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The Impact of Board of Directors' Composition on Firm Performance through Innovation in Finnish and Swedish Corporate Sector

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Abstract

In the modern business world, the organizational, and technological risk exposures are normal, perpetual and deeply ingrained. In such milieu, corporations place a high value on innovation in order to survive, grow and sustain. In the modern business settings, innovation is reckoned as a synonym to corporate success. The composition and characteristics of the board of directors are one of the principal determinants that influence the nature and degree of innovation in a firm. The current study examines whether corporate innovativeness is affected by the characteristics of composition of firm directors and furthermore investigates the extent to which the innovativeness affects firm performance. Secondary quantitative data of 24 Finnish and 36 Swedish publicly traded companies have been obtained from their financial statements, annual reports and NASDAQ OMX Nordic database for the period from 2012 to 2018. The empirical findings revealed that firm performance is influenced by corporate innovativeness, which, in turn, is found to be affected by characteristics of the directors. The major contribution of the current paper is that firm-level innovativeness is not fully exogenous since the firm leadership characteristics, as represented by the board of directors of a firm, impact the innovativeness of a firm.

Keywords: *Corporate governance, board of directors, innovation, board composition, financial performance, non-financial performance, systematic risk.*

1. Introduction

Joseph Schumpeter was the first economist, who propounded the idea of the economics of innovation in a scientific manner in the 1930s [1]. Prior to the economics of innovation, the economic value was considered primarily associated with physical resources. Since the second half of the twentieth century, the discussion pertaining to innovation has gained tremendous momentum and emerged as an important topic of empirical research. The field of economics of innovation is not only confined to researchers but also very much recognized by the major international institutions, such as the Organization for Economic Cooperation and Development [2].

The modern day corporations function in an unprecedentedly risky business environment especially those emanating from organizational and technological facets. In order to survive, grow, sustain, on the one hand, and function smoothly and stay competitive, on the other hand, the corporations assign a great deal of relevance to innovation. Similarly, innovation influences attraction and retention of customers, development, and differentiation of products and services, and market entry, among several other things. In the current business settings, characterized by multiple and complex natured risks, innovation can play a pivotal role in order to affect corporate success. The firms, which are unable to keep pace with the required innovation, may face the existential threat or experience a considerable downturn in terms of their business performance.

Innovation depends upon several technological and business factors, which are often considered *exogenous*. However, it is important to understand that innovation can be *endogenous* too since corporate leadership plays an important role with respect to innovation in corporate objectives, planning, and strategy. Every board of directors

has unique characteristics related to its composition (for example, board size, age, board independence, multiple directorships, education background of directors) that can influence the nature and degree of innovation in a firm, among other determinants, which in turn can affect the economic value of the firm [3].

The current study examines whether, first, several characteristics pertaining to the firm-level boards of directors such as busyness of corporate board of directors, board size, age, education level of a board members, gender affect the firm's innovativeness; and second, the firm-level innovativeness affects market risk exposure of firms, and firm performance both based on market and accounting measures.

In order to answer the abovementioned research questions as many as 24 Finnish and 36 Swedish publicly listed firms on NASDAQ OMX Nordic have been analyzed for the seven-year period– 2012 to 2018. The findings show that several firm-level characteristics of board composition, such as gender, multiple directorships, and board size, affect the firm-level innovativeness. Similarly, firm-level innovativeness influences the accounting-based and market-based performance of firms. The key theoretical contributions of the current paper are the followings–first; innovation is not fully exogenous, as the nature of firm-level leadership underpinned by the characteristics of board of directors, can influence its innovativeness, and second; the association between characteristics of board of directors and firm performance is based on an important premise, which is innovativeness in the current paper, among other things. Similarly, this is one of the fewest studies exploring the abovementioned phenomena in the Finnish and Swedish business settings.

2. Review of Literature and Hypotheses

The overarching goal of a corporate board of directors is to provide entrepreneurial leadership to the firm by ensuring that required monitoring and controls measures are intact and fully functional so that the risk exposure of the firm can be effectively identified, assessed and managed. In addition, the board is responsible for setting strategic goals and at the same time ensuring that all required human and financial resources are in place so that the firm is capable of meeting its overall performance targets [4]. Furthermore, it is the responsibility of directors to appoint executives, approve financial and other reporting and, where necessary, provide guidance to the management of the company [5].

