

THE EFFECT OF INSTITUTIONAL OWNERSHIP AND OWNERSHIP DISPERSION ON ECO-INNOVATION

CITATION

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ABSTRACT

This paper aims to determine the role that the different institutional investors play in promoting eco-innovation, focusing on the analysis of the corrective or enhancing effect that can be derived from ownership dispersion associated with the participation in a company's stock capital of institutional investors with different time horizons. The results obtained for a sample of 6,454 companies for the period 2002-2017 show the convergence of the short-term institutional investors' interests with the long-term institutional investors' demands, which has a positive effect on the implementation of proactive environmental strategies, such as eco-innovation. Additionally, this positive effect is enhanced by disperse ownership structures associated with the participation in a company's stock capital of both types of institutional investors, increasing the firm's commitment to environmental sustainability. Although financial institutions and pension funds diverge from this long-term orientation, seeking an immediate economic return, ownership dispersion allows for correcting their individual negative effect on eco-innovation.

Keywords: eco-innovation, institutional ownership, ownership dispersion, Corporate Social Responsibility.

1.- INTRODUCTION

The pressing need to fight global warming and advance towards the achievement of a sustainable economy have motivated growing political and social interest in eco-innovation as a key issue to reduce or eliminate the environmental impacts caused by production and consumption activities (Del Río et al., 2016; Kanda et al., 2018; Zhang et al., 2019). It deals with developing new products, processes or organizational practices that reduce pollution and favour rational use of natural resources (both materials and energy), in line with the principles of circular economy and sustainable development (Klewitz et al., 2012; Geissdoerfer et al., 2017).

Thus, public institutions, both at national and supranational level, have developed several initiatives (i.e., the Eco-Innovation Action Plan initiated by the European Commission in 2011) to promote eco-innovation (Cecere et al., 2020). In this context, in response to stakeholders (consumers, regulators, environmental NGOs,...) and institutional pressures, and also as part of their own environmental commitment, companies have been

increasingly involved in this type of activities (Berrone et al., 2013; Amore & Bennedsen, 2016; Keshminder & Del Río, 2019).

In parallel, eco-innovation has received increasing attention from academics, becoming an emerging research area (Díaz-García et al., 2016; Hojnik & Ruzzier, 2016; Pacheco et al., 2018). In this sense, the study of drivers of eco-innovation has been the focus of attention of researchers interested in knowing what leads companies to develop eco-innovation (Keshminder & Del Río, 2019; Cecere, 2020). These studies acknowledge the existence of multiple factors of different kinds that affect the firms' propensity to pursue eco-innovation (Guoyou et al., 2013; Díaz-García et al., 2015), their influence varying depending on the type of eco-innovation considered (Demirel & Kesidou, 2011; Keshminder & Del Río, 2019).

Prior literature has examined the effect of institutional ownership on general innovation activity, explaining this relationship by the institutional investors' ability to monitor and influence corporate strategies and decisions (Starks, 2009; McCahery et al., 2016). Overall, studies document a positive effect of firms' institutional ownership on innovation (Kochhar & David, 1996; David et al., 2001; Brossard et al., 2013; Aghion et al., 2013). In this sense, it has been suggested that effective monitoring by institutional investors would reduce managerial myopia and risk aversion and induce managers to innovate as a means to increase future firm value (Kochhar & David, 1996; Aghion et al., 2013). Likewise, considering that the various types of institutional investors have different monitoring/influencing capabilities and investment horizons (Kochhar & David, 1996; Brossard et al., 2013), whether all institutional investors exert the same impact on the innovation activity has also been analysed.

Similarly, prior studies have also looked at the influence of institutional investors on the adoption of sustainability practices by companies, promoting the improvement of their environmental performance (Graves & Waddock, 1994; Solomon et al., 2002; Sparkes & Cowton, 2004; Dyck et al., 2019). Also, in this case, differences regarding the relationship between ownership by the different types of institutional investors and business sustainability, based on their greater or lesser link with the companies in which they invest or their investment horizon have been found (Johnson & Greening, 1999; Cox et al., 2004; Ferreira & Matos, 2008; Oh et al., 2011; García-Sánchez et al., 2020b).

