (1.697)	0.226 (1.456)	0.311 (1.467)	0.432 (1.132)	0.522 (1.123)	0.345* (1.823)	0.112 (1.587)
Durbin-Watson test	1.972	1.899	2.111	1.997	2.091	1.958	1.945
Pseudo-R^2	0.123	0.111	0.167	0.129	0.101	0.125	0.127
F-statistic	1.397*	1.453*	1.645*	1.452*	1.647*	1.844*	1.739*

Table 7. Effects of factors (Z_1 to Z_6) representing corporate governance and board of directors' characteristics on performance variables (Part 2)

Explained variables (h) to (m)	(h) D_c	(i) WACC	(j) Ret	(k) R	(l) SysR	(m) UnsysR
Intercept	0.123	0.098	-0.029	1.023	1.114	0.654
Z_1	-0.811* (-1.822)	-0.227* (-1.932)	0.579 (1.432)	-0.687* (-1.792)	0.284 (1.092)	1.247* (1.887)
Z_2	-1.123 (1.646)	-0.434 (-1.483)	1.094 (1.532)	-0.997 (-1.234)	-0.756 (-1.563)	-0.729 (-1.387)
Z_3	0.876 (1.534)	-0.089* (-1.789)	0.864* (1.832)	-0.045 (-0.746)	0.435* (1.699)	0.197 (1.281)
Z_4	0.112 (0.667)	0.778 (1.593)	0.931 (1.432)	0.856 (1.537)	0.678 (1.487)	0.859 (1.581)
Z_5	-0.739 (-1.534)	0.356 (0.922)	0.912 (1.454)	-0.534* (-1.897)	-0.829* (-1.769)	-0.927* (-1.887)
Z_6	-0.423* (-1.911)	0.062 (0.763)	0.933* (1.897)	-0.083** (-1.732)	-0.332 (-1.454)	-0.292* (-1.788)
LnA	0.089 (0.893)	0.089 (0.356)	0.498* (1.867)	0.453 (0.832)	0.346 (0.789)	-0.671 (-1.056)
Durbin-Watson test	1.899	1.927	2.011	1.991	2.088	1.959
Pseudo-R^2	0.126	0.129	0.129	0.131	0.119	0.121
F-statistic	1.333*	1.723*	1.735*	1.665*	1.582*	1.639*

Note: OLS MLR estimates are shown in above table (t-statistics appear in parentheses), significant at *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. Total number of observations are 1240.

The possible reason for such a thinner relationship between the factors representing corporate governance and board of directors' characteristics on performance variables is that the latter depends more on operational efficiencies, nature of investment and business environment.

Table 8 highlights the effects of capital structure factors (Z_7 to Z_9) on investment variables. The total leverage ratio (Z_7) positively affects all the investment variable-total, tangible, intangible and financial. The long-term leverage ratio affects all the investment variables except the financial investment which shows a negative and significant regression coefficient. Interestingly, short-term leverage has no

effect on investment variables. The firms can use long-term debt to finance their investments in tangible and intangible assets. More investment in tangible and intangible assets underpins favorable business opportunities for firms. Therefore, amidst favorable business opportunities, firms borrow long-term debt to invest in tangible and intangible assets, and if the need is it can even sell its financial assets (negative regression coefficient of financial investment variable). Similarly, the short-term leverage is needed primarily for liquidity management rather than making the investment in assets.

Table 8. Effects of capital structure factors (Z_7 to Z_9) on investment variables

Explained variables (a) to (d)	(a) I/A_{BV}	(b) TI/A_{BV}	(c) ITI/A_{BV}	(d) FI/A_{BV}
Intercept	0.635	0.315	0.045	0.321
Z_7	0.232*** (7.898)	0.118 (7.015)	0.014* (1.763)	0.017* (1.921)
Z_8	0.136*** (6.441)	0.629*** (11.778)	0.213*** (11.595)	-0.107** (-2.453)
Z_9	0.012 (0.608)	0.012 (0.796)	0.000 (0.257)	0.000 (0.615)
LnA	0.044* (1.904)	-0.002 (-0.689)	0.022*** (4.893)	0.086** (2.414)
Durbin-Watson test	1.891	2.063	1.837	2.124
Pseudo-R^2	0.167	0.167	0.176	0.173
F-statistic	6.696***	3.449***	1.644*	4.309***

Note: OLS MLR estimates are shown in above table (t-statistics appear in parentheses), significant at *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. Total number of observations are 1240.

