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CSR and Innovation: Two Sides of the Same Coin

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Abstract

In this chapter, we analyze the association between CSR and innovation. We state that CSR concept has evolved over time and has changed the way innovation is conceived. The state of art shows that CSR activities have been responsively introduced to achieve the stakeholders' needs and standards, to become gradually more strategic activities. In fact, many firms have been involved in CSR projects dealing with the reputation enhancement, the stakeholders' reciprocation, the risk mitigation, and the improvement of the innovation capacity mechanisms. We show the presence of a virtuous dynamic between strategic CSR and innovation: firms have to present strategic CSR activities in the core of their innovative strategies. Sustainable innovations are effective tools to foster CSR activities and, therefore, social performance. Furthermore, we show that the CSR-innovation influence is driven by specific channels such as the company's competitiveness, strategies' developments, and framework. Besides, we shed light on the effects of board diversity, managerial cognition, and corporate cognitive-governance on CSR-innovation association. Finally, we provide an empirical evidence from the SBF120 French companies over the period from 2010 to 2016. We present the nonlinear effect of innovation on the current CSR scores, using a semi-parametric estimation. Our results confirm the divers perception of CSR and its components at the different innovation levels.

Keywords: innovation, responsive CSR, strategic CSR, managerial cognition, competitive advantage, penalized splines

1. Introduction

Given the global grand challenges such as urban mobility, poverty alleviation, endemic violent conflict and the worsening of the ecological crisis, the current complex multidimensional corporate framework intensified the requirements of corporate social engagements. Thus, a common refrain of businesses nowadays is the necessity of adopting socially and ecologically responsible behaviours while ensuring their growth. Besides, since innovation is a key factor to heighten the company's growth and competitive advantage, firms should invest in innovative as well as social matters to gain legitimacy and to respond to the different interested actors' expectations. With the fourth industrial revolution, innovation has been the driver of sustainability. It shapes future production, strengthens competitiveness and improves human well-being as well as decreases the environmental damage [1]. Numerous examples of new innovative products and methods such as the BioMat project between Faurecia and Mitsubishi Chemical or the Flaxpreg project, developed in collaboration with PSA Peugeot-Citroën, Lineo and the French University

of Reims Champagne Ardenne, show the strong bonds between innovation and corporate social engagements. Moreover, it underscores the crucial role of collaborations and strategic partnerships in developing a competitive advantage.

Innovation could help to better satisfy the needs of different stakeholders' groups and to go beyond their expectations by getting involved in more strategic CSR policies. Innovation could, therefore, drive more socially responsible projects. According to [2] it is an urgent need to solve the socio-ecological problems. In a similar vein, [3] pointed out that innovation is commonly considered as the most viable path to support and strengthen the current standards of living while treating and overcoming environmental crises. Therefore, numerous studies assumed that innovation supports social practices [4–6], which complies with the circular economy (CE) plan launched by the European Commission in 2014. This plan aims to unlock the related growth while boosting the European Union competitiveness using new business opportunities as well as novel methods of production and consumption. Nevertheless, due to resources scarcity, conflicting interests, and the riskiness of innovative investments, firms might face difficulties to balance and define their priorities. For instance, [3] pointed out the lack of an innovative potential broad overview in the field of circular economic-related technological developments.

Due to the importance of the innovative and social strategies application, numerous investigations about these two crucial investments were conducted. Nevertheless, very few studies have explored the innovation-corporate social responsibility (CSR henceforth) association. These studies show mixed results. While certain studies tested the synergetic effect that might occur between innovation and CSR, others have debated their positive or deleterious linkage. For instance, London [7] claimed that understanding and analyzing community problems help to identify which efficient solutions should be applied and which resource can be used for social benefit. Through this identification, firms can generate new approaches and products that allow them to create new markets. Therefore, social needs are determinant factors of corporate innovation orientations and success, while innovation is the solution to solve social matters. Yet, according to Mithani [8], managers' engagement in CSR can weaken innovation investment initiatives. He argued that corporate innovation and social investment effects on economic growth follow a specific pecking order in the Indian market. This lack of convergent empirical evidence was explained in previous research by three main reasons:

- First, the diversity of innovation classifications such as the process and product innovation [9], the responsible innovation [10] or the exploratory and exploitative innovation [11]. According to Desjardins [12] there are 10 types of innovation.
- Second, the dynamism of the CSR conception. Indeed, the CSR concept has been developing since its appearance [13]. Each version responds to certain criteria that influence innovation differently. These versions can be classified into two fields: the strategic CSR and the responsive CSR [9, 14–18]. As a result, the CSR-innovation direct linkage alters depending on the CSR conception that - on its turn - changes based on the legal and social framework as well as the corporate commitment and proficiency.
- Third, the moderating and mediating effects of several factors such as corporate cognitive-governance or ethnic and cultural diversity. For instance, Costa et al. [11] pointed out that innovation and CSR synergy occurs only if the enterprise has a high level of social commitment. In a similar vein, Domínguez-Escrig et al. [19] highlighted the association between Stewardship

behaviours and innovation success. Their findings show a mediating role of radical innovation in managers' social behaviours and innovation success relationship.

Due to the importance of the innovative and social strategies application, further investigations about the linkage between these two crucial investments have to be conducted. One explanation of this lack of interest is the intricacy of the CSR concept and its misunderstanding. Weller [20] pointed out that numerous managers who implement ethical strategies and socially responsible ones do not understand their meaning. Dahlsrud [21] provided in his study 37 different definitions of CSR. Despite the complexity of the various CSR descriptions and corporate frameworks, academic research and international organizations have shared five common CSR dimensions. Using coding schemes, he claimed that the different used terms refer generally to these dimensions, which are the stakeholder dimension, the social dimension, the economic dimension, the voluntariness dimension, and the environmental dimension. In fact, the divers' used dialects are the real reason beyond the lack of one universality definition. These confluent definitions enable us to understand the construction of CSR in specific contexts. Yet, they fail to give guidance on how to face CSR challenges and how to consider it while developing business strategies.

The current chapter contributes to this debate on CSR definition. Specifically, we focus on the development of CSR conception over time and how it does shape our understanding of the CSR-Innovation association. Then we analyze how taking into account the cognitive and individual characteristics of top managers, and board directors could help to set a more inclusive framework of this association.

Our chapter is organized as the following. Section (2) presents the evolvement of the CSR and innovation nexus based on the evolutionary CSR concept. In this section, we distinguish between the strategic and responsive CSR. We analyze the moderating effects of the managerial characteristics on CSR-innovation association in section (3). In the penultimate section, we present our empirical investigation. The last section concludes the chapter.