Among the most important characteristics of corporate boards that can affect their effectiveness is the independence of directors. Several studies demonstrate that independent directors are capable of providing better monitoring functions since they do not have any economic interests with the firm. Therefore, a firm having a higher proportion of independent directors on their boards have a lower likelihood of fraudulent practices and accounting manipulations. Board diversity is of paramount importance for a firm board to be effective. Diversity leads to a multiplicity of ideas, perspectives, and viewpoints, which may help firms to visualize, plan and strategize in the holistic manner [6]. Some studies suggest that in order for a corporate board to increase its effectiveness of monitoring and control management, it is important for it to have a diverse mix of directors [7]. Since *the quality comes through quantity*, therefore, some studies, inspired by the resource-dependence theory, suggest that firms having larger board size and/or firms, whose directors have multiple directorships in other firms, can capitalize their *reputational capital*, consisting of *human capital* (education, skills, expertise and experiences) and *relational capital* (professional networks of directors), and resultantly enhance their performance [8,9]. Multiple directorships or busyness of directors directly affects the independence of corporate directors. Accordingly, as the level of busyness of directors increases, their responsibilities increase as well as, resultantly busy directors monitor the managerial actions and apply control mechanism in a better way, since the potential loss of their reputation, in the event of failure to perform their core responsibilities, is immense. On the contrary, the key argument of the agency theory suggests that busyness of corporate directors can negatively affect the firms' performance. There are a number of reasons attributed to such a negative association between the busyness and firm performance [9]. First, multiple directorships may cause a decline in time and attention required to perform the core responsibilities of directors. Second, busy directors may fail to monitor managerial actions. Third, capabilities of busy directors, especially those having so-called high reputational capital, is often firm-specific and their application in the different organizational settings may not be effective.

Another determinant of board efficacy is the so-called *relationship investing*, which implies that when a major stockholder receives a seat on the board, he/she develops a natural instinct to, first, apply effective monitoring and control mechanisms, and second, provide the best of his/her reputational capital to the firms, lest he/she should experience any wealth erosion [10].

The concept of firm performance, which is an integral aspect of the operational efficiency of firms, occupies a pivotal strand in both theory and practice [11]. Furthermore, the concept of firm performance finds a great deal of relevance in the corporate governance literature too. The operational efficiency underlines *how much is produced* whereas corporate governance underpins *how is produced*. The concept of corporate governance, when added to the firm performance, brings rules, responsibilities, best practices, regulations, accountability, disclosures, monitoring, control and several other ethos in the overall discussion of board leadership, innovativeness, and firm performance.

Regarding firm performance assessment, it is worth mentioning that, historically, firms used to rely on accounting indicators, principally. According to some researchers, the accounting measures of firm performance underscore managerial quality [12]. Similarly, the accounting performance measures are often used by analysts and investors to benchmark the profitability on the invested capital [13]. Similarly, market-based performance measures are forward-looking and therefore underline the expectations of the future performance of the firm [14]. Researchers argue that market-based measures provide a more complete picture than that by accounting-based indicators, as former consider the greater range of relevant information pertaining to firm profitability, growth and stock valuation. The firm performance measures can be split into two subcategories: financial and strategic performance [14]. The first measure includes profitability, market value, and growth performance, whereas, the second includes non-financial measures. Similarly, another aspect of the firm performance is the systematic risk, also known as non-specific, unavoidable or market risk, is related to the extent to which a firm's stock price is influenced by the market factors and macro-economic determinants such as economic cycles, government actions, and fiscal and monetary policies [15]. The systematic risks cannot be avoided, as every firm, regardless of its performance and other characteristics must face them [16].

Based on the review of literature, the following hypotheses have been made:

H₁: Busyness of corporate directors affects firms' innovativeness.

H₂: Board size affects firms' innovativeness.

H₃: Higher education level of boards of directors positively affects firms' innovativeness.