Table 9 highlights the effects of capital structure factors (Z_7 to Z_9) on performance variables. The impact of total-leverage (Z_7) and long-term leverage (Z_8) on accounting, stock market and hybrid measures (TQ) is negative and significant at a low level, whereas, the current-leverage has no impact on the abovementioned performance variables. In nutshell, a higher level of leverage invites adverse market reaction and erosion in profitability. Noticeably, none of the capital structure factors

affects the cost of capital variables: E_c, E_d, and WACC. Similarly, the impact of capital structure factors (Z_7 to Z_9) on risk exposure variables – total risk, systematic risk, and unsystematic risk – is non-existent except for the total-leverage factor on total risk, albeit at a low level. The possible explanation of almost no impact of capital structure factors on the cost of capital, and risk exposure variables is that the market dynamics are more influential than firm-level leverage.

Table 9. Effects of capital structure factors (Z_7 to Z_9) on performance variables (Part 1)

Explained variables (a) to (g)	(a) ROA	(b) EPS	(c) ROCE	(d) MBVR	(e) TQ	(f) OCFA	(g) E_c
Intercept	0.595	0.446	3.755	1.708	-117.876	0.058	0.008
Z_7	-0.024** (-2.509)	-0.001** (-2.455)	-0.023 (-0.746)	0.033 (12.464)	-0.159* (-1.754)	0.005 (1.436)	-0.000 (-0.055)
Z_8	0.727 (0.360)	0.110 (0.597)	-0.880 (-0.375)	-1.027* (-1.910)	-0.802* (-1.763)	-0.009 (-0.962)	0.004 (1.094)
Z_9	-0.002 (-0.126)	-0.002 (-1.383)	0.578 (1.432)	0.054 (1.213)	-0.329 (-1.043)	-0.012 (-0.427)	-0.000 (-0.219)
LnA	-0.261 (-1.540)	-0.007 (-0.441)	-0.638 (-3.238)	0.292*** (5.434)	0.063* (1.848)	0.001 (1.548)	0.009 (0.728)
Durbin-Watson test	2.014	1.903	2.017	2.003	1.998	1.933	1.826
Pseudo-R^2	0.141	0.109	0.221	0.282	0.147	0.089	0.077
F-statistic	4.139***	2.324**	5.019***	20.825***	35.509***	1.823*	1.722*

Table 9. Effects of capital structure factors (Z_7 to Z_9) on performance variables (Part 2)

Explained variables (h) to (m)	(h) D_c	(i) WACC	(j) Ret	(k) R	(l) SysR	(m) UnsysR
Intercept	0.001	0.001	0.001	1.023	0.001	0.001
Z_7	0.001 (-0.705)	0.001 (0.705)	-0.023* (-1.779)	0.687* (1.792)	0.001 (0.705)	0.001 (-0.705)
Z_8	-0.008 (-0.381)	-0.008 (-0.381)	0.001 (0.808)	0.997 (1.234)	0.008 (0.381)	-0.008 (-0.381)
Z_9	-0.005 (-0.008)	-0.005 (-0.008)	0.032 (0.971)	-0.045 (-0.746)	0.005 (0.128)	-0.005 (-0.128)
LnA	0.001 (0.496)	0.001 (0.496)	0.034* (1.792)	0.453* (1.832)	0.001* (1.696)	0.001 (0.496)
Durbin-Watson test	1.781	1.801	1.811	1.826	1.903	1.829
Pseudo-R^2	0.099	0.099	0.087	0.101	0.099	0.099
F-statistic	1.632*	1.713*	1.635*	1.665*	1.713*	1.713*

*Note: OLS MLR estimates are shown in above table (t-statistics appear in parentheses), significant at *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. Total number of observations are 1240.*