2. Does CSR depend on innovation?

Since the second half of the 20th century, the corporate responsibility towards ecological and social matters has attracted a lot of interest, especially with the meta-environments in which firms operate nowadays [22, 23].

First, corporate sustainability has been presented as an exception [24]. In order to survive, firms have to provide continuously several resources and energies mobilized in a strategic plan, consistent with the framework rules and norms; otherwise, it will eventually fade. In other words, companies need to allocate their resources to create value and competitive advantage through a greater network development as well as an innovation encouragement [25]. According to the slack resources theory, due to the resources scarcity firms should arbitrate to select sustainable investments. Nevertheless, combining the divergent goals of stakeholders to find the optimal resources allocation function is the hardest mission for every company.

With the increase of multiple pressures and law evolvement, firms' ethical and social practices no longer present a simple voluntary decision, which explains the CSR development over time. Visser [13] considered that CSR versions missed the promotion of our community and ecosystem health, quite the contrary, they made it worse. Specifically, they failed to introduce innovative tools dealing with the existing environmental issues. He argued that the CSR understanding has been

evolving according to overlapping ages¹: The age of Greed, the age of philanthropy, the Marketing age and the Management age. While the three first ages have introduced a responsive CSR stream, the management age has established CSR in the core of business. It generates a strategic CSR.

When the firm is involved in CSR activities that meant to exclusively respond to stakeholders' basic needs and reporting standards, its CSR policy is responsive. However, when more pioneering initiatives are undertaken and going beyond standards and regulations, CSR activities are strategic [9, 27, 28]. We should also mention that another more civil version of CSR is taking place, namely the transformative CSR [13]. Nonetheless, we consider that this version is still in an embryonic stage for the profit-oriented enterprises.

The coexistence of these ages depends on the space–time setting. Hence, to explain the CSR and Innovation nexus we have to understand the evolvement of the CSR concept and its continuous interaction with corporate innovation.

2.1 The responsive CSR

The responsive CSR concept has been used in recent studies. Porter and Kramer [14] considered CSR as responsive if it has two goals: good corporate citizenship and risk mitigation. Put differently responsive CSR has no specific plan and strategy that allow the firm to create a competitive advantage. Indeed, there is no specific study that provides a clear development of responsive CSR conception. Vishwanathan et al. [18] described the non-strategic side of CSR as a blind spot to CSR researchers. Indeed, investigations' focus has been oriented to the strategic CSR. Researchers consider that firms which do not apply CSR strategically are applying it responsively.

This narrow development of responsive CSR made the firms' classification absolute. From a theoretical perception, a company is whether strategic or responsive, while in reality, it can be both especially since responsive CSR versions can share some strategic CSR criteria. We should point out there is no sole definition of the strategic CSR, which makes the responsive CSR understanding more blurred. For instance, Visser [13] argued that responsive CSR is meant to orient its activities in specific areas that are not specifically related to the core business. He identified the following forms of non-strategic CSR: the defensive, charitable and promotional CSR strategies.

Bocquet et al. [9] found that responsive CSR lessens the different corporate innovation types while strategic CSR promotes them. In contrast, Bocquet et al. [17] underlined the positive effect of the responsive CSR on the technological innovation for the SMEs. Thus, to give better insights into these controversial results, we analyze the interaction between innovation and the responsive CSR version previously mentioned.

In the following, we address the different strategies of responsive CSR and their influence on innovation strategies.

2.1.1 The defensive CSR

As business requires creativity, it is assumed to be naturally innovative [29]. Yet, what makes the ages different is to which goal this business creativity is directed. The first age of the CSR development is the age greed, in which CSR was perceived as a tool to serve shareholders' interests by taking into account only aligned stakeholders' interests. During this age, and consistent with the

¹ An age refers to a prevailing culture or context Visser [26].

shareholder theory, CSR activities were defensive as they were undertaken only to protect the financial result.

For example, according to “Fortune” magazine, the American company Enron was one of the most innovative firm from 1996 to 2001. It was listed among the 100 best American companies by the same magazine. Enron practice of CSR was widely known, specifically its green model. It built a great image that hides the true nature of its practices. However, its collapse was unavoidable since it was the result of greed. Some studies considered the Enron scandal as a juncture in the CSR understanding [30, 31]. They analyzed the CSR evolution after the post-Enron era.

After the 2008 Crisis, economic actors realized that they misunderstood CSR conception. Miller [32] considered the confusion between legitimate economic rationality and greed, more specifically excessive desire, is the main trigger of crisis. It is straightforward to see that Enron only acted socially responsible when it is financially profitable. Hence its scandal has been one of the greatest examples of CSR in the age of greed.

Even though CSR activities also have to generate cash-flows, considering the financial performance as the sole gain could never foster sustainability and innovation. Indeed, enhancing financial performance provides more funds for innovation investments. Nevertheless, defensive CSR cannot provide a good understanding of multiple needs of different groups, which increases agency conflicts. Furthermore, it cannot rebuild the corporate reputation, which in return threatens innovation success, especially in casino economies² where high-risk levels are taken. Bertrand et al. [33] described the defensive CSR as a “poor vector” of innovation.

2.1.2 The charitable CSR

The second age of the CSR development is the philanthropic age, where CSR is presented as a charitable action. Carnegie [34] claimed in his article “The Gospel of Wealth” that wealthy investors have to use their fortune for the community’s well-being and empowerment. In line with Stiglitz’s [35], wealth should be distributed equally to avoid the inequality costs and, therefore, recession. Put differently, we need charities to drive growth. The charitable actions can help innovation improvement. Bereskin and Hsu [36] emphasized that the corporate philanthropy with universities and non-profit organization improves the corporate research partnerships and strengthen its network. Thus, innovation efficiency is increased. Charity and philanthropy are mobilized to establish collaborations. Yet, to take advantage of the corporate philanthropy and boost corporate creativity, a long-term strategy of charity should be elaborated [37]. Otherwise, the charity can lead to waste the financial resources and consequently limits innovation investments.

Despite the beatific view of charitable CSR, it has failed to face systemic problems and solve social and ecological matters. This failure was due to two main reasons.

First, charitable activities’ goals do not incorporate the improvement of the financial performance and since companies are for-profit organizations, increasing their gain, and using their cash flows to create a competitive advantage should be out of the question. Therefore, non-strategic social actions can damage the corporate competitive position. Protecting and improving financial results should be neither out nor the core of the CSR scope. In other words, companies should capture

² An economic framework that fosters high risk taking in the quest for higher profit which might lead to crises, for example, the Asian crisis of 1997, the Argentine 1999 to 2002 economic crisis and 1998 the wall street market during the 2007–2008 financial crisis.

private benefits from their social strategies while responding to the philanthropic criterion, which is one of the strategic CSR dimensions, named ‘specificity’ [38].