H₄: Higher proportion of women on boards of directors positively affects firms' innovativeness.

H₅: Higher median age of boards of directors affects firms' innovativeness.

H₆: Innovativeness affects market-based performance of firms.

H₇: Innovativeness affects accounting-based performance of firms.

H₈: Innovativeness affects systematic risk exposure of firms.

3. Data and Methodology

The current study is based on secondary data for the period 2012-18 obtained from the published annual reports of firms, especially financial statements, and corporate governance reports. Additionally, the stock price data were obtained from the NASDAQ OMX Nordic database. The sample size includes 24 Finnish and 36 Swedish firms. The total number of firm-year observations are 393.

Table 1 below highlights the variables used in the analysis along with their labels and their description.

Table 1. Definition and description of variables

Variables	Label	Description
Age	Age	The median age of a firm's directors. Median age is the representative age of the board members.
	Agesq	The age variable is squared in order to bring non-linearity.
	AgeNL	Natural logarithm of the age variable discounts the size effect of the variable.
Board Size	BoardS	Number of directors of a firm.
	BoardSsq	Squared value of the board size variable.
	BoardSNL	Natural logarithm of the board size variable.
Education	Edu	For example, if a director of a firm holds two bachelor's degrees, one master's degree and a doctor of philosophy degree, then he/she claims one point each for two bachelor's degrees (2), two points for one master's degree (2) and three

		points for a Ph.D. (3). Therefore, altogether seven points will be added to the firm-level education. The same procedure will be followed for other directors of the firm. The final firm-level value will be the cumulative value of education a firm's directors.
	EduSq	Squared value of the education variable
	EduNL	Natural logarithm of the education variable
Gender	Gender	The gender variable is calculated as a proportion of female directors on the board. The calculation is as follows: $\text{Gender} = \frac{\text{Female Board Members of the Firm}}{\text{Firm Board Size}}$
Busyness	Busyness	For example, if a director of the firm is on 3 boards of directors and 4 committee members of other firms, then the busyness number will be 7. The same procedure will be followed for other directors of the firm. Finally, median level of busyness (multiple directorships) will be calculated at the firm level.
Board Independence	BoardInd	The board independence variable is a proportion of independent members of a board. The calculation is as follows: $\text{Board Independence} = \frac{\text{Independent Directors of the Firm}}{\text{Board Size}}$
Research and Development	RD	RD is the value of expenses incurred on the research and development at the firm level. The data can be obtained from the Income Statement of the firm.
Total Sales	Sales	A total value of sales revenue can be obtained from the Income Statement of the firm.
Gross Profit	GrossProfit	Gross profit or Earnings (Profit) before tax can be obtained from the Income Statement of the firm.
Total Assets	TotalA	It is the total amount of resources a company possesses. The book value of the total assets can be obtained from the Balance Sheet of the firm.
	TotalALog	Natural logarithm of the total assets variable.
Intangible Assets	IntA	Intangible assets include intellectual property such as patents, trademarks, and copyrights. The book value of the variable can be obtained from the Balance Sheet of the firm.
Market Capitalization	MarketCap	The market capitalization of a company refers to its total market of the firm equity. The data is obtained from the NASDAQ OMX database. The median share price of the given firm for the given year, is multiplied by the number of outstanding shares.
	MarketCapLog	Natural logarithm of the market capitalization variable.
Book Value	BV	This variable is the book value of equity, also known as net worth and net assets. The value is calculated by firm level total assets minus total liabilities. The data can be obtained from the Balance Sheet of the firm.
Innovation 1	Inno1	This variable is calculated by dividing Research & Development Expenditure by Total Sales Revenue of the firm for a given year. Both numerator and denominator values can be obtained from the Income Statement of firms.
Innovation 2	Inno2	This variable is calculated by dividing value of the Intangible Assets by Total Assets value of the firm for a given year. Both numerator and denominator values can be obtained from the Balance Sheet of firms.
Beta	Beta	Beta coefficient represents the systematic/market risk exposure of the firm. Beta coefficient reflects regression (slope) of the firm-level stock return on the market (index) return. A higher beta shows higher market risk. The data for firm-level stock return on the market (index) return can be obtained from the NASDAQ OMX database.
Gross Profit Margin	GPmargin	This variable can be obtained by dividing Gross Profit by Sales Revenue of the firm for a given year. Both numerator and denominator values can be obtained from the Income Statement of firms.
Market-to-Book value ratio	MVBV	This variable is calculated by dividing Market Capitalization by Book Value of firm assets of the firm for the given year.
Instrumental variable 1	InstrumentalIV1	A predicted variable of Innovation 1 variable.
Instrumental variable 2	InstrumentalIV2	A predicted variable of Innovation 2 variable.