Table 10 highlights the effects of investment factors (Z_{10} to Z_{12}) on performance variables: financial return, cost of capital and risk exposure. The investment factors I/A_{BV} (Z_{10}), FI/A_{BV} (Z_{11}), and ITI/A_{BV} (Z_{12}) affect all types of financial performance measures based on accounting, market, and hybrid return positively and highly significantly. On the other hand, investment factors cost of capital variables negatively. The investment factors affect total risk and systematic risk positively, whereas the effect on unsystematic risk is negative. A higher level of investment, a reflection of favorable business opportunities (*ex-ante*), leads to improved financial performance and reduced cost of capital (*both ex-post*) of the sample firms. This finding underpins successful managerial foresight, as more investment undertaken in the wake of envisaged favorable business opportunities materialize in the form of improved financial performance measured by higher financial return (accounting, market and hybrid), falling cost of capital (including cost of debt, cost of equity and *WACC*) and lower risk exposure of sample firms (total, market and firm-specific).

Table 10. Effects of investment factors (Z_{10} to Z_{12}) on performance variables (Part 1)

Explained variables (a) to (g)	(a) ROA	(b) EPS	(c) ROCE	(d) MBVR	(e) TQ	(f) OCFA	(g) E_c
Intercept	0.121	0.089	0.125	-3.119	1.197	-0.534	0.123
Z_{10}	22.711*** (31.522)	0.678*** (8.161)	1.469*** (21.612)	0.687* (1.692)	0.332* (1.787)	-0.099 (-1.587)	-0.711* (-1.827)
Z_{11}	0.811* (1.723)	0.237*** (5.983)	0.072** (2.367)	0.567*** (6.552)	0.089* (1.823)	-0.065** (-2.109)	-1.089*** (-9.687)
Z_{12}	0.133*** (5.227)	0.309*** (7.191)	0.045* (1.844)	0.087** (2.402)	0.092* (1.834)	-0.104* (-1.881)	-0.223** (-2.389)
LnA	0.332* (1.832)	0.287* (1.811)	0.087 (1.009)	0.092* (1.725)	0.098 (1.011)	0.152* (1.823)	0.012 (1.187)
Durbin-Watson test	2.022	1.908	2.021	1.909	2.101	1.933	2.098
Pseudo-R^2	0.336	0.332	0.278	0.174	0.321	0.229	0.311
F-statistic	138.752*	9.221*	61.645*	4.452*	5.647*	4.844*	7.739*

Table 10. Effects of investment factors (Z_{10} to Z_{12}) on performance variables (Part 2)

Explained variables (h) to (m)	(h) D_c	(i) WACC	(j) Ret	(k) R	(l) SysR	(m) UnsysR
Intercept	0.123	0.098	-0.029*	1.023	1.114	0.654
Z_{10}	-0.004 (-0.822)	-0.127* (-1.845)	0.734** (2.432)	0.067** (2.492)	0.219* (1.892)	-0.067 (1.227)
Z_{11}	-0.098** (-2.451)	-0.056** (-2.383)	0.071** (2.389)	0.175*** (11.169)	0.078** (2.563)	-0.112** (-2.341)
Z_{12}	0.095 (1.775)	-0.054* (-1.823)	0.091 (1.209)	0.078 (2.246)	0.094 (2.353)	-0.091* (1.851)
LnA	0.011 (0.363)	0.113* (1.711)	0.034 (1.067)	0.045 (0.732)	0.049 (1.089)	-0.127* (-1.756)
Durbin-Watson test	1.977	1.922	2.002	1.934	2.011	1.923
Pseudo-R²	0.198	0.199	0.171	0.147	0.178	0.234
F-statistic	5.333*	6.723*	5.735*	5.345*	4.993*	9.471*

Note: OLS MLR estimates are shown in above table (t-statistics appear in parentheses), significant at *** p < 0.01, ** p < 0.05, and * p < 0.10. Total number of observations are 1240.

5. CONCLUSION

The principal objective of the current study is to explore whether mutual causalities between the four distinct phenomena – board of directors' characteristics, capital structure, investments, and firm-performance – are unconstrained or whether the abovementioned mutual causalities follow an orderly and sequential pattern.