The second reason is the limited capacity of firms to respond to all social and ecological needs. Non-strategic philanthropy is like trying to fill a bucket, which is leaking from the inside. Porter and Kramer [14] underlined that no business is able to solve all of society’s challenges or bear its costs. Therefore, each company has to select issues that cross its business and field of knowledge. Furthermore, CSR actions must fit the corporate missions and goals. Investing in generic social issues with no dynamic effects and which are neither significantly influenced by the enterprise’s operations nor affect its long-term competitiveness is a waste of corporate wealth. De Silva and Wright [39] indicated that strategic philanthropy is most often associated with open innovation. Accordingly, profit companies are likely to collaborate and co-create value with non-profit organizations through open innovation approaches.

2.1.3 The promotional CSR

The Marketing CSR also called promotional CSR is another form of responsive CSR. A promotional CSR is a reputation-building CSR. It encompasses social practices public relations’ opportunities with the aim of enhancing corporate reputation and brand image. It focuses generally on the stakeholders’ perception of the company and tries to find an optimal strategy that satisfies the interested actors and gives the firm a sound depiction. Therefore, it improves the financial result, provides more environmental support, reduces reputational risk, and builds a greater trust level [40–44]. The main aim of promotional CSR is to guarantee and promote more ‘Visibility’. Singh and Dhir [45], cause-related marketing has become an emerging field of research.

According to the founder of Virgin Group Richard Branson, “Young people today want to see change. They want a better world”³. Hence, being socially responsible is the best promotional way used by firms to achieve stakeholders’ satisfaction. Promotional CSR should start from the inside with an integrated marketing model. Moreover, it is likely to promote exploratory innovation, especially with the reputational risk mitigation. Lefebvre [46] underlined that social marketing is an evolutionary concept planned to foster innovation. Responsible marketing is most often positively associated with more marketing innovation. However, in practice, markets-makers and practitioners face challenges to align social/human and business issues. Hence, the spread of innovation that aims to solve the relative concerns become harder Lefebvre [47].

This CSR version might look sound. Nevertheless, it has several deficiencies. According to Singh and Dhir [45], around two-thirds of customers believe that companies’ spending on marketing is quite large compared to the social matters spending. They are not focusing much on real social issues. With limited knowledge of social or environmental matters, firms might apply CSR actions for greenwashing. Indeed, without a real social goal, using chaotic and disordered actions in a responsive way can only have a short-term impact. Thus, ensuring a corporate gain from the applied action might be harder. In the worst cases, CSR leads to antithetical results. Esper and Barin Cruz [48] discussed how CSR could be a hypocrisy tool to influence the market perception. With the presence of a large gap between the way in which a company shows off and the way in which it acts, stakeholders could

³ Deborah MacDonald Consulting (2018) The Shift Towards Social Entrepreneurship <https://www.deborahmacdonald.com/the-shift-towards-social-entrepreneurship/>

be manipulated and suffer manoeuvring hypocrisy, which leads to social scandals and trust collapse.

This CSR's poor understanding and active talking about CSR commitment while covering profitable practices that are socially and environmentally dubious trapped not only small businesses but also multinationals. Volkswagen test cheating, Siemens bribe scandal, BAE corruption scandal, General Motors defective ignition switches, Mitsubishi products falsified data, as well as Wells Fargo account fraud scandal and so on, are businesses that have gone responsibly astray. Brenkert [49] pointed out that we need to rethink CSR efforts to close the immoral gaps.

To conclude, a large body of research has highlighted the negative results of cosmetic CSR practices. In fact, CSR can be considered as a double-edged sword. It could generate extra costs that hamper corporate survival and innovativeness. Hence, firms have to select the appropriate social practices that foster the firm's position and enhance its profit and growth. In other words, companies should view CSR strategically.

2.2 The strategic CSR

Under the high social pressure, several firms have undertaken CSR initiatives that go beyond CSR regulations and standards to gain the stakeholders' trust. CSR could have positive influences if it is used strategically. According to the institutional theory, the corporate framework is based on the cohesion of the interdependent components. Hence, enterprises are affected and could affect their environment. To face CSR challenges and reach the optimal CSR practices effects firms should classify social acts into three main streams [14]:

- The generic social impact is generated by social matters which are not affected by the company's actions. The CSR practices do not influence the company competitiveness. Investing in this category is by no means strategic.
- The value chain social impact: where we find the possible actions through which the firm can influence its environment. Given the tremendous social issues, no firm has the capacity to solve the whole social problems. Therefore, it should select social programs that can be affected by the company's actions. The value chain social impact actions can be strategic or responsive it depends on the ability of the company to benefit the community while reinforcing its strategy.
- The third stream is the social dimensions of competitive context: In this category, we find the social issues that influence significantly the firms' competitiveness. The CSR actions under this group are strategic.

Based on this classification companies should select more strategic CSR activities that affect the competitive context of the company and improve the social environment. Along the same line, Burke and Logsdon [38] pointed out that social action could create a measurable economic benefit under the five following conditions: the centrality, the specificity, the proactivity, the voluntarism, and the visibility. To establish strategic CSR companies' social actions should be within its field of knowledge. In other words, firms have to prioritize social issues based on their salience to the business activity. Enterprises have to create a shared value, to capture private benefits due to social actions. These actions should be in line with the corporate environmental evolvement and should reflect the firm's anticipation of its framework evolution.

The efficiency of these actions will depend closely on the identification of the key stakeholders; the firm has to be concerned about their interests. More recently, Vishwanathan et al. [18] introduced a more inclusive framework for strategic CSR where they considered strategic CSR as the intersection between the social enhancing activities and the financial performance-enhancing activities. Accordingly, financial performance enhancement is a multidimensional result that depends on all CSR determinants, namely the firm's reputation enhancement, the stakeholder reciprocation, the risk mitigation, and the innovation capacity improvement.

2.2.1 The strategic CSR Pillars

Strategic CSR conception was developed first by Burke et al. [50]. It means relating CSR to the corporate core business, the implementation of social management systems, and the setting of social targets, auditing, and reporting. In the same line, Athanasopoulou and Selsky [51] defined strategic CSR as a continuous process that takes into account its own effect. More precisely, a company can pursue its business goals while considering the stakeholders' engagement through strategic CSR [52]. Thus, the efficient implementation of CSR strategies depends on corporate activities, skills, and capabilities. While other CSR versions can have different opposite linkage with innovation depending on their strategic application, innovation enhancement is one of the strategic CSR pillars. Vishwanathan et al. [18] explained how strategic CSR enhances the firm reputation, increases stakeholder reciprocation, mitigates firm risk, and strengthens innovation capacity. These effects cannot be achieved through the non-strategic CSR.

