



THE MODERATING EFFECT OF GOVERNANCE MECHANISMS ON THE RELATIONSHIP BETWEEN INNOVATION STRATEGY AND THE PERFORMANCE

 **Mouna REKIK¹**

¹Faculty of Economics and Management of Sfax, Tunisia

Email: rekikmouna70@yahoo.fr Tel: 0021622506730



ABSTRACT

Article History

Received: 19 June 2018

Revised: 3 August 2018

Accepted: 10 September 2014

Published: 25 September 2018

Keywords

Innovation strategy

Performance

Corporate governance

Board of directors

Ownership structure

Audit.

The aim of this research is to examine the effect of innovation strategy on firm's performance and investigate the moderating effect of ownership structure and board of directors' characteristics, as governance attributes, on this relationship. Based on a sample of 29 Tunisian companies over a period from 2008 to 2013, we show that innovation strategy has no effect on firm's performance. However, some corporate governance attributes are likely to affect this relationship which turns significant. Overall, the independence of board members, CEO duality, audit quality and the independence of audit committee members have moderating effects on the relationship between the innovation strategy and performance. These results illustrate the crucial role played by the board of directors in determining the relationship between the innovation strategy and firm performance.

JEL Classification:

O31; L25 ; G34 ; G39; G32; M42.

Contribution/Originality: This study contributes in the existing literature both theoretical and empirical reconciliations between these two corpuses: source of performance and value creation. This study is one of very few studies which have investigated the effect of internal mechanisms of governance (ownership structure and board of directors) on the relationship between the innovation strategy and the firm performance.

1. INTRODUCTION

Nowadays, companies are faced with the obligation to improve their activities and monitor the economic developments. Indeed, investment in research and development seems to be the most effective strategy for dealing with these developments. As a consequence of these developments, we are witnessing the emergence of an abundant literature on this particular type of intangible assets including its valuation, and particularly, its effects on the performance of the company. Previous research confirms the positive effect of R&D investment on firm performance and market value (Griliches, 1981; Cockburn and Griliches, 1988; Lev and Sougiannis, 1996; Blundell *et al.*, 1999; Cañibano *et al.*, 2000; Chan *et al.*, 2001; Toivanen *et al.*, 2002; Hall and Oriani, 2006). On the other hand, even if R&D spending decreases cash flow and current profits, they have a positive effect on firms' prospects of higher future profits. R&D investment, especially for firms specializing in high-tech sectors, is guaranteeing firms' innovative potential to ensure their competitiveness in the market and guarantee their viability. However, since company policies are mainly determined by their managers, are the latter encouraged to invest in such activities in order to improve their firm performance?

Researches in this direction remain very limited. Indeed, governance theories do not systematically integrate the analysis of innovation strategies in firms. Similarly, the extant literature on innovation has long ignored the study of systems and structures of governance. The contribution of this paper is therefore making both theoretical and empirical reconciliations between source of performance and value creation.

Today, Tunisia has initiated various reforms of the financial, tax and accounting system and law. The importance of these reforms stems mainly from the changes that Tunisia has experienced both technologically and economically with an increasing opening of its borders. Given the importance of the role played by companies in this context, as an engine of wealth creation, it is interesting to study the organization of formal power between the manager, the board of directors and shareholders. These power relationships will be referred to as corporate governance. Indeed, corporate governance system often strives to create added value for the various stakeholders by making strategic decisions on R&D investments. However, this effort is often tied to economic, technical and institutional problems. More specifically, these investments generate enormous costs for the company. As a result, conflicts of interest and information asymmetry arise. Hence, some shareholders refuse to commit themselves to finance new projects. Moreover, the disruption of the environment can negatively influence any kind of investment. Therefore, any disturbance can have a negative effect on firm performance.

Our research work integrates the Tunisian context and tries to answer this question: to what extent do internal mechanisms of governance (ownership structure and board of directors) have affected the relationship between the innovation strategy and firm performance?

Thus, the purpose of this study is to illustrate the impact of ownership structure and the board of directors' characteristics on the relationship between innovation strategy and firm performance.

The remaining of the paper is structured around three parts. In a first step, we present a review of the literature. Then, we explain the research methodology, and finally, we carry out the statistical analyses to extract the different results.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

A review of the literature in terms of corporate governance reveals that most of the work examines the direct association between governance mechanisms and firm performance by ignoring the indirect relationship between these two variables, with the exception of the studies by [Hutchinson and Gul \(2004\)](#); [Gani and Jermias \(2006\)](#) and [Le et al. \(2006\)](#). These authors show the moderating role of governance mechanisms on the relationship between investment in R&D and performance. According to them, the firm performance could improve in well-governed structures and that corporate governance moderates the relationship between R&D expenditure and performance.

Firm performance is one of the priorities for the company's managers and partners and is of great importance to the company's various partners, managers, investors and employees. This is an objective to be achieved. Several authors have treated the performance of the company and the best ways to achieve good profitability and improve it.

Moreover, the characteristics of investment in R&D (high level of risk, long time horizon and high asset specificity) represent sources of conflicts of interest between the various stakeholders. Governance mechanisms are therefore necessary to converge these interests and consequently to favor investment in R&D, which creates value. Therefore, the concept of corporate governance refers directly to the influence of strategic decisions on value creation.

In fact, a firm's ability to invest in R&D is considered one of the determinants of its performance ([Hall, 1998](#); [Aboody and Lev, 2000](#)). However, studies carried out in terms of corporate governance argue that without an appropriate control system that is able to reduce managerial latitude and information asymmetry problems, the effectiveness of R&D investments may not contribute to the improvement of company value. These phenomena are particularly highlighted by the specific characteristics of R&D: the long time horizon ([Xu and Zhang, 2004](#)) a high

risk rate (Nekhili and Poincelot, 2000) and the specific nature of this investment (Williamson, 1988; Shleifer and Vishny, 1992).

Moreover, several empirical studies have shown that managerial opportunism influences the relationship between R&D expenditures and firm performance (Zahra, 1996; Sanders and Carpenter, 2003; Tihanyi *et al.*, 2003). To deal with this opportunism and to diminish its impact on executive decisions, the theory of corporate governance offers several control mechanisms to ensure the managers monitoring and allow them to make strategic decisions such as R & D investment in order to improve the wealth of shareholders (Fama and Jensen, 1983; Walsh and Seward, 1990; Shleifer and Vishny, 1997).

In what follows, we present a review of previous research dealing with the effect of the two governance mechanisms namely ownership structure and board of directors on the relationship between the innovation strategy and the company's performance. This review of the literature will allow us to formulate our different hypotheses of research.

2.1. The Innovation Strategy and Firm Performance

The relationship between innovation strategies and firm performance is particularly interesting, especially in the last few years. Intangible assets are an increasingly important part of the balance sheets of companies and yet they remain difficult to evaluate. The previous literature has confirmed that investing in R&D activities improves the future performance of companies and ensures their sustainability. In fact, even if R&D expenditures negatively affect cash flow and current profits, they stimulate firms' growth opportunities. According to Del Monte and Papagni (2003) firms that invest in R&D activities have a significantly higher growth rate than firms in the same sector that did not invest. Similarly, Lev (1999) points out that R&D is the main asset of high-tech and biotechnology firms.

Empirical studies have confirmed the positive contribution of R&D activities to the improvement of performance and productivity (Sougiannis, 1994; Aboody and Lev, 2000; Ding *et al.*, 2003; Lööf and Heshmati, 2005) and the market value of firms (Ben-Zion, 1978; Griliches, 1981; Bosworth and Rogers, 1998; Blundell *et al.*, 1999; Toivanen *et al.*, 2002). Moreover, Cañibano *et al.* (2000) found a significant positive relationship between R&D spending and stock market returns. The preceding discussion leads to the following hypothesis:

H1: The innovation strategy has a positive effect on firm performance.

2.2. The Innovation Strategy and Firm Performance: The Structure Effect of Ownership

2.2.1. Concentration of Ownership

The presence of majority shareholders may require managers to act to maximize the value of the company (Shleifer and Vishny, 1997). These shareholders can influence votes at general meetings and more easily mobilize more important means for the control of managers and the protection of their investments. Several agency theorists (Demsetz, 1983; Agrawal and Mandelker, 1990; Jensen, 1990; Bethel and Liebeskind, 1993; Agrawal and Knoeber, 1996) suggest that concentration of capital is a guarantee of minority interest's protection (Alexandre and Paquerot, 2000). Indeed, the more the ownership is concentrated, the better the managers are controlled. In addition, Shome and Singh (1995) and Allen and Phillips (2000) show that there is a positive relationship between block holder ownership and performance. This relationship implies that shareholders with a significant share of the capital all have the power to compel managers to act in their interests and to oppose decisions that run against the objective of maximization of their wealth. In the same vein, and by introducing the R&D investment decision, it seems that the presence of majority shareholders is a factor that stimulates investment in the R&D activities that create value and increase future performance. Based on a sample of 81 firms, Hill and Snell (1989) showed that the concentration of ownership positively affects the intensity of R&D spending, which in turn positively influences the productivity of

the firm. As a result, we assume that the effect of R&D spending on performance will be more favorable in concentrated ownership firms.

H2: The concentration of ownership has a positive effect on the relationship between the innovation strategy and firm performance.

2.2.2. Institutional Ownership

Over the past two decades, institutional investors have become major players in the global economy, particularly because of the weight of their operations in the financial market. Indeed, institutional investors have an active role in controlling the management of the company (Agrawal and Mandelker, 1992). These shareholders have the ability to influence the decisions of managers in order to maximize the return on their investments. According to Bathala *et al.* (1994) the participation of institutional investors in the capital of an enterprise has a beneficial effect on its performance. Similarly, institutional investors have the right to access specific information to evaluate investment projects accurately. As informed investors, institutional investors can make decisions about the execution of long-term investment projects such as R&D projects in order to improve the company's future performance.

Early research has highlighted the "short-sightedness" of institutional investors in R&D (Loescher, 1984; Graves, 1988). These authors found a negative relationship between the intensity of R&D investment and institutional investor's ownership. Similarly, Kor and Mahoney (2005) found that the proportion of shares held by institutional investors has a negative but not significant moderating effect on the relationship between R&D expenditure and performance. Also, Berrone *et al.* (2005) showed that the effect of a significant level of R&D investment on company performance is negative but not significant if the owners of control blocks are banks.