The correlational analysis shows that there has been a high degree of association between the various proxies measuring each of the abovementioned phenomena. This finding justifies the application of the PCA in the current study to eliminate the effects of lesser important variables and instead extract key factors/components that have been included as explanatory variables in the MLR analysis. The relatively experienced and educated executive directors in the firms enhances the total, and non-current debt expectedly to enhance the interest tax shield. More experienced and educated directors can give an explicit priority to maximize the interest tax shield since it adds to the firm value and, at the same time, they can have good reasons to believe that the favorable effects of debt in the form of interest tax shield exceed the unfavorable effects of the same in the form of financial distress costs. The firms having disciplined, and independent boards of directors, witness an increase in the current debt with a potential motive to maintain a higher liquidity level; similarly, these firms avoid non-current debt to minimize managerial slack and mitigate financial distress costs.

Similarly, the impact of explanatory factors highlighting corporate governance and board of directors' characteristics on firm-level investment is limited to some favorable influence on intangible, and financial investments only. The investment in intangible and financial assets requires relatively high human capital in the form of education and experience of top leadership, board discipline and effective monitoring and control by independent directors of firms. On the other hand, the impact of the above factors on firm-performance is majorly unfounded.

Furthermore, it is evidenced that sample firms utilize long-term leverage to finance their investments in tangible and intangible assets due to better repayment planning associated with long-term leverage. Similarly, investment in tangible and intangible assets underpins favorable business opportunities available or likely to be available to firms. Therefore, amidst favorable business opportunities, sample firms borrow long-term debt to invest in tangible and intangible assets, and if the need is, they even divest their financial assets to raise more financial resources to be invested in tangible and intangible assets. The findings further show that the sample firms do not use the short-term leverage to invest since this type of leverage is primarily used to maintain the required amount of liquidity and meet operational requirements.

The impact of capital structure on market return and accounting return is adverse, whereas the effects of the same on cost of capital, and risk exposure variables are nearly absent. The possible reasons for the above results are that the higher leverage is followed by, first, the higher debt-servicing and second, adverse market reactions often and therefore, accounting return and market return market are adversely affected. Similarly, one can argue that market dynamics play a more influential role in determining the cost of capital than the firm-level leverage. The change in investment favorably affects all types of financial performance measures based on accounting, market, and hybrid return, whereas, the same lowers the cost of capital variables. A higher investment leads to higher total risk and systematic risk since the outcome of an investment is always uncertain, whereas the same affects the unsystematic risk inversely since new investments can enhance the managerial discipline and accountability. A higher level of investment, a reflection of favorable business opportunities (ex-ante), leads to improved financial performance and reduced cost of capital (both ex-post) of the sample firms. This finding underpins the successful managerial foresight, as more investment undertaken in the wake of envisaged favorable business opportunities materialize in the form of improved financial performance measured by higher financial return (accounting, market and hybrid), falling cost of capital (including cost of debt, cost of equity and *WACC*) and lower risk exposure (total, market and firm-specific) of sample firms.

Overall, when analyzing the pattern of findings based on mutual causalities between board of

directors' characteristics, capital structure, investments, and firm-performance the notion of the orderly and sequential pattern gets significant empirical support. The stronger causalities exist, first, when board of directors' characteristics influence capital structure, second, when capital structure influences investments and finally when investments influence financial performance. The board of directors' characteristics are not missing causality with investments and financial performance altogether; however, their causality with investments and financial performance is not relatively strong. In a similar manner, capital structure is not missing causality with financial performance altogether, nonetheless, the strength of its causality with financial performance is weaker. The major contribution of the current study is developing a theoretical framework of an orderly and sequential pattern of mutual causalities. Furthermore, this is the first study of its kind in the Nordic corporate settings. The key implication that can be drawn from the empirical findings is that corporate finance managers should consider the distinct sets of factors when making certain key decisions related to the firms. The major limitation of the current study is that it considers the *Nordic* as a single homogenous unit of study/analysis and, therefore, the inter-country differences have been omitted.