- The reputation enhancement: It is one of the most used mechanisms to explain the positive effect of CSR on the firm's competitive position and financial performance increasing. The legitimacy theory and the signal theory give it a robust theoretical foundation. Axjonow et al. [40] described CSR as a tool for reputation management. Indeed, if CSR succeeds to improve financial performance through enhancing the corporate reputation, then it has satisfied one of the strategic CSR pillars. Abugre and Anlesinya [53] stressed that reputation enhancement is a mechanism that mediates the CSR and financial performance link. For Zerbini [27] and Janney and Gove [54], reputation is a strategic asset. In the 21st century, social reputation and digital reputation play an important role in the CSR promotion
- The stakeholder reciprocation: One of the main and well-known theories that have supported the CSR positive effect is the Stakeholder theory [55]. Applying strategic management aim to optimize the different stakeholders' satisfaction. McWilliams and Siegel [56] indicated that when firms are engaged in CSR, their actions should be beneficial to at least certain stakeholders. Hence, selecting the key stakeholder groups is crucial to apply strategic CSR. While the reputation improvement mechanism has to be visible externally, the stakeholders' reciprocation mechanism aim is creating benefit for the existent stakeholders. This mechanism has to improve the cooperation between the firm and its stakeholders [18].

Lins et al. [57] found that during crises trust between stakeholders and companies is built through socially responsible investment (SRI). Employees' productivity is higher for socially responsible firms and creditors have more faith in these firms' transparency. In the same line, Hasan et al. [58] concluded that social considerations of the principal stakeholders are precious especially for firms that dispose of higher

discretionary cash levels. Similarly, Govindan et al. [59] proved that CSR practices influence the suppliers' selection, which affects corporate competitiveness.

- The risk mitigation: CSR strategies should reduce information asymmetry [43], which limits the agency conflicts. Harjoto and Laksmana [42] pointed out that CSR serves as a control mechanism for corporate risk. Consistent with Vishwanathan et al. [18], CSR engagement leads to get in touch with diverse stakeholders, which extends the company's connections and gives access to new information. This information reduces corporate-specific risk. Besides, Mayberry [44] marked that CSR strategies reduce firms' risk and grant insurance-like benefits. Recently the environmental risk was given greater consideration, Zhou et al. [60] focused on the carbon risk management as one of [61] emphasized that natural resources such as the water for the food and beverage sector create conflicts between industries and stakeholders. Indeed, legislation in Europe has been considering the social risk management through several enacted laws. Jung et al. [62] documented a positive relationship between the carbon risk and the cost of the corporate debt. Failing to respond to the Carbon Disclosure Project increases the environmental risk, which leads to an increase in the debt cost.
- The innovation capacity improvement: Previous research and practitioners endorse that innovation enhances corporate competitiveness. It enables companies to differentiate and overcome competitors. Nevertheless, innovation is risky. Its success requires some specific capacities such as the deep comprehension and support from the stakeholders, which can be achieved through the strategic social practices. For instance, Flammer [63] highlighted how responsible companies are favoured and receive more government procurement contracts due to the stakeholders' interest consideration. Moreover, employees are more motivated, they feel safer and more comfortable in responsible firms, which drives better information sharing. Furthermore, the stakeholders' synergy, built through CSR, promotes identifying new opportunities. Interacting and understanding stakeholders' needs should lead to greater innovation opportunities detection. Cegarra-Navarro et al. [64] presented, in their alternative model, innovation enhancement as a CSR mechanism that improves financial performance. Their results support the mediating role of innovation in the CSR-CFP relationship, which is confirmed by Bocquet et al. [9]. Halkos and Skouloudis [65] underlined that strategic CSR is a multifaceted construct that provides a variety of opportunities to innovate regardless of the innovation type. Strategic CSR should lead to thinking-out-of-the-box in a way that improves the corporate creativity and enhances innovation capacities.

It is straightforward to notice that the enhancement of the innovation capacity influences its intensity and initiative. The other mechanisms also can affect innovation success. For instance, a better relational with different stakeholders groups helps the firm to understand their desire and expectations and generates more innovation opportunities. In a similar stream, Porter and Kramer [14] underlined that strategic CSR is a source of innovation and competitive advantage creation. Its effect on innovation can be more pronounced when the company improves its CSR process, which in turn drives social innovation [66]. One of the examples that can show how strategic CSR fosters innovation is Denmark's biggest energy company Orsted. In 2012 and after the financial crisis the price of natural gas was dropping by 90%. To face these circumstances, Orsted's board hired as a new CEO Henrik Poulsen a former executive at LEGO. While several companies adopted crisis

management strategies to overcome the situation, Poulsen detected the opportunity and need for crucial change. The company at this level switched based on their new innovative responsible strategy from black energy to the green one. It was a radical transformation with the new core business, new management methods and new process that grants sustainable growth.

Similarly, Ecolab was a company that sells food safety services and cleaners with a modest growth level, around 10% annually in the early 2000s. When Douglas M. Baker Jr. became the CEO in 2004 he felt that moving to the adjacent markets will not provide the desired growth. In line with Bocquet et al. [9], strategic CSR has to understand and consider the stakeholders while making strategies. Ecolab started its transformation by asking customers among others to understand the real needs and what is really lacking in the market. Through this understanding and collaboration with Nalco Company, Ecolab was able to present new products and cover \$12 billion market cap in 2011.

These examples not only reflect the strong positive association between the strategic CSR and the innovation but also reveal the vital role of the managerial characteristics of this relation.

3. Why do cognitive and social traits in top management positions matter?

CSR and innovation are the key drivers of responsible and sustainable competitive advantages. Hence during this last decade investigations about their linkage presented a significant strand of research. Based on several real examples, studies [17, 67–69] highlighted the crucial influence of the managerial characteristics (the entrepreneurial orientations, cognition, perspective, culture, and so on) on the CSR and innovation nexus. Indeed, managers' characteristics provide the exact CSR age to which the firm belongs. Yang et al. [68] focused on the managerial cognition association with the CSR and innovation link. According to their study, the proactive environmental strategy focus is positively linked to two factors the managers' perceived business and social pressures. This association prompts the corporate innovation capacities. Similarly, Pedersen et al. [69] tested the mediating effect of organizational values such as the management style or the organizational structure and culture on the CSR and innovation nexus. They concluded that the CSR and innovation association depends deeply on the managers' rooted values and flexibility.