However, there is little or no insight into the effect of institutional ownership on those innovations specifically aimed at making better use of resources and reducing the firms' ecological footprint. Indeed, to the best of our knowledge, no previous study has analysed the role that institutional investors play in fostering (or inhibiting) eco-innovation. This paper aims to fill this research gap. Thus, combining the results of both streams of literature (i.e., that different types of institutional investors have a different impact both on the firms' innovation effort and environmental proactivity), the aim of this paper is to analyse the relationship between institutional ownership and eco-innovation, by examining the role that institutional investors play in promoting eco-innovation.

Among the various ways to achieve environmental sustainability, we have focused on eco-innovation because its broad scope as it includes “enhanced process, products, and organizational practices that reduce or avoid negative environmental impacts” (Klewitz

et al., 2012, p. 443), the benefits of which can take the form of reduced negative environmental impacts (i.e., emission reduction and resources use reduction) from a lifecycle perspective, through changes in consumption and/or production activities in line with the principles of circular economy and sustainable development (Kemp & Pearson, 2007; Díaz-García et al., 2015; Del Río et al., 2016; Geissdoerfer et al., 2017; Kanda et al., 2018 Zhang et al., 2019). According to Del Río et al. (2010), the lack of stakeholder pressure is considered a barrier that inhibits firms from developing eco-innovation projects. We focus on a key stakeholder group – institutional investors – whose influence on both general innovation and environmental proactivity has been previously proved (Graves & Waddock, 1994; Kochhar & David, 1996; David et al., 2001; Solomon et al., 2002; Sparkes & Cowton, 2004; Aghion et al., 2013; Brossard et al., 2013; Dyck et al., 2019) and study the effect of their investment horizon on eco-innovation. Thus, our study extends and complements these prior studies.

Furthermore, we focus on the analysis of the corrective or enhancing effect that can be derived from ownership dispersion associated with the presence in the companies' stock capital of institutional investors with different investment horizons. Specifically, we analyse whether differences among different types of institutional investors may vary their joint effect on eco-innovation. Thus, compared to previous research that has studied the effect of ownership dispersion on CSR policies (Dam & Scholtens, 2013; Godos-Díez et al., 2014; Peng & Yang, 2014), our focus on the joint effect on the development of eco-innovation projects derived from ownership by institutional investors with different investment horizons provides a new analysis perspective.

The results obtained for a sample of 6,454 international listed companies for the period 2002-2017, indicate the convergence of the short-term institutional investors' interests with the long-term institutional investors' demands, which has a positive effect on the development of eco-innovation projects with benefits materializing in the long term. Such a positive effect is enhanced by disperse ownership structures associated with the participation in a company's stock capital of both types of institutional investors. Nonetheless, we have observed that pension funds and financial institutions demand an immediate economic return, showing opposition to the implementation of proactive environmental strategies, such as eco-innovation. In this sense, we found that ownership dispersion corrects the prevalence of interests associated with short-term objectives.

Our research contributes to literature in various ways. Firstly, it combines insights of CSR literature, innovation literature and financial literature to analyse the effect of institutional ownership on eco-innovation. Thus, our study enriches the CSR literature by identifying a new driver of eco-innovation - institutional ownership - the effect of which has not been previously studied. Specifically, we show that ownership by institutional investors is positively related to eco-innovation. Moreover, this study's findings show that differences in the institutional investors' investment horizons do not result in a different effect of institutional ownership on eco-innovation. In this regard, our findings confirm those of García-Sánchez et al. (2020a) who found that the capital market values eco-innovation positively. Additionally, this study contributes to CSR literature by extending the available empirical evidence about the effect of ownership structure on firms' CSR

practices and performance (Graves & Waddock, 1994; Solomon et al., 2002; Sparkes & Cowton, 2004; Dyck et al., 2019; García-Sánchez et al., 2020b).

We also contribute to innovation literature by extending and reinforcing prior research on the impact of institutional ownership on general innovation (Kochhar & David, 1996; David et al., 2001; Aghion et al., 2013; Brossard et al., 2013), analysing its effect on a specific type of innovation: those innovations aimed at reducing pollution and promoting rational use of natural resources. In this regard, our results confirm that the positive effect that institutional ownership has on general innovation extends to eco-innovation, regardless of the institutional investors' investment horizon.