REFERENCES

1. Aguilera, R. V., & Crespi-Cladera, R. (2016). Global corporate governance: On the relevance of firms' ownership structure. *Journal of World Business, 51*(1), 50-57. https://doi.org/10.1016/j.jwb.2015.10.003
2. Basu, D., & Sen, K. (2015). Financial decisions by business groups in India: Is it "fair and square"? *Journal of Contemporary Accounting & Economics, 11*(2), 121-137. https://doi.org/10.1016/j.jcae.2015.02.001
3. Berk, J. B., & DeMarzo, P. M. (2020). *Corporate finance* (5th ed.). Harlow, England: Pearson Education.
4. Cadima, J., & Jolliffe, I. T. (1995). Loading and correlations in the interpretation of principle compenents. *Journal of Applied Statistics, 22*(2), 203-214. https://doi.org/10.1080/757584614
5. Dawar, V. (2014). Agency theory, capital structure and firm performance: Some Indian evidence. *Managerial Finance, 40*(12), 1190-1206. https://doi.org/10.1108/MF-10-2013-0275
6. Dierker, M., Lee, I., & Seo, S. W. (2019). Risk changes and external financing activities: Tests of the dynamic trade-off theory of capital structure. *Journal of Empirical Finance, 52*, 178-200. https://doi.org/10.1016/j.jempfin.2019.03.004
7. Fan, Y., Jiang, Y., Kao, M.-F., & Liu, F. H. (2020). Board independence and firm value: A quasi-natural experiment using Taiwanese data. *Journal of Empirical Finance, 57*, 71-88. https://doi.org/10.1016/j.jempfin.2020.04.001
8. Graham, J. R., & Leary, M. T. (2011). A review of empirical capital structure research and directions for the future. *Annual Review of Financial Economics, 3*, 309-345. https://doi.org/10.2139/ssrn.1729388
9. Hundal, S. (2016). Busyness of audit committee directors and quality of financial information in India. *International Journal of Business Governance and Ethics, 11*(4), 335-363. https://doi.org/10.1504/IJBGE.2016.10003075
10. Hundal, S. (2017). Multiple directorships of corporate boards and firm performance in India. *Corporate Ownership and Control, 14*(4), 150-164. https://doi.org/10.22495/cocv14i4art13
11. Hundal, S., Sandstrom, A., & Uskumbayeva, A. (2018). The impact of the financial crisis on corporate capital structure in the Nordic countries. *Eurasian Journal of Economics and Finance, 6*(3), 34-51. https://doi.org/10.15604/ejef.2018.06.03.003
12. Jensen, M. C. (1986). Agency cost of free cash flow, corporate finance, and takeovers. *American Economic Review, 76*(2), 323-329. https://doi.org/10.2139/ssrn.99580
13. Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305-360. https://doi.org/10.1016/0304-405X(76)90026-X
14. Jolliffe, I. T. (1987). Rotation of principal components: Some comments. *Journal of Climatology, 7*(5), 507-510. https://doi.org/10.1002/joc.3370070506
15. Kang, M., Wang, W., & Xiao, Y. (2018). Market imperfections, macroeconomic conditions, and capital structure dynamics: A cross-country study. *Emerging Markets Finance and Trade, 54*(1), 234-254. https://doi.org/10.1080/1540496X.2017.1326380
16. Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review, 48*(3), 261-297. Retrieved from www.jstor.org/stable/1809766
17. Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: A correction. *The American Economic Review, 53*(3), 433-443. Retrieved from www.jstor.org/stable/1809167
18. Myers, S. C. (1984). The capital structure puzzle. *The Journal of Finance, 39*(3), 575-592. https://doi.org/10.2307/2327916
19. Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics, 13*(2), 187-221. https://doi.org/10.1016/0304-405X(84)90023-0
20. Salim, M., & Yadav, R. (2012). Capital structure and firm performance: Evidence from Malaysian listed companies. *Procedia - Social and Behavioral Sciences, 65*, 156-166. https://doi.org/10.1016/j.sbspro.2012.11.105
21. Sheikh, N. A., & Wang, Z. (2011). Determinants of capital structure: An empirical study of firms in manufacturing industry of Pakistan. *Managerial Finance, 37*(2), 117-133. https://doi.org/10.1108/03074351111103668