The age of CSR in which the company is positioned depends on the managerial characteristics. Furthermore, managers' perspective is able to create the appropriate climate to facilitate the CSR conception transformation. However, this managerial perspective can be oriented due to the legal and social framework pressure, consistent with the institutional theory. Scott [70] indicated that the normative, regulative, and cognitive elements form different kinds of pressures shape the managers' cognition in strategy establishment. Indeed, the existence of unavoidable restraints can make the CSR and environmental management unsustainable [71].

3.1 The CEO traits

System builders such as the corporate innovators, managers and board members are the main actors that orient the firms' decision-making. Their attitudes and actions influence corporate strategies and the interaction between its decisions. The CEO position is considered as the highest in the company's organogram. Hence, we

focus on its traits' effects on the CSR-innovation nexus. Cho and Kim [72] mentioned that the CEO's career is significantly affected by risky strategies such as innovation, research and development, CSR and capital expenditures. Consequently, young and less experienced CEOs are less likely to undertake innovative or social investments. Nevertheless, the exploitation of the old knowledge and the CEOs' willingness to preserve their value and success may alleviate this negative impact. In a similar vein, Lin et al., [73] provided evidence for the positive association between the CEO educational degree and innovation initiative. Bendell and Huvaj [74] emphasized that CEOs with high tenure are more likely to invest in innovation when they adopt CSR strategies. Their position allows them to bring more attention to the organizational network with different external stakeholders, which increases their innovation incentive. They concluded that the CSR and innovation linkage is strong when CEOs have long execution periods. Thus, the CEO experience, knowledge and network moderate the CSR-innovation linkage, which explains the universities current development. We notice that universities' curricula, specifically management and corporate programs have been updated and have become more focused on social performance and CSR. Managers aim to acquire legitimacy through their social practices while gaining competitive advantages through innovation.

3.2 The board diversity

Board diversity in large companies plays a crucial role in the decision-making process. Indeed, the directors' attributes such as gender, nationality, age, educational level and independency mediate the innovation-CSR linkage [17, 75].

The gender diversity more specifically the gender equality, which is one of the CSR components, forms a responsible innovation pillar, according to the European Commission report.⁴ Several previous studies stressed that female directors are more risk-averse and avoid risky investments [76]. Thus, they invest less in innovation. Nevertheless, this risk aversion is influenced by the female manager experience. With their specific knowledge and higher flexibility [77], women presence on the board creates complementarity which promotes innovation. Elstad and Ladegard [78] underlined that the presence of women on the board influences the decision-making dynamism. Attia et al. [79] pointed out that gender diversity can enhance corporate product innovation. The presence of women can create better interaction and greater complementarity between R&D teams.

Another pillar of responsible innovation is the Governance dimension. The CSR-governance is associated with the presence of independent directors. Besides, the presence of foreign directors provides greater community involvement [80]. These criteria reflect the company's transparency and social performance, which affect the stakeholders' trust and reduces corporate risk and consequently improves innovation. According to Attia et al. [79], independent directors' presence fosters the innovation intensity and process innovation.

The educational level also is one of the board diversity forms. Haniffa and Cooke [81] focused on the ethnic and cultural background of the board's members. They argued that a higher educational level is associated with better stakeholders understanding. This understanding helps the board members to predict the adequate innovation fields. Moreover, a higher educational level provides a better knowledge, which foster innovation.

⁴ Options for Strengthening Responsible Research and Innovation 2014. https://ec.europa.eu/research/science-society/document_library/pdf_06/options-for-strengthening_en.pdf

3.3 Human dimension, knowledge and innovation in the fourth revolution area

Digitalization has been speeded since the ending of the 20th century. This development presented the trigger of the fourth industrial revolution. A revolution based on the interaction and the fusion of the real sphere, the digital sphere, and the biological one. What makes this revolution exceptional is its high speed that has no historical precedent. With an exponential rather than a linear pace, industries in every region have to update their systems of management, production and governance to face the depth of the environmental changes [82]. The world economic forum [83] project aims to accelerate sustainable production. This project is based on using innovation to drive efficiency, decreases the environmental damages, boost competitiveness and enhancing the human well-being. Hence, to reach this goal, shaping future production and promoting new levels of collaborations is required. Through the interactions between the different interested actors, an informational and knowledge exchange process occurs, which in turn generates greater innovations [84]. Soto-Acosta et al. [85] pointed out that digital technologies created new tools of communication that can enhance the management of knowledge and the corporate network. Besides, they focused on open innovation importance. Indeed, collaborating or including stakeholders in the decision-making process helps to open the company's view [86]. Hence, it boosts the social strategic engagement while improving innovative capacities. Moreover, corporate innovation interacts with the management systems. Singh et al. [87] claimed that transformational leadership increases the employees' motivation and enhances their communication which helps them to realize their green potentialities and boost green innovation, thereby ensuring their competitive position. Del Giudice et al. [88] presented a detailed analysis of human resources management and the open innovation link in modern enterprises. Human dimensions are pivots of innovativeness and social and ecological commitment. Projects such as CAYLEY, FlaxPreg, VOILIN, and so on are great examples that show the vital role of collaboration, inclusion and networks enhancement to generate sustainable innovative projects and to improve creativity.

With the fast evolvement of the corporate framework and under the fourth revolution circumstances, new industries are emerging while others are fading. Hence, having better knowledge will enhance corporate abilities to predict future development. Nevertheless, having knowledge does not grant its efficient use. Del Giudice et al. [89] pointed out the importance of collaboration and information sharing in enhancing knowledge use. They shed light on the role played by new technologies in harmonizing the corporate knowledge needs and the informational flows.

4. Empirical study

The dynamism of the CSR conception was one of the reasons that explain the CSR-innovation ambiguous link. According to Vishwanathan et al. [18], the corporate innovative capacity should present one of the strategic CSR pillars. Hence, assuming a positive linear link between CSR and innovation is expected if the CSR measure is a strategic one. In our investigation, we attempt to extend the previous studies by using a more flexible semi-parametric model to seize the shape of the innovation effect on the CSR index. This method relaxes the econometric assumptions, thereby, grants more accurate results that are inspired by reality. We use the ESG index and its components to measure CSR, while we consider the natural logarithm of patents as the innovation proxy. The aim of this study is to verify whether the current ESG index and its components reflect strategic CSR measures.

Put differently, how can companies include CSR in their strategies and orient their innovativeness toward the social and ecological commitment, thereby, generate innovative projects that create shared value. Our main assumptions are:

H: The corporate innovativeness does not affect CSR linearly. Thus, CSR is not always presented in the core of the companies strategies.

To reach our goal, this section will be as flows. First, we present our sample and data. Second, the variables descriptions followed the methodology and Model. Finally, we present and analyze the empirical results.