Indeed, the presence of these investors as shareholders is a factor that may affect the quality of selected R&D projects and therefore the performance of the company. Nevertheless, Chung *et al.* (2003) argue that institutional ownership has no significant impact on the relationship between investment in R&D and the market value of the firm. The preceding discussion leads to the following hypothesis:

H3: Institutional ownership has a mixed effect on the relationship between innovation strategy and company performance. This effect would be negative or positive.

2.2.3. The Managerial Ownership

According to Jensen and Meckling (1976) the intensity of conflicts between shareholders and managers depends on the ownership structure of the firm and in particular on managerial ownership. Moreover, a share of high capital that is held by the leaders generates fewer conflicts and therefore a successful company. These authors show that managerial ownership can reduce the willingness of managers to take advantage of their position, expropriate the wealth of shareholders and engage in decisions that do not maximize the value of the firm. This results from the thesis of convergence of interests. Contrarily, this thesis was challenged on the one hand by Demsetz (1983) who affirms the neutrality thesis according to which the property structure has no effect on the value of a firm. Shleifer and Vishny (1989) from their part support the thesis of entrenchment, which stipulates that the ownership of a large part of the capital allows managers to escape control and thus results in a decrease in the performance of the firm.

For companies engaged in R&D activities, we propose that managerial ownership encourages them to choose R&D projects that have a positive effect on the company's long-term performance term. Also, the bad behavior of managers in the decision-making process can harm the performance of the company and jeopardize the value of the company. Several empirical studies have asserted this idea. Chang *et al.* (2006) find that the ownership of the internal market positively influences the effect of an increase in R&D expenditure on the financial market. As a consequence, we hypothesize that:

H4: The managerial property has a positive effect on the relationship between the innovation strategy and firm performance.

2.3. The Strategy of Innovation and Performance of the Company: Effect of the Board of Directors

2.3.1. The Size of the Board of Directors

The agency theory (Jensen, 1986) supports the idea that when the board is small, the control of the manager's behavior is effective. Large boards are considered unreactive and relatively ineffective in their operation. Indeed, John and Senbet (1998) gave an explanation that there is an additional cost related to the communication and decision-making problems associated with more administrators. Thus, a large board causes the dominance and expansion of the discretionary behavior of managers.

Yermack (1996) and Eisenberg *et al.* (1998) showed that the size of the board of directors is negatively correlated with firm performance. Therefore, a limited board size is desirable to control the behavior of executives and ensure the effectiveness of strategic decision making such as investment decision in gender R&D activities to improve company performance. Moreover, we propose that the effect of the innovation strategy on performance be more favorable in companies with small boards of directors. Our hypothesis is then as follows:

H5: The size of the board has a negative effect on the relationship between the innovation strategy and firm performance.

2.3.2. The Independence of Board Members

The external directors are considered to be independent of the executives and the company. Their control is supposed to be more effective (Hanson and Song, 2000). Indeed, according to Fama and Jensen (1983) the presence of independent directors in the board increases the effectiveness of the board in controlling and limiting the opportunism of executives since the goal of directors is the protection of Interests and maximizing the value of the company. The effectiveness of the Board relies primarily on the presence of external, experienced and independent directors and on the existence of a market of external directors guaranteeing the absence of collusion between directors and Independent directors.

For companies that invest in R&D activities, independent board encourages executives to engage in R&D activities that allow long-term wealth creation for shareholders. These arguments support the idea that the effect of R&D expenditure on performance will be more favorable in companies with boards of directors predominated by external directors. This has been well validated by previous studies.

In fact, Kroll *et al.* (2006) examined the effect of R&D expenditures on firm performance on a sample of US firms and found that this effect was positive and significant only for firms with independent boards. Moreover, the direct effect is reflected in the active participation of these directors in the decision-making process, in the control and ratification of the decisions taken by the directors in terms of investment in R&D in such a way those only projects that create value for shareholders (Fama and Jensen, 1983; Zahra, 1996).

Similarly, Chung *et al.* (2003) demonstrated that capital and R&D expenditures have a positive impact on the market value of a firm. This result holds true for firms with a board of directors dominated by external directors suggesting that these directors better control managerial actions.

These arguments lead to the following hypothesis from these reflections we envisage that:

H6: Board independence has a positive effect on the relationship between the innovation strategy and firm performance.

2.3.3. CEO Duality

Another characteristic is supposed to influence the relationship between the innovation strategy and the firm's performance, CEO duality. This is the case when the CEO is also the chairman of the board. This characteristic is considered a source of conflicts according to the theory of agency. Thus, according to Brickley *et al.* (1997) duality means the assignment of the same person as general manager and chairman of the board of directors for the same period.

Moreover, insofar as the function of the board of directors is to appoint, remunerate and dismiss the CEO, when the latter is also the Chairman of the Board, this will confer an influential role and power to the manager (Mizruchi, 1983) and to hinder the proper functioning of the board and to influence its independence (Fama and Jensen, 1983; Jensen, 1993). Similarly, this high concentration of power in the hands of the same person is a source of opportunistic and inefficient behavior, which negatively affects the wealth of shareholders. Accordingly, we assume that the effect of R&D expenditure on performance will be less favorable in companies that have CEO duality characteristic. This has been well confirmed by Chang *et al.* (2006) who find that the combination of management and chairmanship functions affects negatively the effect of the announcement of increased R&D spending.

Thus, we formulate the following hypothesis:

H7: CEO duality has a negative effect on the relationship between the innovation strategy and firm performance.

2.3.4. Gender Diversity of the Board

The presence of women on the board has been the subject of several theoretical and empirical reflections, especially in developed countries, such as the Singh (2008) study of British companies and Adams and Ferreira (2007;2009) in the American context and Rose (2007) for the case of Danish firms.

The question that now arises is whether the presence of the women in the board has an impact on the board. The answer to this question is mixed between defenders and opponents of gender diversity in boards. Indeed, according to the advocates of this diversity, women bring new ideas; have a very important communication capacity in relation to men (Ehrhadto and Nowake, 2002; Adams and Ferreira, 2003; Carter *et al.*, 2003). In the same vein, Omri *et al.* (2011) provide that joint boards improve the image of the company through disclosure of their openness, tolerance and fairness. This result was corroborated by the study of Kang *et al.* (2009) which provide that the announcement of the addition of a woman to the board has an effect on improving performance.

Women directors make specific contributions in terms of experiences, perspectives and management styles compared to male administrators (Hillman *et al.*, 2002; Daily and Dalton, 2003; Huse, 2007). Thus, the presence of women allows the Board of Directors to approach a wider range of ideas, helping to identify new opportunities for innovation (Miller and Triana, 2009). We can therefore expect the presence of women on the boards of directors contribute positively and significantly on the innovation strategy within the company. Our hypothesis is then as follows:

H8: The presence of women on the board of directors affects positively the relationship between the strategy of innovation and the performance of Tunisian companies.

2.3.5. Audit Quality

Several studies have suggested that independent audit can reduce information asymmetry existed between the management and firm stakeholders by allowing outsiders to verify the validity of financial reports (DeAngelo, 1981). The related audit credibility model also suggests that the management select external auditors with a view to signaling their honesty and quality to accounting users. Therefore, the effectiveness of auditing and its ability to constrain the earnings management is expected to vary with the quality of the auditor (DeAngelo, 1981). In addition, DeAngelo (1981); Watts and Zimmerman (1986) and Becker *et al.* (1998) suggest that big auditing firms are usually identified as high quality auditors in the literature. Based on these studies, we use Big 4 auditing firms as the surrogate of audit quality.

On the other hand, Moore and Ronen (1990) show that audit can give an idea about the quality of the management in company. It therefore enables the company to improve its performance by infusing a new life, through the arrival of new capital invested by reassured shareholders. In terms of investment in research and development, we expect firms with the highest quality auditors to have the highest levels of intangible expenditure.

Previous studies have shown the positive impact of audit quality on the level of capitalization of R&D expenditure (Krishnan *et al.*, 2002). The related hypothesis is then formulated as follows:

H9: *The audit quality has a positive effect on the relation between the innovation strategy and firm performance.*

2.3.6. Independence of Audit Committee Members

The role of the Audit Committee is to oversee the audit process and to resolve any disagreements that may arise between the auditors and management. Indeed, Abbott *et al.* (2000) suggest that firms whose audit committees are composed of independent members have been less sanctioned by the SEC because of fraudulent or erroneous financial statements. The composition of the audit committee is the subject of several recommendations, which state that the audit committee should be composed of a majority of independent external directors in order to guarantee their independence and efficiency of their monitoring (Beasley and Salterio, 2001). In the same vein, Klein (1998) shows that the effectiveness of the board depends on its own structure as well as on the structure of its committees. Indeed, he maintains that the assignment of independent external directors to the audit committee is likely to improve the performance of the company. This shows the importance of the role of independent members in the audit committee in the process of allocating resources in R&D activities and to contribute the innovation and better performance. Hence, our hypothesis is as follows:

H10: *The presence of a large percentage of independent members on the audit committee positively affects the relationship between the innovation strategy and the performance of Tunisian companies.*

3. RESEARCH DESIGN

To study the relationship between innovation strategy and firm performance and the moderating effect of governance mechanisms (effect of ownership structure and board effect), we use a sample of Tunisian non-financial companies listed in a period from 2008 to 2013, namely 29 companies. Companies belonging to the financial sector (banks, financial services, insurance companies, etc.) have been excluded because they have an atypical financial structure.

3.1. Definitions and Measures of Variables

In order to operationalize the hypotheses to be tested, we define the denomination of the selected variables and their measurements as well as their references (table1).