In the current paper, several data analytical techniques, for example, descriptive statistics, correlational analysis and regression analysis have been applied. The following multivariate ordinary least square regression models have been applied to test various hypotheses:

$$\begin{aligned} Innovation\ 1 = & a_{it} + \beta_1(Age)_{it} + \beta_2(Agesq)_{it} + \beta_3(AgeNL)_{it} + \beta_4(BoardS)_{it} + \beta_5(BoardSsq)_{it} + \beta_6(BoardSNL)_{it} \\ & + \beta_7(Edu)_{it} + \beta_8(EduSq)_{it} + \beta_9(EduNL)_{it} + \beta_{10}(Gender)_{it} + \beta_{11}(Busyness)_{it} + \beta_{12}(BoardInd)_{it} \\ & + \beta_{13}(RD)_{it} + \beta_{14}(Sales)_{it} + \beta_{15}(GrossP)_{it} + \beta_{16}(Inno2)_{it} + \beta_{17}(GPmargin)_{it} + \beta_{18}(MVBV)_{it} \\ & + \beta_{19}(MarktCapLog)_{it} + \beta_{20}(TotalALog)_{it} + \beta_{21}(InstrumentalIV2)_{it} + \beta_{22}(Beta)_{it} + \varepsilon_i \end{aligned}$$

$$\begin{aligned} Innovation\ 2 = & a_{it} + \beta_1(Age)_{it} + \beta_2(Agesq)_{it} + \beta_3(AgeNL)_{it} + \beta_4(BoardS)_{it} + \beta_5(BoardSsq)_{it} + \beta_6(BoardSNL)_{it} \\ & + \beta_7(Edu)_{it} + \beta_8(EduSq)_{it} + \beta_9(EduNL)_{it} + \beta_{10}(Gender)_{it} + \beta_{11}(Busyness)_{it} + \beta_{12}(BoardInd)_{it} \\ & + \beta_{13}(RD)_{it} + \beta_{14}(Sales)_{it} + \beta_{15}(GrossP)_{it} + \beta_{16}(Inno1)_{it} + \beta_{17}(GPmargin)_{it} + \beta_{18}(MVBV)_{it} \\ & + \beta_{19}(MarktCapLog)_{it} + \beta_{20}(TotalALog)_{it} + \beta_{21}(InstrumentalIV1)_{it} + \beta_{22}(Beta)_{it} + \varepsilon_i \end{aligned}$$

$$\begin{aligned} GPmargin = & a_{it} + \beta_1(Age)_{it} + \beta_2(Agesq)_{it} + \beta_3(AgeNL)_{it} + \beta_4(BoardS)_{it} + \beta_5(BoardSsq)_{it} + \beta_6(BoardSNL)_{it} \\ & + \beta_7(Edu)_{it} + \beta_8(EduSq)_{it} + \beta_9(EduNL)_{it} + \beta_{10}(Gender)_{it} + \beta_{11}(Busyness)_{it} + \beta_{12}(BoardInd)_{it} \\ & + \beta_{13}(RD)_{it} + \beta_{14}(Sales)_{it} + \beta_{15}(GrossP)_{it} + \beta_{16}(Inno1)_{it} + \beta_{17}(Inno2)_{it} + \beta_{18}(MVBV)_{it} \\ & + \beta_{19}(MarktCapLog)_{it} + \beta_{20}(TotalALog)_{it} + \beta_{21}(InstrumentalIV1)_{it} \\ & + \beta_{22}(InstrumentalIV2)_{it} + \beta_{23}(Beta)_{it} + \varepsilon_i \end{aligned}$$