Finally, we contribute to financial literature by documenting the effect of ownership dispersion on eco-innovation. In this sense, our findings extend the understanding of the effect of shareholder dispersion on firm value (Becht et al., 2003; Konijn et al., 2011) and CSR policies (Dam & Scholtens, 2013; Godos-Díez et al., 2014; Peng & Yang, 2014) by showing that, when ownership dispersion is associated with the presence in the companies' stock capital of institutional investors with different investment horizons, it can have either a corrective or an enhancing effect on eco-innovation, depending on whether the interests of long-term and short-term institutional investors converge or diverge.

Secondly, from a theoretical point of view, to explain the relationship between institutional ownership and eco-innovation we combine several theoretical frameworks commonly used in CSR and innovation literatures (i.e., the resource-based theory, institutional theory and agency theory). Thus, we contribute to institutional theory by extending empirical evidence about the role played by institutional investors as a source of institutional pressure on firms to develop (or refrain from developing) eco-innovations. We also contribute to agency theory by showing that not all institutional investors have the same effect on innovation strategies. Specifically, ownership by financial institutions and pension funds is negatively associated to eco-innovation, whereas there is a positive relationship between eco-innovation and ownership by the remaining types of institutional investors.

Finally, compared to prior studies on innovation focused on a single country (Kochhar & David, 1996; Aghion et al., 2013; Demirel & Kesidou, 2011; Guoyou et al., 2013; Amore & Benedsen, 2016; Roud & Thurner, 2018) or a region (Brossard et al., 2013), we adopt an international approach encompassing 71 countries. Furthermore, we consider a long analysis period from 2002 to 2017, which allows us to broaden the time frame hitherto used. We stress the breadth of our sample (95,489 observations relating to 6,454 listed companies worldwide), which contributes to the generalization of our results.

The rest of the paper proceeds as follows: the next section briefly outlines the overall characteristics and main drivers of eco-innovation identified in prior literature. The third section presents the development of the research hypotheses based on the analysis of the relationship between institutional ownership, ownership dispersion and eco-innovation. The fourth section sets out the study's empirical framework. The fifth section summarizes the main results along with their discussion. The sixth section complements the main analysis by studying whether differences among different types of institutional investors

may affect the joint effect of their participation in a firm's capital on eco-innovation. Finally, the last section presents the main conclusions and implications of our study as well as its limitations and some topics for future research.

2. ECO- INNOVATION: CHARACTERISTICS AND DRIVERS

Nowadays, eco-innovation has gained increasing recognition as a critical way to reach environmental sustainability (Guoyou et al., 2013; Del Río et al., 2016; Cancino et al., 2018; Keshminder & Del Río, 2019). Thus, in response to the growing pressures to reduce their environmental impacts, companies have resorted to eco-innovation (Berrone et al., 2013; Díaz-García et al., 2015; Amore & Bennesen, 2016).

Although a standardized definition of eco-innovation does not exist (Kesidou & Demirel, 2012; Kanda et al., 2018; Zhang et al., 2019), according to Kemp & Pearson (2007, p. 8), it refers to “the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organisation (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives”. Thus, under the label eco-innovation a broad range of types of innovation aimed at making better use of resources by firms and reducing their ecological footprint throughout the different stages/processes of their value chain can be included (Demirel & Kesidou, 2011; Klewitz et al., 2012; Díaz-García et al., 2015).

Eco-innovation presents undoubted benefits for companies (Klewitz et al., 2012) allowing them to improve their competitiveness (Demirel & Kesidou, 2011; Díaz-García et al., 2015) through the reduction of costs and risks, the increased market share (higher sales in current markets or access to new markets) and margins, and a better image and reputation (Klewitz et al., 2012; Berrone et al., 2013; García-Sánchez et al., 2020a), leading to “win-win” situations (Porter & Van Der Linde, 1995), in which environmental impacts are reduced and, at the same time, businesses' competitiveness increases (Demirel & Kesidou, 2011; Díaz-García et al., 2015).