3.2. Dependant Variables

- **ROA (Return on assets):** Over the last twenty years, empirical studies have attempted to show that intangible investments generate a significant increase in the future performance of companies. The study by Casta *et al.* (2007) was interested in demonstrating the associations between investments in intangible capital on the one hand and the financial, economic and competitive performance of companies on the other. In this research, the performance of the companies studied will be measured, in an economic approach, by the Return on Assets (ROA) ratio, which is the return on assets, which corresponds to the ratio between the operating income and the total assets (Eisenberg *et al.*, 1998). This ratio is then as follows:

$$ROA = \text{Operating Income} / \text{Total assets}$$

- **Tobin's Q ratio:** Tobin's Q refers to a traditional measure of expected long-run firm performance (Bozec *et al.*, 2010). The employment of market value of equity may present the firm's future growth opportunities which could stem from factors exogenous to managerial decisions and this is indicated by the company's level (Demsetz and Villalonga, 2001; Shan and McIver, 2011). In addition, a high Q ratio shows success in

the a way that the firm has leveraged its investment to develop the company that is valued more in terms of its market-value compared to its book-value (Kapopoulos and Lazaretou, 2007).

$$\text{Tobin's } Q \text{ ratio} = (\text{Market capitalization} + \text{Total debt}) / \text{Total asset}$$

3.3. Independent Variables

- **The importance of innovation strategy:** In general, when addressing the question of measurement of intangible capital, previous studies often mention the problem of the availability of information. While the information published by US companies provides data on intangible expenditures (either capitalized or funded), which makes it easier for researchers working on this context and leads to more relevant results, most other contexts (France, Spain, Germany, Tunisia ...) suffer from a lack of information on intangible values. The only data available are those provided in companies' accounting statements and are often limited to amounts capitalized (Thibierge, 1997; Thibierge, 2001; Bouden, 2006; Charfi-Laadhar, 2006; Turki *et al.*, 2006; Casta *et al.*, 2007) or information published voluntarily by companies (Bourmont, 2006) or in their management reports. As part of our research, our aim is to study the importance of the innovation strategy in the Tunisian company. We therefore refer to the amounts of intangible assets that appear on the assets of the individual accounts of Tunisian firms. In addition, in order to limit the effect of large variations in the intangible assets of different companies, intangible capital will be measured in proportion to the total assets. This measure, which relates intangible assets to total assets, has been used by many previous studies including those by Thibierge (2001); Thibierge (1997). It is defined by the following ratio:

$$\text{INNOV} = \text{Net intangible assets} / \text{Total assets}$$

- **Concentration of ownership:** The capital concentration is defined as the percentage of capital, at least 20% (according to La Porta *et al.* (1999)) held by the largest shareholder.

$$\text{CONC}_K = \text{Percentage of capital held by the largest shareholder}$$

- **Institutional ownership:** This variable corresponds to the proportion of capital held by institutional investors. It is calculated by the number of securities held by institutional investors divided by the total number of securities. Although the results are still mixed, there is a strong trend that institutional investors with a high proportion of the company's capital are actively involved in the control and management of the company and tend to improve its performance (Omri, 2002).

$$\text{INST}_K = \text{Percentage of capital held by institutional investors}$$

- **The managerial ownership:** This variable is measured by the percentage of capital held by management. This measure has been used in many research including those by Rediker and Seth (1995) and Fernández and Arrondo (2005).

$$\text{DIR}_K = \text{Percentage of capital held by management}$$

- **The size of boards of directors:** The size of the board of directors is measured by the total number of directors sitting there. This measure has been adopted by several researchers including Petra (2007) and Siala *et al.* (2009).

$$\text{TCA} = \text{Total number of directors who sit on the board}$$

- **The independence of boards members:** The Independence of Board Members is measured by the ratio of the number of independent directors to the total number of directors serving on the Board of Directors. This measure was also used by Ahmed *et al.* (2006) and Siala *et al.* (2009).

$$\text{ADM_IND} = \text{Number of independent directors} / \text{The total number of directors}$$

- **CEO Duality:** The CEO Duality is a binomial variable taking the value *1 if the positions of Director General and Chairman of the Board are held by one person and 0 if not*. This measure been used by several previous studies like Kang *et al.* (2009); Brickley *et al.* (1997) and Godard and Shatt (2004).

- **Gender diversity of the boards:** Board diversity is measured in terms of the percentages of women on the board. Gender diversity reinforces the control mission assigned to the board and reduces control costs (Walsh and Seward, 1990) because the female directors are in most cases independent (Dalton *et al.*, 1999) and thus improves performance of the company.

DIV_CA = Percentage of women in the board

- **Audit quality:** The previous literature uses a variety of audit quality measures. Nevertheless, the most observable and widely used measure in the literature is to refer to the reputation of the audit firm (Johnson and Lys, 1990; Craswell *et al.*, 1995; Francis and Krishnan, 1999; Piot, 2001; Krishnan *et al.*, 2002; Hiraki *et al.*, 2003; Bourmont, 2006). According to this approach, the most important international auditors in the global market (generally the "Big"), as well as their representatives in the world, are seen as those offering the best quality audit service. A lower quality is attributed to the other auditors.

Based on these reflections, the audit quality "QUAL" will be measured by a binomial variable taking the value *1 if the company is audited by at least one Big and taking the value 0 otherwise*.

- **Independence of audit committee members:** The independence of the members of the Audit Committee is measured by the percentage of independent directors sit on the Audit Committee. This measure has been used in previous work, including those by Wright (1996); Carcello and Neal (2000) and Zarai and Bettabai (2007).

Table-1. Definitions and measures of variables

Variables	Measures
The dependent variable (to be explained)	
<ul style="list-style-type: none"> • ROA (Return on assets) • Tobin's Q ratio 	<ul style="list-style-type: none"> • Ratio of operating income to total assets. • Ratio of the market Capitalization plus total debt divided by total asset of the company.
The independent variables (explanatory)	
<i>INNOV</i>	The measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets.
Variables related to the ownership structure	
<i>CONC_K</i>	Percentage of capital held by the largest shareholder.
<i>INST_K</i>	Percentage of capital held by institutional investors.
<i>DIR_K</i>	Percentage of capital held by management.
Variables related to the Board of Directors	
TCA	Total number of directors who sit on the board.
ADM_IND	Number of independent directors on the total number of directors.
DUAL	1 if the positions of Director General and Chairman of the Board are held by one person and 0 if not.
DIV_CA	Percentage of women in the board.
QUAL	1 if the company is audited by at least one Big and taking the value 0 otherwise.
IND_AUD	The proportion of independent directors who sit on the Audit Committee.
The control variables	
SIZE	Company size: the natural logarithm of the total assets.
DEBT	Debt ratio: total debt / total assets.
SEC	1 if the firm belongs to high-tech sectors and 0 if not.

IND_AUD = the proportion of independent directors who sit on the Audit Committee

Control variables

- **Company size:** The company size is measured by the natural logarithm of the total assets (Godard, 2002). It's a control variable, but it can also have an impact on the performance.

SIZE = Log (Total assets)

- **Debt ratio:** The debt ratio determined by the percentage of total debt over the total assets. The impact of this ratio on performance shows results equivocal. Indeed, Weir *et al.* (2002) associate a negative

relationship between performance and the debt ratio, while other authors believe that debt affects positively the profitability of the company.

$$DEBT = Total\ debt / Total\ assets$$

- **Sector:** To account for the sector effect and to obtain more reliable results, we introduced a control variable (binary variable). In this respect, this variable takes *1 if the firm belongs to high-tech sectors and 0 if not*¹.

3.4. Research Model

In order to test our hypotheses and based on the characteristics of the various variables, our general model is a multiple linear regression on panel data (Sevestre, 2002) presented as follows:

$$\text{Variable to explain }_{it} = c + \alpha \text{ Explanatory variables }_{it} + \beta \text{ Control variables }_{it} + \varepsilon_{it}$$

Among the assumptions we have made, some support a moderating role in the main relationship studied. In other words, we consider if the effect of innovation strategy on firm performance is affected by the characteristics related to ownership structure and the board of directors.

A moderator variable is defined as a variable that essentially influences the relationship between two other variables. It systematically modifies the magnitude, intensity, meaning and / or form of the effect of the independent variable on the dependent variable (Sharma *et al.*, 1981).

According to Baron and Kenny (1986) the moderating effect is observed when a moderator variable Z modifies the intensity of the relationship between the independent variable X and the dependent variable Y. The authors thus specify that there exist three relations which Release: The influence of X on Y: (β_1), the influence of Z on Y: (β_2) and the influence of X and Z on Y: (β_3). The equation of the regression is of this form:

The moderating effect of Z is detected when the link (β_3) is significant (see FIG. 1). The links (β_1) and (β_2) are not necessarily significant. If, on the other hand, the link (β_2) is significant, Z is a quasi-moderator.

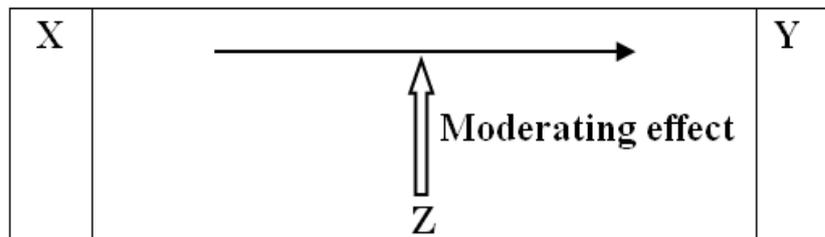


Figure-1. Representation of a moderating effect

Source: Saunders (1956); Zedeck (1971).

To identify factors related to ownership structure to the board of directors that can influence the relationship between innovation strategy and firm performance, we used two regression models.

The first regression model is as follows:

$$\text{Performance (ROA, Tobin's Q)} = \beta_0 + \beta_1 \text{ INNOV} + \beta_2 \text{ DEBT} + \beta_3 \text{ SIZE} + \beta_4 \text{ SEC} + \varepsilon$$

The second regression model is as follows:

$$\text{Performance (ROA, Tobin's Q)} = \beta_0 + \beta_1 \text{ INNOV} + \beta_2 \text{ X} + \beta_3 \text{ INNOV} * \text{X} + \beta_4 \text{ DEBT} + \beta_5 \text{ SIZE} + \beta_6 \text{ SEC} + \varepsilon$$

With X: variable related to the ownership structure or the board of directors. In other words, we will test the effects of different combinations of characteristics related to ownership structure and the board of directors on the relationship between the performance of the company and the innovation strategy. The regression models with moderating variables are presented in the table below:

¹According to the list of high-tech activities in NAF nomenclature set by INSEE (2002).