4.1 Sample and data

To test the effect of corporate innovation on the CSR scores, we conduct our study on the SBF 120 French companies. Thanks to the French Parliament enacted Grenelle Acts in 2010 large French companies have to communicate their CSR activities, which enable us to have a clearer view of the CSR strategies for these companies. Our panel data, which covers the period from 2010 to 2016, are collected from two main sources. The Bloomberg database was employed to measure the CSR through the ESG score and its components. Besides, we use the annual sectorial survey of the National Institute of Statistics and Economic studies to determine the corporate innovation through patents number.

4.2 Variables' descriptions

Tables 1 and **2** present the variables' description used to conduct our study. In **Table 1**, we consider the Natural logarithm of patents ($\text{Ln_PA} + 1$) as an innovation proxy, which is the independent variable. The CSR measures are the dependent variables. The ESG presents the global score of the CSR while the specific environmental, social and governance scores are presented respectively by the ENV, SOC and GOV. **Table 2** describes our controls. Based on the prior research, we selected the board specifics, the ownership structure and the financial performance variables.

4.3 Methodology and Model

Imposing the linear econometric assumption of innovation effect on the CSR might not be accurate especially with the dynamism of the CSR conception. Aiming to define a pragmatic shape, we use in this study a semi-parametric model. Through

Abbreviation	Description	Type	Previous studies
PAT	Number of patents	Discrete	Mishra [90]; Raghupathi [91]
$\text{Ln_PA} + 1$	Natural logarithm of $\text{PAT}+1$	Continuous	
ESG	CSR disclosure score	Continuous	Wang and Sarkis [92]; Ji et al. [93]; Hoang et al. [94]
ENV	Environment disclosure score	Continuous	
SOC	Social disclosure score	Continuous	
GOV	Governance disclosure score	Continuous	

Table 1.
The dependent and independent variables description.

Abbreviation	Description	Type
B_SIZE	Number of the board members	Discrete
WO_B	% of women on the board	Continuous
B_AGE	Board average age	Continuous
ESG_BONUS	Remuneration for CSR policies	Dummy
Ln_TE	Natural logarithm of total employees	Continuous
ROA	Return on assets	Continuous
LEV	Debt book to total asset ratio	Continuous
INDP_B	% of independent on the board	Continuous
Duality	Board duality	Dummy
IN_PROP	% of the institutional investors' share of capital	Continuous
STAT_PROP	% of the state's share of capital	Continuous
FAM_PROP	% of the family's share of capital	Continuous

Table 2.
The controls description.

this method, we relax constraints for the innovation effect while maintaining the linearity assumption for the controls. Hence, our model is as follows:

$$CSR_{i,t} = \alpha + f(innovation_{i,t}) + \beta_k controls_{i,t} + \varepsilon_{i,t} \tag{1}$$

CSR refers to the CSR variables (ESG, ENV, SOC, GOV) defined previously. Innovation is measured by the Ln_PA + 1 and controls matrix includes all the controls variables presented in **Table 2**. Finally, $\varepsilon_{i,t}$ is the estimation error term. This model has two main parts. The first is α and β_j controls $_{i,t}$ which presents the parametric linear part while the second is $f(innovation)$ namely a function of the CSR-innovation link. This non-parametric presentation can be estimated using several smoothing methods. In our investigation, we use the penalized splines. According to Keele [95], the splines methods provide the best mean squared error fit. Besides, the smoothing splines are designed to avert the overfitting. The splines estimation does not pre-specify ad hoc cut-off points. Hence, it minimizes the objective function to have the most pragmatic estimations.

$$\min \left\{ \frac{1}{n} \sum_{i=1}^n (CSR - f(innovation) - \alpha - \beta_k controls)^2 + \lambda J \right\} \tag{2}$$

The n index refers to the number of observations and J presents the roughness of the objective function. This function optimum depends on the minimization of residuals squared and the maximum possible smoothing of the innovation function. The λ term is the key to this tradeoff. There are diver types of splines smoothing such as the Quadratic, the Cubic or the Natural splines. In our study, we use the penalized splines since it has fewer parameters and empirically leads to similar results. Hence, the minimization equation presented in Eq. (2) become.

$$\min \left\{ \frac{1}{n} \sum_{i=1}^n (CSR - f(innovation) - \alpha - \beta_j controls)^2 + \lambda \int f''(innovation) d(innovation) \right\} \tag{3}$$

The f'' is the second derivative of the function f . Thus, the roughness of the innovation function is captured by this new expression. Finally, we compare the explanatory power of our semi-parametric regressions with the linear regression

using the likelihood ratio test (LR test) since our estimations apply penalized iteratively reweighted least squares.

$$LR = -2\left(\log likelihood_{\text{restricted}} - \log likelihood_{\text{unrestricted}}\right) \tag{4}$$

Follows an approximate χ^2 distribution, the null hypothesis of this test supposes the equality between likelihoods. The degree of freedom is determined through the difference between the numbers of parameters of each model. Put differently, if the semi-parametric regression has a higher number of parameters then the linear regression is not appropriate.

4.4 Empirical results

In **Table 3** we present the descriptive statistics of our study. We focus on the averages of our variables and their dispersion.

With an average of 59.67, the SBF120 companies have innovative potentialities. Nevertheless, the patents number presents a significant dispersion with a high standard deviation. For the CSR measures, the average of the ESG scores is 43.474, more precisely; the highest mean of the ESG components is the governance score with an average of 58.37 against only 36.656 the lowest for the environmental score. These statistics shed light on the environmental current issues and the required efforts needed by these companies to improve their environmental disclosure. Besides, we found that 18.4% of companies are using a remuneration bonus policy to enhance the ESG performance this might drive more attention to the ESG matters and help companies to view CSR more strategically.

Variable	Mean	Std. Dev.	Max	Min
Patents	59.672	250.853	2448	0
Ln_PA + 1	1.128	1.949	7.803	0
ESG	43.474	12.942	68.182	5.785
ENV	36.656	14.042	67.442	1.55
SOC	49.193	14.469	80.702	3.509
GOV	58.368	9.032	76.786	14.286
B_SIZE	12.627	3.419	23	4
WO_B	.237	.125	.579	0
B_AGE	58.573	4.952	68.778	15.384
ESG_BONUS	.184	.387	1	0
Ln_TE	10.027	1.775	13.071	0
ROA	3.798	10.585	276	-23.067
LEV	25.677	16.223	96.083	-80.736
INDP_B	.538	.204	1	0
Duality	.203	.402	1	0
IN_PROP	.408	.248	.907	0
STAT_PROP	.04	.15	.922	0
FAM_PROP	.089	.182	.805	0

Table 3.
Variables description and summary statistics.