However, compared to general innovations, eco-innovations are riskier and more uncertain (Ghisetti et al., 2017; Cecere et al., 2020) and have higher capital costs (Ghisetti et al., 2017). Furthermore, eco-innovations face the “double externality” problem (Rennings, 2000): on the one hand, they face the typical knowledge externalities associated to any innovation, and, on the other, they face environmental externalities resulting from the fact that the positive spillovers produced during the introduction and diffusion of eco-innovations ease imitation, discouraging firms' investment in it (Cai & Li, 2018). Furthermore, eco-innovations are also riskier than other environmental practices, as they require greater financial resources in the short-term while their outcomes and financial returns are uncertain and will be obtained in the long-term (Markman et al., 2004; Berrone et al., 2013).

According to Del Río et al (2016), many of the drivers for eco-innovation are the same as those that operate for general innovation. These factors include economic and marketing pressures (i.e., cost savings and improved image/reputation), financing availability and

market demand (Guoyou et al., 2013; Díaz-García et al., 2015). However, compared to general innovation, eco-innovation has some distinctive characteristics (Del Río et al., 2016; Cecere et al., 2020), so it may have other specific drivers or the effect and/or importance of the common drivers may differ (Del Río et al., 2016; Hojnik & Ruzzier, 2016; Cecere et al., 2020). Thus, for example, public policies aimed at promoting and financing innovation are a key driver of eco-innovation (Del Río et al., 2010; Díaz García et al., 2015).

Although the factors that affect firms' propensity to pursue eco-innovation are multiple and varied (Guoyou et al., 2013; Díaz-García et al., 2015), overall, they can be grouped into two broad categories: internal and external to the firm (Demirel & Kesidou, 2011; Keshminder & Del Río, 2019). The first group refers to the firms' resources and capabilities that can facilitate or constrain eco-innovation, including financial constraints, technological competences, green skills, environmental strategy, ownership, structure, corporate governance, etc. (Demirel & Kesidou, 2011; Berrone et al., 2013; Amore & Bannedsen, 2016; Del Río et al., 2016).

These drivers can be explained by the resource-based theory, which poses that each company is heterogeneous having different resources and capabilities (Li, 2014; Cai & Li, 2018), which can be tangibles and intangibles (Sarkis et al., 2010). Such firm-specific resources and capabilities allow companies to develop and implement competitive strategies and determine how they respond to external pressures. Thus, to the extent that the firm's specific resources and capabilities cannot be perfectly duplicated by its competitors, they may provide sustained competitive advantages (Lado & Wilson, 1994). Firm-specific resources and capabilities affect the firm's ability to eco-innovate (Díaz-García et al., 2015; Keshminder & Del Río, 2019; García-Sánchez et al., 2020a) and moderate the influence of institutional pressures on eco-innovation (Berrone et al., 2013). In this regard, several authors (David et al., 2001; Amore & Bannedsen, 2016) stress the effect of the firm's governance context (ownership and corporate governance mechanisms) on general innovation.

The second group of drivers (i.e., external drivers) refers to the institutional and stakeholder pressures faced by firms, including stricter regulation, consumers demanding environmental-friendly products, environmentally committed industrial clients, competitors, socially responsible investors, pressure groups and environmental NGOs, media, governments, etc. (Brunnermeier & Cohen, 2003; Frondel et al., 2007; Berrone et al., 2013; Del Río et al., 2016; Chen et al., 2018; Dyck et al., 2019).

Such external pressures have been analysed drawing on institutional theory (Berrone et al., 2013; Li, 2014; Cai & Li, 2018) which focuses on how organizations respond to external pressures by seeking legitimacy and approval (DiMaggio and Powel, 1983), greater resources and, ultimately, an enhanced capacity for survival (Scott, 1987). As those who are ultimately responsible for judging whether an organization's strategies and behaviours are acceptable or not, and who can directly or indirectly exert pressure on the company, stakeholders play a prominent role in the legitimization process (O'Donovan, 2002; Rayman-Bacchus, 2006).

Thus, institutional and stakeholder pressures on corporate social responsibility can lead companies to engage in eco-innovation in order to demonstrate their environmental commitment to obtain legitimacy and avoid economic and/or social costs (Hojnik & Ruzzier, 2016; Cai & Li, 2018). The capacity of stakeholders to exert pressure is related to their real influence and/or power over the organisation (O'Donovan, 2002). In this sense, institutional investors are considered to be major stakeholders, in view of their strong influence on corporate strategies and decisions (Starks, 2009; McCahery et al., 2016).