Table-2. The different models and regressions to be tested

Hypothesis	Regress to test	Model
H ₁	$ROA_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 DEBT_{it} + \beta_3 SIZE_{it} + \beta_4 SEC_{it} + \varepsilon_{it}$	M1.1
	Tobin's $Q_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 DEBT_{it} + \beta_3 SIZE_{it} + \beta_4 SEC_{it} + \varepsilon_{it}$	M1.2
H ₂	$ROA_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 CONC_K_{it} + \beta_3 (INNOV * CONC_K)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M2.1
	Tobin's $Q_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 CONC_K_{it} + \beta_3 (INNOV * CONC_K)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M2.2
H ₃	$ROA_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 INST_K_{it} + \beta_3 (INNOV * INST_K)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M3.1
	Tobin's $Q_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 INST_K_{it} + \beta_3 (INNOV * INST_K)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M3.2
H ₄	$ROA_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 DIR_K_{it} + \beta_3 (INNOV * DIR_K)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M4.1
	Tobin's $Q_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 DIR_K_{it} + \beta_3 (INNOV * DIR_K)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M4.2
H ₅	$ROA_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 TCA_{it} + \beta_3 (INNOV * TCA)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M5.1
	Tobin's $Q_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 TCA_{it} + \beta_3 (INNOV * TCA)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M5.2
H ₆	$ROA_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 ADM_INST_{it} + \beta_3 (INNO * ADM_INST)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M6.1
	Tobin's $Q_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 ADM_INST_{it} + \beta_3 (INNO * ADM_INST)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M6.2
H ₇	$ROA_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 DUAL_{it} + \beta_3 (INNO * DUAL)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M7.1
	Tobin's $Q_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 DUAL_{it} + \beta_3 (INNO * DUAL)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M7.2
H ₈	$ROA_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 DIV_CA_{it} + \beta_3 (INNO * DIV_CA)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M8.1
	Tobin's $Q_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 DIV_CA_{it} + \beta_3 (INNO * DIV_CA)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M8.2
H ₉	$ROA_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 QUAL_{it} + \beta_3 (INNO * QUAL)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M9.1
	Tobin's $Q_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 QUAL_{it} + \beta_3 (INNO * QUAL)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M9.2
H ₁₀	$ROA_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 IND_AUD_{it} + \beta_3 (INNO * IND_AUD)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M10.1
	Tobin's $Q_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 IND_AUD_{it} + \beta_3 (INNO * IND_AUD)_{it} + \beta_4 DEBT + \beta_5 SIZE + \beta_6 SEC + \varepsilon_{it}$	M10.2

4. STATISTICAL ANALYZES

4.1. Descriptive Analysis

Table 3 shows a disparity in the innovation variable manifested by a low standard deviation and the existence of a non-remarkable difference between the minimum (0) and the maximum (0.2586776). This may be due to industrial effects. In general, it is recognized that firms operating in high-tech sectors invest more in R & D activities than firms in traditional sectors. It should be noted that 24.13% of the companies in the sample belong to high-tech sectors. The average value of the ROA is 0.2586776.

Among ownership and board characteristics, Table 3 shows that the average participation of shareholders, institutional investors and managers in the capital is respectively 35.36574%, 12.94247% and 11.34568%. The board of directors of the companies in the sample is on average of 8 members, this figure is close to the recommendations of Lipton and Lorsch (1992). These latter estimates that the optimal size of the board is between 8 and 12 people. The Board of Directors is composed of 16.49114% of independent directors.- Gender diversity shows that, on the whole, women are relatively unrepresented on the boards of our sample (4%). Nevertheless, 68.39% of the companies confuse the functions of general manager and chairman of the board of directors.

Companies in our sample audited by a Big 4 audit are 33.91%. While, the average independence of audit committee members does not exceed 7% with a minimum of (0) and this is justified by the existence of family businesses in our sample.

Table-3. Descriptive statistics of variables

Part A: Continuous Variables

Variables	N	Mean	Median	Std. Dev.	Min	Max
ROA	174	0.0613872	0.0520378	0.0900411	-0.2516123	0.3054475
Tobin's Q	174	2.60	1.75	2.72	-0.21	26.04
INNOV	174	0.0092958	0.0026695	0.0265312	0	0.2586776
DEBT	174	0.0918526	0.0627601	0.0965712	0	0.4040222
SIZE	174	18.21317	18.07981	0.9083798	16.66747	21.0697
TCA	174	8.247126	8	2.404684	4	12
ADM_IND	174	0.1649114	0.166685	0.1667795	0	0.6667
CONC_K	174	0.3536574	0.3547	0.3328253	0	0.89332
INST_K	174	0.1294247	0.0736	0.1443303	0	0.5116
DIR_K	174	0.1134568	0	0.1917698	0	0.755
DIV_CA	174	0.04	0	0.07	0	0.30
IND_AUD	174	0.07	0	0.15	0	0.50

ROA is the ratio of operating income to total assets; Tobin's Q ratio is the ratio of the market Capitalization plus total debt divided by total asset of the company; INNOV is the measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets; DEBT ratio is total debt / total assets; SIZE is the natural logarithm of the active total. TCA is Total number of directors who sit on the board; ADM_IND is the number of independent directors on the total number of directors; CONC_K is the percentage of capital held by the largest shareholder; INST_K is the percentage of capital held by institutional investors; DIR_K is the percentage of capital held by management; DIV_CA is the percentage of women in the board; IND_AUD is The proportion of independent directors who sit on the Audit Committee.

Part B: Dichotomes variables

	SEC			DUAL			QUAL		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0	132	75.86	75.68	55	31.61	31.61	115	66.09	66.09
1	42	24.14	100.00	119	68.39	100.00	59	33.91	100.00
Total	174	100		174	100.00		174	100.00	

SEC equal to 1 if the firm belongs to high-tech sectors and 0 if not; DUAL equal to 1 if the positions of Director General and Chairman of the Board are held by one person and 0 if not; QUAL equal to 1 if the company is audited by at least one Big and taking the value 0 otherwise.

4.2. Correlation Matrix

Multiple linear regression estimation requires the absence of multicollinearity between the different independent variables. An examination of the correlation matrix (Table 4) shows that all correlation coefficients are less than 0.8, which corresponds to the limit set by Kennedy (1985) and from which we start to have serious problems of multicollinearity. This leads us to conclude that there is no serious problem of multicollinearity.

Table-4. Pearson Correlation Matrix

	ROA	Tobin' s Q	INNOV	DEBT	SIZE	CONC_K	INST_K	DIR_K	TCA	ADM_IND	DIV_CA	IND_AUD	DUAL	QUAL	SEC
ROA	1.00														
Tobin' s Q	0.25***	1.00													
INNOV	0.03	0.09	1.00												
DEBT	-0.45***	-0.07	-0.07	1.00											
SIZE	-0.02	0.14*	-0.05	0.21***	1.00										
CONC_K	0.20***	0.37***	0.19**	-0.02	0.02	1.00									
INST_K	-0.14*	-0.10	-0.04	0.23***	0.17**	-0.36***	1.00								
DIR_K	0.23***	0.03	0.14*	-0.09	-0.19**	0.42***	-0.24***	1.00							
TCA	-0.07	0.00	-0.08	0.30***	0.37***	-0.47***	0.27***	-0.27***	1.00						
ADM_IND	0.38***	0.15**	0.02	-0.21***	-0.23***	-0.10	-0.02	0.12	-0.02	1.00					
DIV_CA	0.06	-0.04	-0.13*	-0.33***	-0.17**	-0.29***	-0.16**	-0.12	0.09	0.19**	1.00				
IND_AUD	0.31***	0.10	0.21***	-0.30***	-0.16**	-0.14*	0.12	0.02	-0.02	0.44***	0.36***	1.00			
DUAL	0.01	-0.19**	-0.17**	-0.12	-0.07	-0.03	-0.06	0.17**	-0.13*	-0.05	0.01	-0.17**	1.00		
QUAL	-0.00	0.01	0.04	0.10	0.11	0.15**	0.18**	-0.03	-0.15**	0.03	-0.26***	-0.02	-0.04	1.00	
SEC	-0.05	0.08	0.27***	-0.09	-0.18**	0.03	-0.18**	-0.16**	-0.06	0.09	-0.03	0.09	-0.14*	-0.23***	1.00

ROA is the ratio of operating income to total assets; Tobin's Q ratio is the ratio of the market Capitalization plus total debt divided by total asset of the company; INNOV is the measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets; DEBT ratio is total debt / total assets; SIZE is the natural logarithm of the active total. TCA is Total number of directors who sit on the board; ADM_IND is the number of independent directors on the total number of directors; CONC_K is the percentage of capital held by the largest shareholder; INST_K is the percentage of capital held by institutional investors; DIR_K is the percentage of capital held by management; DIV_CA is the percentage of women in the board; IND_AUD is The proportion of independent directors who sit on the Audit Committee. DUAL equal to 1 if the positions of Director General and Chairman of the Board are held by one person and 0 if not; QUAL equal to 1 if the company is audited by at least one Big and taking the value 0 otherwise; SEC equal to 1 if the firm belongs to high-tech sectors and 0 if not. Asterisks indicate significance at 10% (*), 5% (**), and 1% (***)

5. RESULTS

In the following, we present the results obtained from the tests of the different regression models.

5.1. Analysis of the Effect of the Innovation Strategy on Company Performance

Table 5 below shows that the coefficient of correlation between the variable INNOV and the variable ROA is not significant. Innovation strategy has no significant influence on the performance of Tunisian firms. This result rejects our first hypothesis. This finding can be explained by the characteristics of the firms in our sample since these firms do not possess a sufficiently large intangible asset or rather because the innovation strategy in these firms is not important.

Similarly, when measuring firm performance by the Tobin's Q ratio, the relationship remains insignificant. This finding does not confirm the preceding findings by *Baklouti et al. (2007)* on intangible assets and their influence on performance in the case of the Tunisian markets. These authors find that investment in research and development capital has a negative impact on performance of Tunisian companies.

Table-5. Regression results for models 1.1 and 1.2

	M 1.1	M 1.2
VARIABLES	ROA	Tobin's Q
INNOV	-0.040 (-0.31)	-7.141 (-1.00)
DEBT	-0.036 (-0.37)	-3.899 (-0.78)
SIZE	-0.011 (-0.71)	-2.611 (-1.20)
Constant	0.265 (0.95)	50.573 (1.26)
Observations	174	174
R-squared	0.005	0.154
Number of id	29	29
Firm FE	YES	YES

ROA is the ratio of operating income to total assets; Tobin's Q ratio is the ratio of the market Capitalization plus total debt divided by total asset of the company; INNOV is the measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets; DEBT ratio is total debt / total assets; SIZE is the natural logarithm of the active total.