$$\begin{aligned} Beta = & a_{it} + \beta_1(Age)_{it} + \beta_2(Agesq)_{it} + \beta_3(AgeNL)_{it} + \beta_4(BoardS)_{it} + \beta_5(BoardSsq)_{it} + \beta_6(BoardSNL)_{it} \\ & + \beta_7(Edu)_{it} + \beta_8(EduSq)_{it} + \beta_9(EduNL)_{it} + \beta_{10}(Gender)_{it} + \beta_{11}(Busyness)_{it} + \beta_{12}(BoardInd)_{it} \\ & + \beta_{13}(RD)_{it} + \beta_{14}(Sales)_{it} + \beta_{15}(GrossP)_{it} + \beta_{16}(Inno1)_{it} + \beta_{17}(Inno2)_{it} + \beta_{18}(MVBV)_{it} \\ & + \beta_{19}(MarktCapLog)_{it} + \beta_{20}(TotalALog)_{it} + \beta_{21}(InstrumentalIV1)_{it} + \beta_{22}(InstrumentalIV2)_{it} \\ & + \beta_{23}(GPmargin)_{it} + \varepsilon_i \end{aligned}$$

$$\begin{aligned} MVBV = & a_{it} + \beta_1(Age)_{it} + \beta_2(Agesq)_{it} + \beta_3(AgeNL)_{it} + \beta_4(BoardS)_{it} + \beta_5(BoardSsq)_{it} + \beta_6(BoardSNL)_{it} \\ & + \beta_7(Edu)_{it} + \beta_8(EduSq)_{it} + \beta_9(EduNL)_{it} + \beta_{10}(Gender)_{it} + \beta_{11}(Busyness)_{it} + \beta_{12}(BoardInd)_{it} \\ & + \beta_{13}(RD)_{it} + \beta_{14}(Sales)_{it} + \beta_{15}(GrossP)_{it} + \beta_{16}(Inno1)_{it} + \beta_{17}(Inno2)_{it} + \beta_{18}(GPmargin)_{it} \\ & + \beta_{19}(MarktCapLog)_{it} + \beta_{20}(TotalALog)_{it} + \beta_{21}(InstrumentalIV1)_{it} + \beta_{22}(InstrumentalIV2)_{it} \\ & + \beta_{23}(Beta)_{it} + \varepsilon_i \end{aligned}$$

4. Empirical findings

In the Table 2 below descriptive statistics of the sample firms have been highlighted. The average median age of the board of directors is 56,8 years, whereas the average total board size is 9. Similarly, the average of busyness and board independence is 3,56 and 0,72, respectively. The average values of Innovation-1 and Innovation-2 are 0,05 and 0,11, respectively. From the firms performance perspective, the average values of gross profit margin and market-to-book are 0,37 and 1,42, respectively.

Table 3 highlights that Inno1 variable is positively associated with market value of firms and book value of firms as measured by total assets. Similarly, Inno1 is negatively associated with *the Gender* variable, representing proportion of women on corporate boards. Similarly, Inno2 variable is positively associated with firm board size and ratio of market-to-book value of firms, and at the same time Inno2 variable is negatively associated with market risk exposure of firms and book value of firms. Similarly, accounting measure of performance is positively associated with the market-to-book value of firms, and negatively associated with board size and market value, and book value of firms. The market performance of the firms, as measured by the market-to-book value of firms, is positively associated with Inno2 variable, and negatively associated with board size, education of board members, market risk exposure and book value of firms. However, beta coefficient, the market risk exposure of firms, is positively associated with education of boards of directors and busyness of directors, and negatively associated with board size, Inno2 variable, market-to-book value and market capitalization of firms.