3. HYPOTHESES DEVELOPMENT

3.1. The effect of institutional ownership on eco-innovation

The effect of institutional ownership on innovation has been studied drawing on agency theory (Brossard et al., 2013). Innovation projects (including eco-innovation) entail significant information asymmetries (Demirel & Parris, 2015; Cecere et al., 2020), and, consequently, high agency costs (Jensen & Meckling, 1976; Kochhar & David, 1996). As a result, institutional investors have higher incentives to monitor managers and actively influence corporate decisions in order to protect their interests. To the extent that institutional investors acknowledge that, despite the risks involved, innovation can provide competitive advantages and improve firms' long-term value (Kochhar & David, 1996; Luong et al., 2017), their active monitoring will boost innovation.

Prior studies have documented a positive association between institutional ownership and firm innovation (David et al., 2001; Aghion et al., 2013; Brossard et al., 2013). In this sense, faced with the possibility that this association may be the consequence of the use of "screening methods" by institutional investors to selectively choose innovative companies (superior investor hypothesis), studies show that institutional investors influence a firm's propensity to innovate through their "active engagement", involving themselves in corporate decision-making regarding investments in innovation projects (active investor hypothesis) (Kochhar & David, 1996; Aghion et al., 2013). In other words, instead of assuming a passive role, institutional investors tend to adopt an active one, carrying out various actions to pressure managers to innovate (David et al., 2001; Brossard et al., 2013).

The effect of institutional ownership on business strategies and decisions extends to corporate sustainability, promoting the adoption of corporate practices and behaviours compatible with sustainable development (Dyck et al., 2019; García-Sánchez et al., 2020b). Previous studies have shown that institutional investors acknowledge the benefits from socially responsible behaviours (Aguilera et al., 2006; Oh et al., 2011) and, as a result, use their influence to promote the adoption of CSR-related practices by the companies in which they invest (Ferreira & Matos, 2008; Dyck et al., 2019). To the extent that the stock market values positively eco-innovation (García-Sánchez et al., 2020a), it can be expected that institutional investors also push companies to eco-innovate.

However, the financial literature has stressed that institutional investors are not "a uniform group" (García-Sánchez et al., 2020b) but differ in terms of their

monitoring/capabilities (Fich et al., 2015) and investment horizons (Hoskisson et al., 2002), which can affect their interest and/or ability to influence firms' strategies and decisions both regarding innovation and sustainability (Kochhar & David, 1996; Brossard et al., 2013; García-Sánchez et al., 2020b).

The investment time horizon has been considered a pertinent matter that affects the relationship between institutional ownership and innovation (Brossard et al., 2013) and environmental performance (Oh et al., 2011). In this regard, the financial literature has highlighted the differences between long-term/pressure-resistant institutional investors versus short-term/pressure-sensitive institutional investors (i.e., Kochhar and David, 1996; Brickley et al., 1998; García-Sánchez et al., 2020b).

The first category of investors (long-term/pressure-resistant institutional investors), which includes pension funds and endowment funds, mutual funds, investment funds, and foundations (Brickley et al., 1998), is more sensitive to external demands regarding environmental sustainability, which, together with the fact that their investments have a long-term horizon and demand a lower immediate economic return, suggest that these investors will show a greater commitment to innovation (Brossard et al., 2013; Luong et al., 2017) and sustainability (Cox et al., 2004; Harjoto & Jo, 2008; Oh et al., 2011), promoting the development of more proactive environmental practices, such as eco-innovation. This type of institutional investors will exercise active monitoring on managers' behaviour forcing them to carry out those risky long-term investments that could enhance firm value, even if they are reluctant to make them (Kochhar & David, 1996; Aghion et al., 2013).

On the one hand, Kochhar & David (1996), Brickley et al. (1998) and Brossard et al. (2013) found that long-term/pressure-resistant institutional investors positively affect firm innovation. In a similar vein, in their analysis of the effect of foreign institutional ownership on innovation, Bena et al. (2017) and Luong et al. (2017) observed a positive effect of long-term/pressure-resistant foreign institutional investors on firm innovation. On the other hand, Cox et al. (2004), Harjoto & Jo (2008) and Oh et al. (2011) found a positive relationship between the participation in a company's stock capital of institutional investors with a long-term investment horizon and its environmental performance.