T student in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table-6. Regression results for models 2, 3 and 4

VARIABLES	M2.1 ROA	M2.2 Tobin' s Q	M3.1 ROA	M3.2 Tobin' s Q	M4.1 ROA	M4.2 Tobin' s Q
INNOV	3.669*** (2.42)	66.305 (1.01)	0.088 (0.94)	-0.806 (-0.17)	-0.689 (-0.84)	-16.453 (-0.46)
CONC_K	0.025 (0.72)	1.689 (1.27)				
INNOV*CONC_K	-6.177*** (-2.38)	-122.906 (-1.11)				
INST_K			0.013 (0.15)	-0.515 (-0.48)		
INNOV*INST_K			-2.742 (-0.77)	-131.014 (-1.69)		
DIR_K					0.065 (1.58)	-1.064 (-0.60)
INNOV*DIR_K					1.785 (0.73)	33.129 (0.28)
DEBT	-0.036 (-0.45)	-3.864 (-0.79)	-0.057 (-0.70)	-4.838 (-0.91)	-0.043 (-0.47)	-3.913 (-0.78)
SIZE	-0.017 (-0.097)	-2.672 (-1.18)	-0.010 (-0.060)	-2.577 (-1.21)	-0.006 (-0.34)	-2.602 (-1.20)
Constant	0.356 (1.14)	51.006 (1.22)	0.244 (0.84)	50.196 (1.28)	0.165 (0.55)	50.571 (1.27)
Observations	174	174	174	174	174	174
R-squared	0.042	0.170	0.011	0.172	0.035	0.157
Number of id	29	29	29	29	29	29

5.2. Analysis of the Effect of Ownership Structure on the Relationship between Innovation Strategy and Company Performances

Table 6 shows the results on the moderating effect of the different characteristics related to the ownership structure on the relationship between the innovation strategy and firm performance. In other words, the question is whether this relationship varies with the concentration of ownership and the participation of institutional investors and managers in the capital.

ROA is the ratio of operating income to total assets; Tobin's Q ratio is the ratio of the market Capitalization plus total debt divided by total asset of the company; INNOV is the measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets; CONC_K is the percentage of capital held by the largest shareholder; INST_K is the percentage of capital held by institutional investors; DIR_K is the percentage of capital held by management; DEBT ratio is total debt / total assets; SIZE is the natural logarithm of the active total.

T student in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

• Concentration of Ownership

Table 6 shows that the effect of the innovation strategy on the performance of the firm measured by the ROA is significant and positive at the 1% threshold, taking into account the concentration of the property. Thus, by introducing the strategy of innovation, a concentrated property constitutes a factor that stimulates the performance of the company. This idea is not confirmed by studying the interaction effect CONC_K*INNOV on the firm's performance since this effect is negative and significant at the 1% threshold. This result rejects hypothesis H2, so, the concentration of ownership has a negative moderating effect on the relationship between the innovation strategy and the performance of Tunisian firms. This finding suggests that the ownership of a capital share by the shareholders is not a means of giving the power to compel the leaders to act in their favor and to oppose decisions that run counter to the objective of maximization of the wealth of shareholders.

The results are not significant when we took the Tobin's Q as a performance measure.

- **The Institutional Property**

Table 6 shows that the relationship between the innovation strategy and the firm's performance of the firm, measured by the ROA and Tobin's Q, is not significant with the presence of institutional investors in the capital. Also, by testing the interaction effect between R & D investment and institutional ownership on performance since the INST_K*INNOV interaction is not significant (with the two measures). Taken together, these results reject the hypothesis H3 and not attest the negative effect of institutional ownership on the relationship between the innovation strategy and the firm's performance.

- **The Managerial Property**

Table 6 shows that the effect of the innovation strategy on firm performance measured by the ROA and Tobin's Q, is not significant in the presence of the managerial property. However, by studying the effect of interaction DIR_K*INNOV on the firm's performance, also this effect is not significant (with the two measures). Taken together, these results reject the hypothesis H4. In this case, we can't assume that according to what has been planned (H4) the managerial property has a positive moderating effect on the relationship between innovation strategy and firm's performance.

5.3. Analysis of the Effect of the Board of Directors on the Relationship between the Innovation Strategy and the Performance of the Company

Table 7 presents the results of the effect of different characteristics related to the board of directors on the relationship between the innovation strategy and firm performance.

Table-7. Regression results for models 5, 6, 7, 8, 9 and 10

VARIABLES	M5.1ROA	M5.2Tobin' s Q	M6.1ROA	M6.2Tobin' s Q	M7.1 ROA	M7.2 Tobin' s Q	M8.1 ROA	M8.2Tobin' s Q	M9.1 ROA	M9.2 Tobin' sQ	M10.1 ROA	M10.2 Tobin' sQ
INNOV	4.987*** (-3.55)	-20.493 (0.34)	-1.058*** (-3.12)	-29.871** (-1.77)	0.065** (1.73)	-3.103 (-0.87)	-0.054 (-0.39)	-6.724 (-0.99)	-0.095 (-0.56)	-3.293 (-0.92)	-0.89** (-1.73)	-51.45** (-1.71)
TCA	-0.010 (-1.68)	-0.322 (-1.41)										
INNOV*TCA	0.632*** (3.65)	2.081 (0.27)										
ADM_IND			-0.117 (-1.52)	-0.018 (-0.02)								
INNOV*ADM_IND			4.279*** (3.06)	101.518 (1.59)								
DUAL					-0.035*** (-2.93)	-0.355 (-0.42)						
INNOV*DUAL					-0.907** (-1.72)	-35.302** (-1.84)						
DIV_CA							-0.217 (-1.00)	4.563 (0.97)				
INNOV*DIV_CA							25.821 (1.41)	-823.4*** (-2.45)				
QUAL									0.002 (0.05)	0.189 (0.30)		
INNOV*QUAL									1.15*** (2.39)	-86.497* (-1.75)		
IND_AUD												
INNOV*IND_AUD											2.868** (1.84)	148.98** (1.72)
DEBT	-0.061 (-0.77)	-3.691 (-0.75)	-0.066 (-0.77)	-4.634 (-0.89)	-0.052 (-0.63)	-4.695 (-0.92)	-0.051 (-0.54)	-3.605 (-0.73)	-0.029 (-0.30)	-4.598 (0.96)	-0.065 (-0.87)	-5.421 (-1.05)
SIZE	-0.014 (-0.89)	-2.701 (-1.25)	-0.006 (-0.36)	-2.587 (1.20)	-0.011 (-0.65)	-2.563 (-1.23)	-0.005 (-0.37)	-2.742 (-1.24)	-0.012 (-0.73)	-2.604 (-1.34)	-0.009 (-0.54)	-2.529 (-1.25)
Constant	0.412 (1.33)	54.833 (1.36)	0.199 (0.65)	50.264 (1.27)	0.302 (0.94)	50.136 (1.30)	0.169 (0.66)	52.837 (1.60)	0.284 (0.94)	50.732 (1.41)	0.243 (0.313)	49.422 (1.32)
Observations	174	174	174	174	174	174	174	174	174	174	174	174
R-squared	0.047	0.168	0.041	0.168	0.032	0.179	0.021	0.165	0.019	0.221	0.022	0.198
Number of id	29	29	29	29	29	29	29	29	29	29	29	29

ROA is the ratio of operating income to total assets; Tobin's Q ratio is the ratio of the market Capitalization plus total debt divided by total asset of the company; INNOV is the measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets; TCA is Total number of directors who sit on the board; ADM_IND is the number of independent directors on the total number of directors; DUAL equal to 1 if the positions of Director General and Chairman of the Board are held by one person and 0 if not; DIV_CA is the percentage of women in the board; QUAL equal to 1 if the company is audited by at least one Big and taking the value 0 otherwise; IND_AUD is The proportion of independent directors who sit on the Audit Committee; DEBT ratio is total debt / total assets; SIZE is the natural logarithm of the active total.

T student in parentheses, *** p<0.01, ** p<0.05, * p<0.1

- **The Size of the Board of Directors**

Table 7 shows that the effect of the innovation strategy on the firm's performance measured by the ROA is significantly negative (at the 1% threshold), taking into account the size of the board of directors. The results of model 5.1 show that the interaction effect TCA*INNOV on the ROA is significant and positive. The hypothesis H5 is therefore rejected. As a result, the size of the board has a positive moderating effect on the innovation strategy and consequently on the performance of the company.

- **The Independence of the Members of the Board Of Directors**

Table 7 shows that the effect of innovation strategy on firm performance measured by ROA is negative and significant at the 1% threshold and at the 5% threshold when performance is measured by Tobin's Q. The study of the effect of interaction ADM_IND*INNOV on the variable ROA shows that this effect is positive and significant also at the threshold of 1%. The hypothesis H6 is therefore accepted. This result suggests that independent directors are effective monitors who are able to control decision-makers, in particular in terms of investment in R&D, enhancing firm performance. We then conclude that independent directors have a positive moderating effect on the relationship between the innovation strategy and firm's performance.

- **CEO Duality**

Table 7 shows that the effect of the innovation strategy on the firm's performance measured by the ROA is significantly negative (at the 5% threshold), taking into account CEO duality on the board. But, the results are not significant when we took the Tobin's Q as a performance measure. The results of models 7.1 and 7.2 show that the interaction effect DUAL*INNOV on the ROA and Tobin's Q is significant and negative. The hypothesis H7 is therefore accepted. As a result, CEO duality has a negative moderating effect on the innovation strategy and consequently on the performance of the company. Such a result may be motivated by the fact that the combination of the two functions by the same person does not constitute a factor facilitating access to information and communication between the board of directors and the management team, and don't offers the flexibility to promote growth opportunities and to make better investment decisions especially in R & D in order to improve the performance of the company.

- **Gender Diversity of the Board**

Table 7 shows that the effect of the innovation strategy on the performance of the company, measured by the ROA and Tobin's Q, is not significant in the presence of women on the board. However, by studying the effect of interaction DIV_CA*INNOV on the firm's performance, also this effect is not significant in model 8.1, but significant and negative in model 8.2.