Table 2. Descriptive Statistics (N=393)

Variables	Range	Minimum	Maximum	Mean	Standard deviation
Age (year)	25,5	44	69,5	56,8	4,08
BoardS (number)	9	5	14	9	2,16
Edu (number)	55	2	57	18,7	6,78
Busyness (number)	7	1	8	3,56	1,49
BoardInd (coefficient)	0,73	0,20	0,93	0,72	0,11
RD (Million Eur)	4997	0,01	4997	167,33	566,32
Sales (Million Eur)	37947,71	48,00	37995,71	5792,46	6469,76
GrossP (Million Eur)	16501,00	-120,00	16381,00	1761,41	2350,55
TotalA (Million Eur)	46114,31	31,00	46145,31	6371,39	8586,94
IntA (Million Eur)	18241,15	6,50	18247,65	649,73	1588,47
MarketCap (Million Eur)	47465,20	15,01	47480,21	6419,43	7993,65
BV (Million Eur)	35377,01	543,93	35920,94	2932,68	4639,66
Beta (coefficient)	3,10	-0,27	2,83	0,73	0,24
Inno1 (coefficient)	0,48	0,01	0,49	0,05	0,05
Inno2 (coefficient)	0,72	0,01	0,73	0,11	0,15
GPmargin (coefficient)	0,88	-0,02	0,86	0,37	0,21
MVBV (coefficient)	23,77	0,10	23,87	1,42	1,85

Table 3. Pairwise Coefficient of Correlation (N=393)

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
X1	1	-,05	,06	,05	,04	,02	-,01	,01	-,00	-,02	-,05	-,03	-,04	,00
X2	-,05	1	,26**	-,02	,02	-,03	,13**	-,21**	,05	,14**	-,30**	-,13*	,37**	,45**
X3	,06	,26**	1	-,10*	,37**	,02	,18**	,19**	,00	-,02	-,04	-,12*	,29**	,34**
X4	,05	-,02	-,10*	1	,11*	-,03	-,15**	,02	-,10*	-,03	,05	,03	-,05	-,06
X5	,04	,002	,37**	,11*	1	-,07	-,08	,10*	-,02	,04	-,06	,04	,05	,05
X6	,02	-,03	,02	-,03	-,07	1	-,03	-,01	-,02	,04	,04	,02	-,04	-,07
X7	-,01	,13**	,18**	-,15**	-,08	-,03	1	0,05	,71**	,01	,02	-,07	,36**	,40**
X8	,01	-,21**	,19**	,02	,10*	-,01	-,05	1	-,04	-,11*	-,06	-,13**	-,11*	,03
X9	-,00	,05	,00	-,10*	-,02	-,02	,71**	-,04	1	,08	,03	-,00	,13*	,11*
X10	-,02	,14**	-,02	-,03	,04	,04	,01	-,11*	,08	1	,03	,12*	-,00	-,17**
X11	-,05	-,30**	-,04	,05	-,06	,04	,02	-,06	,03	,03	1	,19**	-,15**	-,34**
X12	-,03	-,13*	-,12*	,03	,04	,02	-,07	-,13**	-,00	,12*	,19**	1	,01	-,35**

X13	-,04	,37**	,29**	-,05	,05	-,04	,36**	-,11*	,13*	-,00	-,15**	,01	1	,74**
X14	,00	,45**	,34**	-,06	,05	-,07	,40**	,03	,11*	-,17**	-,34**	-,35**	,74**	1

Note: X1 – Age; X2 – BoardS ; X3 – Edu; X4 – Gender; X5 – Busyness; X6 – BoardInd; X7 – RD; X8 – Beta; X9 – Inno1; X10 – Inno2; X11 – Gpmargin; X12 – MVBV ; X13 – MarktCapLog ; X14 – TotalALog. Correlation coefficients are significant at ** (1%) and * (5%).

Table 4 highlights the impact of boards of directors related variables on innovation variables. Busyness of corporate directors is the only variable related to the boards of directors composition that positively influence Inno1 variable, which is calculated by dividing R&D expenditure by sales revenue. Similarly, board size and busyness affect Inno2, calculated by dividing value of the intangible assets by total assets, negatively, however, education of directors affects Inno2 positively.