Thus, to the extent that these "patient" investors adopt a long-term perspective (Brossard et al., 2013), they will favour those investments that can increase the firm's long-term value and competitive position although their outcomes and payoffs occur in the long-term. Furthermore, their greater independence in relation to the companies in which they invest would make them more inclined to exert activism in order to induce managers to innovate with the aim of increasing firm value. Therefore, a positive relationship between the participation in the companies' stock capital of long-term/pressure-resistant investors and the development of eco-innovation by such firms can be expected.

The second category of investors (short-term/pressure-sensitive institutional investors), among which are financial institutions (banks and insurance companies) and cross holdings (Brickley et al. 1998), is more resistant to external pressures, showing a more economic and short-term orientation. They are "inpatient" investors seeking to obtain

short-term profits (Brossard et al., 2013). As a result, these “myopic” investors would favour a short-term focus in managers, by inhibiting firm innovation (Kochhar & David, 1996) as well as the adoption of proactive environmental strategies, the benefits of which are difficult to quantify and obtain in the immediate future (Oh et al., 2011).

In this regard, on the one hand, Brossard et al. (2013) found that firms have lower R&D ratios when institutional ownership is dominated by short-term investors. In a similar vein, Luong et al. (2017) report that short-term/pressure sensitive foreign institutional investors do not promote firm innovation. On the other hand, Oh et al. (2001) observed that short-term/pressure-sensitive institutional investors consider RSC investments risky and do not promote them, whereas García-Sánchez et al. (2020b) found that financial institutions and cross holdings have no impact on the adoption of the new GRI-SDG Compass strategy by firms.

Indeed, given that this type of institutional investors adopts a short-term perspective looking for short-term gains, they are not interested in encouraging managers to carry out long-term investments in eco-innovation, as their results are, also, uncertain (Kochhar & David, 1996). Furthermore, having a close relationship with the companies in which they invest, they tend to adopt a passive attitude to avoid conflicts, exhibiting a greater acquiescence to the managers’ decisions (David et al., 2001; Ferreira & Matos, 2008) and, therefore, they will not influence managerial actions regarding eco-innovation. Consequently, a negative relationship between the participation in the companies’ stock capital of short-term/pressure-sensitive investors and the development of eco-innovation by such firms can be expected.

Based on the previous discussion, we propose the following hypothesis:

H1a: The interests of long-term and short-term institutional investors diverge in line with the theoretical expectations, so that a homogeneous ownership structure characterized by the presence of long-term institutional investors would favour eco-innovation (positive effect); while if the only institutional owners were short-term institutional investors, eco-innovation would be inhibited (negative effect).

Nevertheless, some prior studies’ findings show that this approach is not as restrictive, revealing opposite effects to those expected for short-term institutional investors as a consequence of the impact that environmental scandals can have on the companies’ reputation and revenues (i.e., Nike, Shell and BP). Thus, for example, Oh et al. (2011) and Rees and Rodionova (2013) observed a positive relationship between ownership by financial institutions and the companies’ CSR performance. According to Oh et al. (2011), to the extent that financial institutions would not be able to sell their shares without negatively affecting the company's stock price, they may be forced to adopt a long-term orientation and exert strong monitoring on managers' decisions in order to promote those investments that could increase the company's long-term value.

This argument may also explain the results obtained by Kochhar & David (1996) regarding general innovation, implying that the conceptual foundations of the “myopic investor hypothesis” may need to be reviewed. As a result, it could be expected that, in some situations, short-term institutional investors put pressure on companies to invest in eco-innovation projects. Thus, the following hypothesis is stated:

H1b: The interests of long-term and short-term institutional investors converge, both favouring eco-innovation; in such a way that a homogeneous ownership structure characterized by the presence of either of them would have a positive effect on eco-innovation.

3.2. The effect of ownership dispersion on eco-innovation

Prior research has analysed the effect of firms' ownership dispersion on corporate decision-making and firm value with opposing predictions and unclear findings (Betch et al., 2003; Konijn et al., 2011; Bauguess et al., 2012). Similarly, several studies have documented a relationship between ownership dispersion and CSR policies (Dam & Scholtens, 2013; Godos-Díez et al., 2014; Peng & Yang, 2014).