Taken together, these results reject the hypothesis H8. This finding is confirmed by the study of [Bouaziz and Triki \(2012\)](#) in Tunisian context, which found a negative and significant result. Indeed, this result corroborates the

study by Farrell and Hersch (2005) which predicted a negative impact of gender diversity on firm's performance, due to the small number of women on the councils, which can skew the scope of their presence. Also, Huse (2007) explained that diversity on the board also has its disadvantages: it can create coordination difficulties, require more time in discussions, and lose cohesion within the board. Potential conflicts and misunderstandings can be at the expense of effective decision-making on the board of directors (Goodstein *et al.*, 1994).

- **Audit Quality**

Table 7 shows that the effect of the innovation strategy on the firm's performance measured by the ROA and Tobin's Q is not significant taking into account the audit quality. But, the results of the interaction effect QUAL*INNOV on the ROA is positive and significant at the 1% threshold. In this case, the hypothesis H9 is therefore accepted. Audit quality improves the performance of the firm, which is consistent with the results of Lennox (1999). But, when performance is measured by Tobin's Q the interaction effect QUAL*INNOV is negative and significant at the 5% threshold.

This finding concord with Zare *et al.* (2013) who's found a negative and significant relation between audit firm size and company's profitability. This result may refer to the low quality of audit firms. The audit profession is dominated by big audit firms and a few smaller national audit firms. Hence, we concluded that audit firms in Tunisia are of low quality.

- **Independence of Audit Committee Members**

Table 7 shows that the effect of innovation strategy on firm performance measured by the ROA and Tobin's Q is negative and significant at the 5% threshold into account of independence of audit committee members. The study of the effect of interaction IND_AUD*INNOV on the variable ROA and Tobin's Q shows that this effect is positive and significant also at the threshold of 5%.

The hypothesis H10 is therefore accepted. This result corroborates the results of several studies including Klein (1998) which shows that the assignment of external directors (Independent) audit committee is likely to improve the performance of the company.

6. CONCLUSION

The purpose of this paper is to examine the relationship between innovation strategy and firm performance and the moderating the effect of ownership structure and the board of directors on this relationship. The study carried out on a sample of 29 Tunisian companies listed on the Tunis stock exchange over a period from 2008 to 2013 shows that the innovation strategy has no effect on the performance of the company. These results suggest that the lack of relationship between the strategy of innovation and the performance of the firm in the Tunisian context can be justified by the small number of firms investing in R&D activities.

However, this effect exists if the characteristics related to the board of directors are introduced. In general, the results show that the concentration of ownership, institutional ownership, the managerial property, the size of the board of directors and gender diversity of the board do not have a moderating effect on the relationship between the innovation strategy and the firm's performance.

On the other hand, the independence of board members, the CEO duality, audit quality and independence of audit committee members have a moderating effect on the relationship between the innovation strategy and the performance of the firm.

Taken together, these results illustrate the crucial role played by the board of directors in determining the relationship between the innovation strategy and firm performance. This is useful for companies in the high-tech sector who are forced to allocate huge resources in R&D to preserve their sustainability. These companies should

thus establish an adequate system of corporate governance to limit the opportunistic behavior of managers and ensure that efficient R&D investment decisions are engaged to maximize the wealth of shareholders.

The contribution of this study is twofold. The first is to include an innovative aspect in the literature on the governance of the corporate by integrating the notion of moderating governance variables, rarely explored, in the study of the relationship between innovation strategy and firm performance.

The second contribution highlights the importance of the role played by governance mechanisms, particularly the board of directors, in ensuring the effectiveness of the deployment of resources in R&D activities closely linked to the improvement of firm performance.

To sum up, we consider that the present research could be extended by examining the effect of corporate governance on the relationship between innovation strategy and the performance of the firm in different institutional contexts, since differences in governance systems across countries (Europe, USA, Japan, etc.) in several aspects (concentration of ownership, shareholder identity, etc.), as demonstrated by La Porta *et al.* (1999) and Faccio and Lang (2002) on such a relationship.

Funding: This study received no specific financial support.

Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.

REFERENCES

- Abbott, L.J., S. Parker and G.F. Peters, 2000. The effectiveness of Blue Ribbon Committee Recommendations in mitigating financial misstatements: An empirical study. Working paper.
- Aboody, D. and B. Lev, 2000. Information asymmetry, R&D, and insider gains. *The Journal of Finance*, 55(6): 2747-2766. Available at: <https://doi.org/10.1111/0022-1082.00305>.
- Adams, R.B. and D. Ferreira, 2003. Diversity and incentives: Evidence from corporate boards. Working Paper, University of Stockholm.
- Adams, R.B. and D. Ferreira, 2007. A theory of friendly boards. *The Journal of Finance*, 62(1): 217-250. Available at: <https://doi.org/10.1111/j.1540-6261.2007.01206.x>.
- Adams, R.B. and D. Ferreira, 2009. Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics*, 94(2): 291-309. Available at: <https://doi.org/10.1016/j.jfineco.2008.10.007>.
- Agrawal, A. and G.N. Mandelker, 1990. Large shareholders and the monitoring of managers: The case of antitakeover charter amendments. *Journal of Financial and Quantitative analysis*, 25(2): 143-161. Available at: <https://doi.org/10.2307/2330821>.
- Agrawal, A. and G.N. Mandelker, 1992. Shark repellents and the role of institutional investors in corporate governance. *Managerial and Decision Economics*, 13(1): 15-22. Available at: <https://doi.org/10.1002/mde.4090130103>.
- Agrawal, A. and C. Knoeber, 1996. Firm performance and mechanisms to control agency problems between managers and shareholders. *Journal of Financial and Quantitative Analysis*, 31(3): 377-397. Available at: <https://doi.org/10.2307/2331397>.
- Ahmed, K., M. Hossain and M.B. Adams, 2006. The effects of board composition and board size on the informativeness of annual accounting earnings. *Corporate Governance: An International Review*, 14(5): 418-431. Available at: <https://doi.org/10.1111/j.1467-8683.2006.00515.x>.
- Alexandre, H. and M. Paquerot, 2000. Effectiveness of control structures and rooting of leaders. *Finance Control Strategy*, 3(2): 5-29.
- Allen, J.W. and G.M. Phillips, 2000. Corporate equity ownership, strategic alliances, and product market relationships. *The Journal of Finance*, 55(6): 2791-2815. Available at: <https://doi.org/10.1111/0022-1082.00307>.
- Baklouti, M.A., W. Jamoussi and H. Affes, 2007. The intangibles: Emergence, recognition and financial performance - study of the Tunisian market. 28th Congress of the Francophone Association of Accounting, Poitiers.

- Baron, R.M. and D.A. Kenny, 1986. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6): 1173-1182. Available at: <https://doi.org/10.1037//0022-3514.51.6.1173>.
- Bathala, C.T., K.P. Moon and R.P. Rao, 1994. Managerial ownership, debt policy, and the impact of institutional holdings: An agency perspective. *Financial Management*, 23(3): 38-51. Available at: <https://doi.org/10.2307/3665620>.
- Beasley, M.S. and S.E. Salterio, 2001. The relationship between board characteristics and voluntary improvements in audit committee composition and experience. *Contemporary Accounting Research*, 18(4): 539-570. Available at: <https://doi.org/10.1092/rm1j-a0ym-3vmv-tamv>.
- Becker, C.L., M.L. Defond, J. Jiambalvo and K.R. Subramanyam, 1998. The effect of audit quality on earnings management. *Contemporary Accounting Research*, 15(1): 1-24.
- Ben-Zion, U., 1978. The investment aspect of non-production expenditures: An empirical test. *Journal of Economics and Business*, 30(3): 224-229.
- Berrone, P., J. Surroca and J.A. Tribo, 2005. The influence of blockholders on R&D investments intensity: Evidence from Spain. WP 05-46, Business Economics Series 11.
- Bethel, J.E. and J. Liebeskind, 1993. The effects of ownership structure on corporate restructuring. *Strategic Management Journal*, 14(S1): 15-31. Available at: <https://doi.org/10.1002/smj.4250140904>.
- Blundell, R., R. Griffith and J. Van Reenen, 1999. Market share, market value and innovation in a panel of British manufacturing firms. *The Review of Economic Studies*, 66(3): 529-554. Available at: <https://doi.org/10.1111/1467-937x.00097>.
- Bosworth, D. and M. Rogers, 1998. Research and development, intangible assets and the performance of large Australian companies. Meulbourne Institute WP, n° 2/98.
- Bouaziz, Z. and M. Triki, 2012. The impact of the board of directors on the financial performance of Tunisian companies. *Universal Journal of Marketing and Business Research*, 1(2): 56-71.
- Bouden, I., 2006. The identification of intangibles during business combinations: An exploratory study of the French Financial Market. No. halshs-00151309.
- Bourmont, M., 2006. The determinants of the publication of information on research and development activities in France: A longitudinal and methodological study. Act of the 27th Francophone Accounting Congress, Tunisia.
- Bozec, R., M. Dia and Y. Bozec, 2010. Governance-performance relationship: A re-examination using technical efficiency measures. *British Journal of Management*, 21(3): 684-700. Available at: <https://doi.org/10.1111/j.1467-8551.2008.00624.x>.
- Brickley, J.A., J.L. Coles and G. Jarrell, 1997. Leadership structure: Separating the CEO and chairman of the board. *Journal of Corporate Finance*, 3(3): 189-220. Available at: [https://doi.org/10.1016/s0929-1199\(96\)00013-2](https://doi.org/10.1016/s0929-1199(96)00013-2).
- Cañibano, L., M. Garcia-Ayuso and P. Sánchez, 2000. Accounting for intangibles: A literature review. *Journal of Accounting Literature*, 19: 102-130.
- Carcello, J.V. and T.L. Neal, 2000. Audit committee composition and auditor reporting. *The Accounting Review*, 75(4): 453-467. Available at: <https://doi.org/10.2308/accr.2000.75.4.453>.
- Carter, D.A., B.J. Simkins and W.G. Simpson, 2003. Corporate governance, board diversity, and firm value. *Financial Review*, 38(1): 33-53. Available at: <https://doi.org/10.1111/1540-6288.00034>.
- Casta, J.F., O. Ramond and S. Lin, 2007. Value relevance of comprehensive income: Evidence from major European capital markets. Paper Presented at the 2007 European Accounting Association Annual Meeting.
- Chan, L., J. Lakonishok and T. Sougiannis, 2001. The stock market valuation of research & development expenditures. *Journal of Finance*, 56(6): 2431-2456. Available at: <https://doi.org/10.1111/0022-1082.00411>.
- Chang, S.-C., S.-S. Chen and W.-C. Lin, 2006. Internal governance and the wealth effect of R&D expenditure increases. Working Paper. Available from http://www.efmaefm.org/efma2006/papers/620254_full.pdf.
- Charfi-Laadhar, S., 2006. Empirical analysis of the explanatory factors of the decision to activate research and development expenditure: Case of French companies. Act of the 27th French-Speaking Congress of Accounting, Tunisia.