For the percentage of women’s presence on the board, we register an average of 23.7%. After the Copé-Zimmermann enacted law in 2011, this average has increased considerably compared to prior periods. Nevertheless, the female directors occupy rarely executive positions. The board average age is 58.57 years old. It is also a positive signal on the degree of expertise of the directors as most of them have been board members in the past or have a business experience. However, with such a

	ESG	ENV	SOC	GOV
Ln_PA + 1	3.881* (2.127)	7.214*** (2.269)	0.756*** (0.268)	−0.972 (1.684)
B_SIZE	1.090*** (0.142)	0.829*** (0.170)	1.127*** (0.170)	1.034*** (0.092)
WO_B	16.796*** (3.701)	10.495** (4.448)	12.046*** (4.495)	9.774*** (2.398)
B_AGE	−0.373*** (0.117)	−0.212 (0.141)	−0.200 (0.141)	−0.174** (0.076)
ESG_BONUS	3.486*** (1.139)	2.410** (1.334)	2.646* (1.368)	5.458*** (0.738)
Ln_TE	0.977*** (0.257)	0.906*** (0.310)	0.810** (0.314)	−0.053 (0.167)
ROA	−0.048 (0.037)	−0.046 (0.043)	0.009 (0.044)	−0.006 (0.024)
LEV	0.024 (0.029)	−0.011 (0.035)	−0.025 (0.036)	−0.030 (0.019)
INDP_B	14.759*** (2.336)	20.352*** (2.802)	10.912*** (2.823)	11.209*** (1.516)
Duality	0.621 (1.094)	−0.627 (1.320)	1.478 (1.335)	0.460 (0.710)
IN_PROP	8.487*** (2.034)	9.379*** (2.412)	8.183*** (2.448)	1.941 (1.319)
STAT_PROP	1.462 (2.748)	8.959*** (3.259)	−1.502 (3.365)	−0.194 (1.779)
FAM_PROP	0.794 (2.733)	6.353* (3.366)	−9.121*** (3.397)	4.445** (1.772)
FOR_PROP	2.426 (2.127)	−2.032 (2.506)	6.783*** (2.518)	1.085 (1.380)
_cons	24.007 (7.161)	9.370 (8.568)	25.675*** (8.529)	47.106*** (4.652)
Number of obs	681	648	657	681
pilot goodness-of-fit chi2 (P-value)	64.78 (0.0016)	57.34 (0.0000)	22.71 (0.9458)	79.38 (0.0000)
Log restricted-likelihood (P-value)	−2404.585 (0.0000)	−2375.429 (0.0000)	−2421.249 (0.0000)	−2132.486 (0.0000)
LR test vs. linear model: chibar2 (P-value)	7.14 (0.0038)	7.09 (0.0039)	—	5.95 (0.0074)

Values between the parentheses presents the standard errors of the estimated coefficients.

*p-value < 10%.

**p-value < 5%.

***p-value < 1%.

Table 4.
The innovation effects on the CSR proxies.

high average age, modern trends might not be appreciated. On one hand, this might reduce conflicts during the decision making process. On the other hand, it risks neglecting the youth population trends and views. Concerning the board independency, on average more than half of the boards' members are independent (53.8%), which reflect a great level of transparency. Besides, this help to open the companies view and have an outsider perception.

To reach the aim of this investigation, **Table 4** as well as **Figures 1–4** reflect the innovation effect on the CSR proxies.

Figure 1 presents the innovation effect on the global ESG score. According to its result, we underline the generally positive impact of innovation on the CSR scores, which is consistent with **Table 4** coefficient (significant at the 10% level). Indeed, this graph can be divided into three main parts based on the innovation intensity

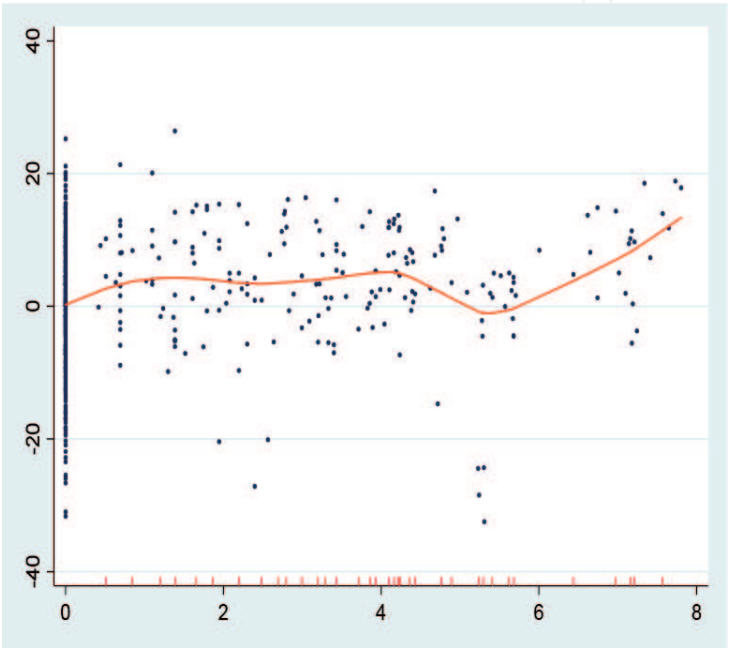


Figure 1.
Innovation effect on the ESG scores.

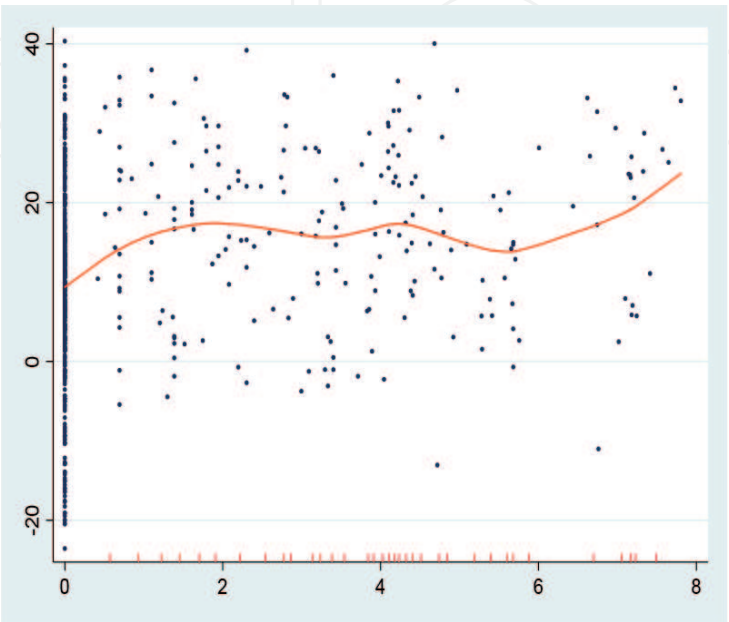


Figure 2.
Innovation effect on the Environmental scores.