Table 5 highlights that board size, education, proportion of women in boards of directors (Gender), market capitalization of firms, age of board members, Inno1 variable and market-to-book value ratio positively affect the accounting performance measure (Gross profit margin). Similarly, non-linear value of the board size (squared), and education (squared), busyness of directors, beta coefficient, book value of firm, non-linear value of age of directors (non-logarithmic) negatively affect the accounting performance of firms.

Table 4. Effect of board of directors characteristics on innovation variables (N=393)

Dependent Variable	Independent Variable	Regression coefficients	t-value	sig
Inno1	Busyness	0,06	2,68	0,00
Pseudo R ²	0,13	Durbin-Watson test	1,78	
Inno2	BoardSNL	-0,23	-2,67	0,00
Inno2	EduSq	0,71	22,66	0,00
Inno2	Busyness	-0,34	-14,05	0,00
Pseudo R ²	0,19	Durbin-Watson test	1,86	

Table 5. Effect of board of directors characteristics and innovation on accounting-based performance (Gross profit margin) (N=393)

Dependent variables	Regression coefficients	t-value	Significance
BoardSq	-0,02	-3,22	0,00
BoardS	42,98	2,67	0,01
EduSq	-0,01	-1,64	0,10
Edu	0,02	1,85	0,07
Gender	0,11	1,54	0,10
Busyness	-0,03	-5,04	0,00
Beta	-0,09	-2,77	0,01
MarktCapLog	0,11	5,79	0,00
TotalALog	-0,13	-6,87	0,00
AgeNL	-0,03	-5,01	0,00
Age	13,52	4,12	0,00
Agesq	12,23	4,13	0,00
Inno1	0,14	2,52	0,01
MVBV	0,07	1,58	0,10
Pseudo R ²	0,35	Durbin-Watson test	1,87

Table 6 highlights that market capitalization of firms, sales revenue, busyness of directors, non-linear value of education (squared), and Inno2 variable positively affect the market-based performance (market-to-book value ratio). Similarly, book value of firms (non-linear), gross profit margin, age of directors, and Inno1 variable negatively affect the market based performance measure of firms.

Table 7 highlights that education of directors, book value of firms, proportion of women directors on boards and busyness of directors positively affect the market risk exposure of firms, whereas, board size, market capitalization of firms, gross profit margin and age of directors negatively affect the same. Interestingly, none of the two innovation variable have any impact on the market risk exposure of firms.

Table 6. Effect of board of directors characteristics and innovation on market-based performance (market-to-book value ratio) (N=393)

Dependent variables	Regression coefficients	t-value	Significance
TotalALog	-1,83	-16,83	0,00
MarktCapLog	1,01	7,67	0,00
MarketCap	0,01	4,15	0,00
Sales	0,01	2,81	0,01
GrossP	-0,01	-2,20	0,03
Busyness	0,06	1,50	0,10
Age	-2,86	-1,35	0,10
Agesq	-2,59	-1,36	0,10
EduSq	0,001	5,276	0,00
EducationNL	-0,76	-4,10	0,00
Inno2	0,80	6,94	0,00
Inno1	-0,06	-1,49	0,10
Pseudo R ²	0,42	Durbin-Watson test	1,77

Table 7. Effect of board of directors characteristics and innovation on the systematic risk (beta coefficient) (N=393)

Dependent variables	Regression coefficients	t-value	Significance
BoardSsq	-0,01	-6,34	0,00
BoardSNL	-0,83	-6,41	0,00
Edu	0,01	4,95	0,00
EducationNL	0,33	1,77	0,08
MarketCap	-0,01	-5,21	0,00
TotalALog	0,06	4,53	0,00
Gender	0,11	1,97	0,05
Busyness	0,02	2,72	0,01
GPmargin	-0,07	-1,81	0,07
AgeNL	-0,02	-3,29	0,00
Pseudo R ²	0,42	Durbin-Watson test	1,79

5. Conclusion

The principal argument of the current paper is that innovation is not exclusively exogenous, since the corporate leadership as represented by the board of directors play a pivotal role pertaining to the innovation activities of firms. The correlation analysis shows that Inno1 is negatively associated with the proportion of women on corporate boards, whereas, Inno2 variable is positively associated with firm board size. Similarly, business, and education of corporate directors and board size affect innovativeness of firms. Inno1 affects accounting performance positively, whereas the same affects market performance negatively. However, Inno2 affects market performance of firms positively. However, none of the two innovativeness variable impact market risk exposure of firms. The major contribution of the current paper is that it challenges the popular notion that there is a direct association between the firm level innovation and firm performance. The core argument of the paper is that before innovation start determining firm performance, it must be affected by the board of directors characteristics and the same phenomenon is empirically proved in the current paper.