- Chung, K.H., P. Wright and B. Kedia, 2003. Corporate governance and market valuation of capital and R&D investments. *Review of Financial Economics*, 12(2): 161-172. Available at: [https://doi.org/10.1016/s1058-3300\(02\)00063-0](https://doi.org/10.1016/s1058-3300(02)00063-0).
- Cockburn, I. and Z. Griliches, 1988. The estimation and measurement of spillover effects of R&D investment-industry effects and appropriability measures in the stock market's valuation of R&D and patents. *The American Economic Review*, 78(2): 419-423.
- Craswell, A.T., J.R. Francis and S.L. Taylor, 1995. Auditor brand name reputations and industry specializations. *Journal of Accounting and Economics*, 20(3): 297-322. Available at: [https://doi.org/10.1016/0165-4101\(95\)00403-3](https://doi.org/10.1016/0165-4101(95)00403-3).
- Daily, C.M. and D.R. Dalton, 2003. Women in the boardroom: A business imperative. *Journal of Business Strategy*, 24(5): 8-10. Available at: <https://doi.org/10.1108/jbs.2003.28824eaf.002>.
- Dalton, D.R., C.M. Daily, J.L. Johnson and A.E. Ellstrand, 1999. Number of directors and financial performance: A meta-analysis. *Academy of Management Journal*, 42(6): 674-686. Available at: <https://doi.org/10.5465/256988>.
- DeAngelo, L.E., 1981. Auditor size and audit quality. *Journal of Accounting and Economics*, 3(3): 183-199. Available at: [https://doi.org/10.1016/0165-4101\(81\)90002-1](https://doi.org/10.1016/0165-4101(81)90002-1).
- Del Monte, A. and E. Papagni, 2003. R&D and the growth of firms: Empirical analysis of a panel of Italian firms. *Research Policy*, 32(6): 1003-1014. Available at: [https://doi.org/10.1016/s0048-7333\(02\)00107-5](https://doi.org/10.1016/s0048-7333(02)00107-5).
- Demsetz, H., 1983. The structure of ownership and the theory of the firm. *The Journal of Law and Economics*, 26(2): 375-390.
- Demsetz, H. and B. Villalonga, 2001. Ownership structure and corporate performance. *Journal of Corporate Finance*, 7(3): 209-233.
- Ding, Y., H. Stolowy and M. Tenenhaus, 2003. R&D productivity: An international study. HEC Group Research Paper Series, No. 781/2003.
- Ehrhadto, O. and E. Nowake, 2002. Private benefits and Minority shareholder expropriation, empirical evidence from IPOs of German family-owned firms. Working Paper, Humboldt University and Goethe University.
- Eisenberg, T., S. Sundgren and M.T. Wells, 1998. Larger board size and decreasing firm value in small firms. *Journal of Financial Economics*, 48(1): 35-54. Available at: [https://doi.org/10.1016/s0304-405x\(98\)00003-8](https://doi.org/10.1016/s0304-405x(98)00003-8).
- Faccio, M. and L.H. Lang, 2002. The ultimate ownership of Western European corporations. *Journal of Financial Economics*, 65(3): 365-395. Available at: [https://doi.org/10.1016/s0304-405x\(02\)00146-0](https://doi.org/10.1016/s0304-405x(02)00146-0).
- Fama, E.F. and M.C. Jensen, 1983. Separation of ownership and control. *The Journal of Law and Economics*, 26(2): 301-325.
- Farrell, K.A. and P.L. Hersch, 2005. Additions to corporate boards: The effect of gender. *Journal of Corporate Finance*, 11(1-2): 85-106. Available at: <https://doi.org/10.1016/j.jcorpfin.2003.12.001>.
- Fernández, C. and R. Arrondo, 2005. Alternative internal controls as substitutes of the board of directors. *Corporate Governance: An International Review*, 13(6): 856-866. Available at: <https://doi.org/10.1111/j.1467-8683.2005.00476.x>.
- Francis, J.R. and J. Krishnan, 1999. Accounting accruals and auditor reporting conservatism. *Contemporary Accounting Research*, 16(1): 135-165. Available at: <https://doi.org/10.1111/j.1911-3846.1999.tb00577.x>.
- Gani, L. and J. Jermias, 2006. Investigating the effect of board independence on performance across different strategies. *The International Journal of Accounting*, 41(3): 295-314. Available at: <https://doi.org/10.1016/j.intacc.2006.07.009>.
- Godard, L., 2002. The size of the board: Determinants and impact on performance. *Journal of Management Sciences*, 33: 125-148.
- Godard, L. and A. Shatt, 2004. Characteristics and functioning of French administrations: A state of the art. FARGO Paper, No. 104020.
- Goodstein, J., K. Gautam and W. Boeker, 1994. The effects of board size and diversity on strategic change. *Strategic Management Journal*, 15(3): 241-250. Available at: <https://doi.org/10.1002/smj.4250150305>.
- Graves, S.B., 1988. Institutional ownership and corporate R&D in the computer industry. *Academy of Management Journal*, 31(2): 417-428. Available at: <https://doi.org/10.5465/256557>.

- Griliches, Z., 1981. Market value, R&D, and patents. *Economics Letters*, 7(2): 183-187. Available at: [https://doi.org/10.1016/0165-1765\(87\)90114-5](https://doi.org/10.1016/0165-1765(87)90114-5).
- Hall, 1998. Innovation and market value. Working Paper, n°6984, NBER.
- Hall, B.H. and R. Oriani, 2006. Does the market value R&D investment by European firms? Evidence from a panel of manufacturing firms in France, Germany, and Italy. *International Journal of Industrial Organization*, 24(5): 971-993. Available at: <https://doi.org/10.1016/j.ijindorg.2005.12.001>.
- Hanson, R.C. and M.H. Song, 2000. Managerial ownership, board structure, and the division of gains in divestitures. *Journal of Corporate Finance*, 6(1): 55-70. Available at: [https://doi.org/10.1016/s0929-1199\(99\)00013-9](https://doi.org/10.1016/s0929-1199(99)00013-9).
- Hill, C.W. and S.A. Snell, 1989. Effects of ownership structure and control on corporate productivity. *Academy of Management Journal*, 32(1): 25-46. Available at: <https://doi.org/10.5465/256418>.
- Hillman, A.J., A.A. Cannella Jr and I.C. Harris, 2002. Women and racial minorities in the boardroom: How do directors differ? *Journal of Management*, 28(6): 747-763. Available at: <https://doi.org/10.1177/014920630202800603>.
- Hiraki, T., H. Inoue, A. Ito, F. Kuroki and H. Masuda, 2003. Corporate governance and firm value in Japan: Evidence from 1985 to 1998. *Pacific-Basin Finance Journal*, 11(3): 239-265. Available at: [https://doi.org/10.1016/s0927-538x\(03\)00023-4](https://doi.org/10.1016/s0927-538x(03)00023-4).
- Huse, M., 2007. Boards, governance and value creation: The human side of corporate governance. Cambridge: Cambridge University Press.
- Hutchinson, M. and F.A. Gul, 2004. Investment opportunity set, corporate governance practices and firm performance. *Journal of Corporate Finance*, 10(4): 595-614. Available at: [https://doi.org/10.1016/s0929-1199\(03\)00022-1](https://doi.org/10.1016/s0929-1199(03)00022-1).
- INSEE, 2002. An approach to high technology in the Nord-Pas-de-Calais. INSEE Profiles Nord-Pas-De-Calais, No. 4. Available from www.insee.fr/fr/insee_regions/Nord-Pas-de-Calais/rfc/docs/c4b-02.pdf.
- Jensen, M., 1990. Shareholders must control managers. *Harvard Expansion*. pp: 60-72.
- Jensen, M.C., 1986. Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, 76(2): 323-329.
- Jensen, M.C., 1993. The modern industrial revolution, exit, and the failure of internal control systems. *The Journal of Finance*, 48(3): 831-880. Available at: <https://doi.org/10.2307/2329018>.
- Jensen, M.C. and W.H. Meckling, 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4): 305-360. Available at: [https://doi.org/10.1016/0304-405x\(76\)90026-x](https://doi.org/10.1016/0304-405x(76)90026-x).
- John, K. and L.W. Senbet, 1998. Corporate governance and board effectiveness1. *Journal of Banking & Finance*, 22(4): 371-403.
- Johnson, W.B. and T. Lys, 1990. The market for audit services: Evidence from voluntary auditor changes. *Journal of Accounting and Economics*, 12(1-3): 281-308.
- Kang, E., D.K. Ding and C. Charoenwong, 2009. Investor reaction to women directors. *Journal of Business Research*, 63(8): 888-894. Available at: <https://doi.org/10.1016/j.jbusres.2009.06.008>.
- Kapopoulos, P. and S. Lazaretou, 2007. Corporate ownership structure and firm performance: Evidence from Greek firms. *Corporate Governance: An International Review*, 15(2): 144-158. Available at: <https://doi.org/10.1111/j.1467-8683.2007.00551.x>.
- Kennedy, P., 1985. A guide to econometrics. 2nd Edn., Cambridge: The MIT Press.
- Klein, A., 1998. Firm performance and board committee structure. *The Journal of Law and Economics*, 41(1): 275-304. Available at: <https://doi.org/10.1086/467391>.
- Kor, Y.Y. and J.T. Mahoney, 2005. How dynamics, management, and governance of resource deployments influence firm-level performance. *Strategic Management Journal*, 26(5): 489-496. Available at: <https://doi.org/10.1002/smj.459>.
- Krishnan, G., M. Percy and I. Tutticci, 2002. The role of audit quality in firm valuation: The case of R&D capitalization in Australia. Working Paper.
- Krishnan, S.R., K.K. Srinivasan, S. Singh, S.R. Bell, K.C. Midkiff, W. Gong, S. Fiveland and M. Willi, 2002. Strategies for reduced NOx emissions in pilot-ignited natural gas engines. ASME-WA Meeting, Proc. ICEF, 39: 361-367.