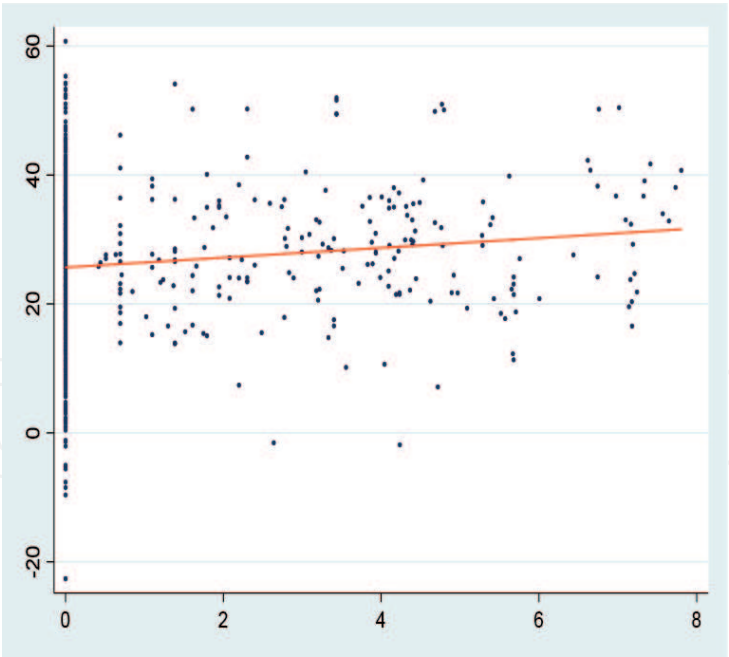


Figure 3.
Innovation effect on the Social scores.

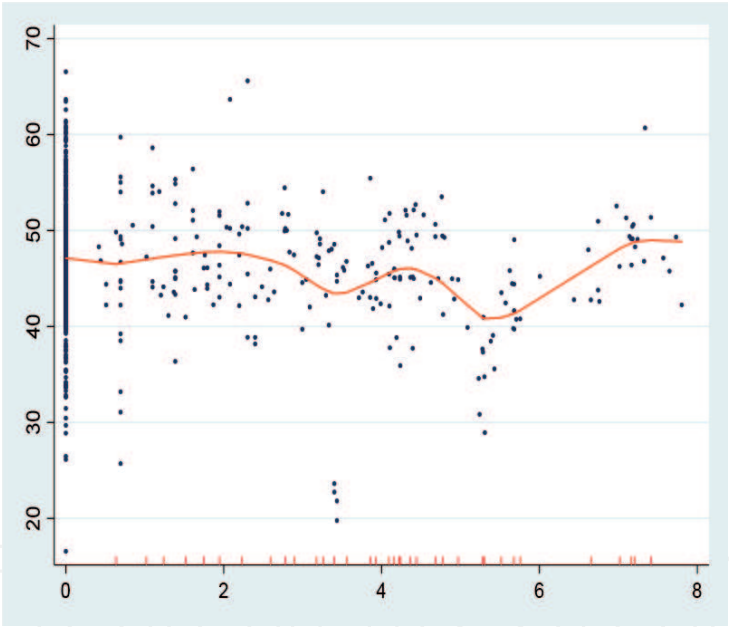


Figure 4.
Innovation effect on the Governance scores.

(when $\text{Ln_PA} + 1$ less than 4; between 4 and 5, and higher than 5). In the first part, an increase in corporate innovation enhances CSR slightly. Firms belonging to the first category of innovation intensity tend to consider ESG matters while innovating. The second part reflects a negative association between CSR and innovation. Companies in the second category are inventing without focusing on the ESG issues quite the contrary their innovation might reduce their ESG scores. In other words, those companies are not applying CSR strategically. They only focus on CSR matters if it grants financial benefits. Finally, the last category is where innovation can boost ESG scores. At this level of innovation, we found a remarkable positive effect of the corporate innovativeness on CSR. The most innovative companies are those that apply CSR strategically. They put CSR in the core of their innovation process. We might assume their adoption of open innovation, which allow companies to

share knowledge and better understand stakeholders, consequently improves ESG scores. The positive effect of this third category is confirmed not only for the ESG global score but also its components. Nevertheless, it is not the case of the two first categories. While **Figure 3** supports the linear shape between social engagement and innovation, **Figures 2** and **4** show similar curves' shapes with different flattening level. Innovation is always socially beneficial.

Concerning the controls' linear effect on the CSR scores, we should drive attention to the positive influence of the board diversity and board size in enhancing the CSR engagement. Moreover, the ESG remuneration fosters the ESG scores. Its effect is more pronounced in the governance score. Besides, we find a non-significant influence of the board duality and the financial variables. Furthermore, foreign ownership only increases social commitment. The family ownership decreases it while enhancing the governance scores. Finally, we point out the state and institutional ownership effect on boosting environmental engagement.

5. Conclusion and implications

The evolvement of social and ecological requirements created a dynamic corporate framework that leads to alternate business practices. This evolution has widened the CSR scope. Hence, CSR went from a defensive or a philanthropic extra activity to a part of the core business. These successive mutations influenced the CSR-innovation link. In this chapter, we analyzed the evolvement of the CSR conception based on four ages: the age of greed, the age of philanthropy, the marketing age and the management age. Moreover, we presented the links between the different CSR versions and corporate innovation. This link is associated with corporate competitiveness.

CSR forms a road map for an emerging innovation paradigm if it is strategically perceived. Indeed, the CSR and innovation nexus is influenced by the managerial perspectives, which are the cores of the CSR understanding and innovation initiatives. However, the managers' social commitment is not an independent factor. It is affected by the institutional framework. In other words, it depends on the legal, social and economic pressures as well as the digital transformation. With an economic system similar to a Matryoshka doll, decision-makers have to predict future evolutions through strengthening their social network. They have to identify the right moments and persons with whom they should collaborate to create shared value, enhance their innovativeness and improve their environment comprehension. Regulators should consider the continuous evolvement of the business-work and the technological improvement to control the irresponsible behaviours. They can help firms to identify the appropriate timing of the CSR and innovation synergistic effect occurrence.

Finally, we draw attention that the strategic CSR version is not the last one. Nowadays, a transformative CSR is taking place. The difference between these two CSR versions is that while strategic CSR has been included in the core business, the transformative CSR is the trigger of the business. Investors are creating new social start-ups where business innovativeness is driven by social and ecological matters. Thus, their innovativeness is a responsible innovation.

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