References

- [1] A. B. McDaniel, "A Contemporary View of Joseph A. Schumpeter's Theory of the Entrepreneur", *Journal of Economic Issues*, vol. 39, no. 2, pp. 485-489, 2005.
- [2] D. P. T. Lopes, N. S. Vieira, A. C. Q. Barbosa and C. Parente, "Management innovation and social innovation: convergences and divergences". *Academia Revista Latinoamericana de Administración*, vol. 30, pp. 474-489, 2017.
- [3] R. Varadarajan, "Innovation, Innovation Strategy, and Strategic Innovation", Emerald Publishing Limited, vol. 15, pp. 143-166, Ed. Innovation and Strategy, *Review of Marketing Research*, 2018.

- [4] A. Calder 2008. *Corporate Governance: a Practical Guide to the Legal Frameworks and International Codes of Practice*. London: Kogan Page Ltd., 2008, pp. 67-74.
- [5] A. Knell. *Corporate Governance: How to Add Value to Your Company - A Practical Implementation Guide*. Amsterdam: Elsevier Science & Technology, 2006, pp. 47-73.
- [6] A. T. Moghaddam, A. Massihabadee, M. Shorvarzi and A. Mehrazeen, "Board of Directors and General Manager Role in Organization Governance an Attention to Board of Directors' Characteristics Components". *International Journal of Organizational Leadership*, vol. 7, pp. 143-152, 2018.
- [7] M. Beasley and S. Salterio. *The Relationship Between Board Characteristics and Voluntary Improvements in Audit Committee Composition and Experience*. Raleigh: North Carolina State University, 2001, pp. 67-95.
- [8] S. Hundal, "Busyness of audit committee directors and quality of financial information in India", *International Journal of Business Governance and Ethics*, vol. 11, no. 4, pp. 335-363, 2016.
- [9] S. Hundal, "Multiple directorships of corporate boards and firm performance in India", *Corporate Ownership & Control*, vol. 14, no. 4, pp. 150-164, 2017.
- [10] A. Klein, "Audit Committee, Board of Director Characteristics, and Earnings Management", *Law & Economics Research Paper Series working paper*, no. 06-42, 2006.
- [11] N. Venkatraman and V. Ramanujam, "Measurement of Business Economic Performance: An Examination of Method Convergence". Alfred P. Sloan School of Management, working paper no. 1814-86, 1986. [Online]. Available: https://dspace.mit.edu/bitstream/handle/1721.1/48491/measurementofbus00venk.pdf?sequence=1&origin=publication_detail. [Accessed on 30-Jun-2019].
- [12] R. A. Brealey, S. C. Myers and F. Allen. *Principles of corporate finance*. New York: McGraw-Hill Irwin, 2014, 10th Edition, pp. 285-325.
- [13] P. Vernimmen, P. Quiry, Y. Le Fur, M. Dallochio and A. Salvi. *Corporate Finance: Theory and Practice*. West Sussex: John Wiley and Sons Ltd., 2014, pp. 182-276.
- [14] M. Selvam, J. Gayathri, V. Vasanth and S. Marxiaoli, "Determinants of Firm Performance: A Subjective Model". *International Journal of Social Science Studies*, vol. 4, pp. 90-100, 2016.
- [15] A. Head and D. Watson. *Corporate Finance. Principles and Practice*. London: Pearson Education, 2016, 7th Edition., pp. 182-243.
- [16] S. Ross, R. Westerfield and J. Jaffe. *Corporate Finance*. 6th ed. New York: McGraw-Hill Education, 2003, pp. 234-275.