- Kroll, M., S.A. Le and B. Walters, 2006. The moderating effects of external monitors on the relationship between R&D spending and firm performance. *Journal of Business Research*, 59(2): 278-287. Available at: <https://doi.org/10.1016/j.jbusres.2005.04.003>.
- La Porta, R., F. Lopez-De-Silanes and A. Shleifer, 1999. Corporate ownership around the world. *The Journal of Finance*, 54(2): 471-517.
- Le, S.A., B. Walters and M. Kroll, 2006. The moderating effects of external monitors on the relationship between R&D spending and firm performance. *Journal of Business Research*, 59(2): 278-287. Available at: <https://doi.org/10.1016/j.jbusres.2005.04.003>.
- Lennox, C., 1999. Are large auditors more accurate than small auditors? *Accounting and Business Research*, 29(3): 217-227. Available at: <https://doi.org/10.1080/00014788.1999.9729582>.
- Lev, B., 1999. R&D and capital markets. *Journal of Applied Corporate Finance*, 11(4): 21-35.
- Lev, B. and T. Sougiannis, 1996. The capitalization, amortization, and value-relevance of R&D. *Journal of Accounting and Economics*, 21(1): 107-138. Available at: [https://doi.org/10.1016/0165-4101\(95\)00410-6](https://doi.org/10.1016/0165-4101(95)00410-6).
- Lipton, M. and J.W. Lorsch, 1992. A modest proposal for improved corporate governance. *Business Lawyer*, 48(1): 59- 77.
- Loescher, S.M., 1984. Bureaucratic measurement, shuttling stock shares, and shortened time horizons-implications for economic-growth. *Quarterly Review of Economics and Business*, 24(4): 8-23.
- Lööf, H. and A. Heshmati, 2005. On the relationship between innovation and performance: A sensitivity analysis. *Economics of Innovation and New Technology*, 15(4/5): 317-344. Available at: <https://doi.org/10.1080/10438590500512810>.
- Miller, T. and D.C.M. Triana, 2009. Demographic diversity in the boardroom: Mediators of the board diversity-firm performance relationship. *Journal of Management Studies*, 46(5): 755-786. Available at: <https://doi.org/10.1111/j.1467-6486.2009.00839.x>.
- Mizruchi, M.S., 1983. Who controls whom? An examination of the relation between management and boards of directors in large American corporations. *Academy of Management Review*, 8(3): 426-435. Available at: <https://doi.org/10.2307/257831>.
- Moore, G. and J. Ronen, 1990. External audit and asymmetric information. *Auditing: A Journal of Practice and Theory*, 9(supplement 8): 234-242.
- Nekhili and Poincelot, 2000. The R & D function and managerial latitude: A theoretical analysis. *Finance Control Strategy*, 3(1): 167-215.
- Omri, A., I. M'hamid and H. R., 2011. Gender diversity in the board of directors and performance of Tunisian listed firms. *Global Journal of Management and Business Research*, 11(8): 40-49.
- Omri, M.A., 2002. Role of Institutional Investors and Performances of Tunisian Enterprises. *CAFRAD*.
- Petra, S.T., 2007. The effects of corporate governance on the informativeness of earnings. *Economics of Governance*, 8(2): 129-152. Available at: <https://doi.org/10.1007/s10101-006-0018-8>.
- Piot, C., 2001. Agency costs and audit quality: Evidence from France. *European Accounting Review*, 10(3): 461-499. Available at: <https://doi.org/10.1080/09638180126797>.
- Rediker, K.J. and A. Seth, 1995. Boards of directors and substitution effects of alternative governance mechanisms. *Strategic Management Journal*, 16(2): 85-99. Available at: <https://doi.org/10.1002/smj.4250160202>.
- Rose, C., 2007. Does female board representation influence firm performance? The Danish evidence. *Corporate Governance: An International Review*, 15(2): 404-413. Available at: <https://doi.org/10.1111/j.1467-8683.2007.00570.x>.
- Sanders, W.G. and M.A. Carpenter, 2003. Strategic satisficing? A behavioral-agency theory perspective on stock repurchase program announcements. *Academy of Management Journal*, 46(2): 160-178. Available at: <https://doi.org/10.2307/30040612>.
- Saunders, D.R., 1956. Moderator variables in prediction. *Educational and Psychological Measurement*, 16(2): 209-222. Available at: <https://doi.org/10.1177/001316445601600205>.
- Sevestre, P., 2002. *Econometrics of panel data*. Paris: Dunod.

- Shan, Y.G. and R.P. McIver, 2011. Corporate governance mechanisms and financial performance in China: Panel data evidence on listed non financial companies. *Asia Pacific Business Review*, 17(3): 301-324. Available at: <https://doi.org/10.1080/13602380903522325>.
- Sharma, S., R.M. Durand and O. Gur-Arie, 1981. Identification and analysis of moderator variables. *Journal of Marketing Research*, 18(3): 291-300. Available at: <https://doi.org/10.2307/3150970>.
- Shleifer, A. and R.W. Vishny, 1989. Management entrenchment: The case of manager-specific investments. *Journal of Financial Economics*, 25(1): 123-139.
- Shleifer, A. and R.W. Vishny, 1992. Liquidation values and debt capacity: A market equilibrium approach. *The Journal of Finance*, 47(4): 1343-1366. Available at: <https://doi.org/10.1111/j.1540-6261.1992.tb04661.x>.
- Shleifer, A. and R.W. Vishny, 1997. A survey of corporate governance. *The Journal of Finance*, 52(2): 737-783.
- Shome, D.K. and S. Singh, 1995. Firm value and external blockholdings. *Financial Management*, 24(4): 3-15. Available at: <https://doi.org/10.2307/3665947>.
- Siala, F., F. Adjaoud and C. Mamoghli, 2009. The combined effect of external auditor reputation and internal corporate governance on performance. *Journal of Academy of Business and Economics*, 9(2): 16-29.
- Singh, J., 2008. Tight rope walk at tata steel: Balancing profits and CSR. *South Asian Journal of Management*, 15(1): 118-136.
- Sougiannis, T., 1994. The accounting based valuation of corporate R&D. *Accounting Review*, 69(1): 44-68.
- Thibierge, C., 1997. Contribution to the study of the determinants of the accounting of intangible investments. Thesis in Management Sciences, University of Paris IX, Dauphine.
- Thibierge, C., 2001. Intangible assets, stock market valuation and debt constraint: An empirical study on the French and Spanish markets. Working Paper, ESCP-EAP, Finance Department.
- Tihanyi, L., R.A. Johnson, R.E. Hoskisson and M.A. Hitt, 2003. Institutional ownership differences and international diversification: The effects of boards of directors and technological opportunity. *Academy of Management Journal*, 46(2): 195-211. Available at: <https://doi.org/10.5465/30040614>.
- Toivanen, O., P. Stoneman and D. Bosworth, 2002. Innovation and the market value of UK firms, 1989-1995. *Oxford Bulletin of Economics and Statistics*, 64(1): 39-61. Available at: <https://doi.org/10.1111/1468-0084.00002>.
- Turki, H., A. Abdelmoula and A. Jarboui, 2006. Accounting for expenditures intangibles: What empirical determinants: The case of Tunisian firms. 27th Congress of the Francophone Accounting Association, Tunis, Tunisia.
- Walsh, J.P. and J.K. Seward, 1990. On the efficiency of internal and external corporate control mechanisms. *Academy of Management Review*, 15(3): 421-458. Available at: <https://doi.org/10.5465/amr.1990.4308826>.
- Watts, R.L. and J.L. Zimmerman, 1986. Positive accounting theory. Englewood Cliffs, NJ: Prentice Hall.
- Weir, C., D. Laing and P.J. McKnight, 2002. Internal and external governance mechanisms: Their impact on the performance of large UK public companies. *Journal of Business Finance & Accounting*, 29(56): 579-611. Available at: <https://doi.org/10.1111/1468-5957.00444>.
- Williamson, O.E., 1988. Corporate finance and corporate governance. *The Journal of Finance*, 43(3): 567-591.
- Wright, D.W., 1996. Evidence on the relation between corporate governance characteristics and the quality of financial reporting. Working Paper, University of Michigan: 1-38. Available from <http://ssrn.com/abstract=10138>.
- Xu, M. and C. Zhang, 2004. The explanatory power of R&D for the cross-section of stock returns: Japan 1985-2000. *Pacific-Basin Finance Journal*, 12(3): 245-269. Available at: <https://doi.org/10.1016/j.pacfin.2003.09.001>.
- Yermack, D., 1996. Higher market valuation of companies with a small board of directors. *Journal of Financial Economics*, 40(2): 185-211. Available at: [https://doi.org/10.1016/0304-405x\(95\)00844-5](https://doi.org/10.1016/0304-405x(95)00844-5).
- Zahra, S.A., 1996. Governance, ownership, and corporate entrepreneurship: The moderating impact of industry technological opportunities. *Academy of Management Journal*, 39(6): 1713-1735. Available at: <https://doi.org/10.5465/257076>.
- Zarai, M.A. and W. Bettabai, 2007. Impact of the effectiveness of audit committees on the quality of disclosed accounting profits. *Governance Review*, 4(1).

- Zare, R., S. Khedri and F. Farzanfar, 2013. Examining the effect of auditing institution, internal auditing department and companies' profitability on voluntary information disclosure in Tehran stock exchange. *International Journal of Economy, Management and Social Sciences*, 2(9): 680-686.
- Zedeck, S., 1971. Problems with the use of "moderator" variables. *Psychological Bulletin*, 76(4): 295-310. Available at: <https://doi.org/10.1037/h0031543>.

Views and opinions expressed in this article are the views and opinions of the author(s), International Journal of Business, Economics and Management shall not be responsible or answerable for any loss, damage or liability etc. caused in relation to/arising out of the use of the content.