Ownership concentration is associated with high shareholder involvement and closer monitoring of firm management (Brandon & Krüger, 2018). Dominant shareholders may exert greater power, limiting managerial discretion and actively influencing corporate management (Konijn et al., 2011; Bauguess et al., 2012), which can bring about serious agency problems (Shleifer & Vishny, 1997; Peng & Yang, 2014). In this sense, dominant shareholders can impose their view and use their influence either positively or negatively, by promoting or discouraging value-enhancing projects and investments. Conversely, ownership dispersion "prevents unanimous agreement over a single output level" (Hansen & Lott, 1996, p. 53), balancing the dispersed shareholders' interests and, thus, moderating the influence that they individually exert on corporate decisions.

With regard to the influence of ownership dispersion on eco-innovation, two different effects can be hypothesized based on: (a) the divergence-of-interests hypothesis (H1a), or (b) the convergence-of-interests hypothesis (H1b), previously stated.

In the first case, i.e., when the interests of long-term and short-term institutional investors diverge so that, in line with theoretical predictions, the former favour eco-innovation whereas the latter inhibit it, homogeneity in the firm's ownership structure derived from the presence of a single category of investors would lead to the implementation of unbalanced projects, excessively proactive or economic. On the contrary, ownership dispersion associated with the participation in the companies' stock capital of institutional investors with different investment horizons could mean the implementation of environmental strategies that reconcile the interests of both groups. In this sense, a corrective relationship could be expected from short-term (long-term) investors, whose voting rights would correct the excess (scarcity) of eco-innovation promoted by long-term (short-term) investors. Accordingly, we propose the following hypothesis:

H2a: The interests of long-term and short-term institutional investors diverge, so that an ownership structure characterized by the diversity of shareholders would lead to a corrective effect on the influence that each type of institutional investor individually exerts on eco-innovation.

From the perspective of the convergence-of-interests hypothesis, that is, assuming that the objectives of both generic categories of institutional investors may converge and both may promote business sustainability, the result of ownership dispersion would enhance

the individual effect that each investor has on eco-innovation. Thus, the following hypothesis can be stated:

H2b: The interests of long-term and short-term institutional investors converge, in such a way that an ownership structure characterized by diversity of shareholders would enhance the individualized effect that each type of institutional investor has on eco-innovation.

4. METHOD

4.1 Sample

The sample consists of 6,454 listed companies worldwide whose financial, environmental and social information is available in the Thomson Reuters database. The selected period of study goes from 2002 to 2017, allowing us to have an unbalanced data panel of 95,489 observations. The sample companies operate in 10 activity sectors (energy, basic material, industrial, consumer goods, health care, consumer services, telecommunications, public services, financial and real state, and technology), and are located in 71 countries with different economic and institutional settings (Anglo-Saxon countries, Scandinavian countries, European countries, Asia-Pacific countries, Latin-American and Caribbean countries, MENA and African countries), presenting a very homogeneous temporary distribution. There is a bias in favour of financial and real estate, industrial and consumer services sectors, whereas, geographically, the companies located in the US have the larger presence in the sample.

4.2. Model, variables and analysis techniques

The model designed to test the research hypotheses is synthesized in Equation [1].

$$\begin{aligned} \text{EcoInnovation}_{i,t} = & \varphi_0 + \varphi_1 \text{LpInstInv}_{i,t} + \varphi_2 \text{CpInstInv}_{i,t} + \varphi_3 \text{LpInstInv} * \\ & \text{CpInstInv}_{i,t} + \varphi_4 \text{Size}_{i,t} + \varphi_5 \text{Leverage}_{i,t} + \varphi_6 \text{ROA}_{i,t} + \varphi_7 \text{Cash}_{i,t} + \varphi_8 \text{ForeignSales} + \\ & \varphi_9 \text{CapitalExp}_{i,t} + \varphi_{10} \text{R\&D}_{i,t} + \varphi_{11} \text{FirmAge}_{i,t} + \varphi_{12} \text{BoardIndependence}_{i,t} + \\ & \varphi_{13} \text{FemaleDirectors}_{i,t} + \varphi_{14} \text{CSRcommittee}_{i,t} + \varphi_{15} \text{FirmAge}_{i,t} + \\ & \varphi_{16} \text{Munificence}_{i,t} + \varphi_{17} \text{NCSRPI}_i + \varphi_{18} \text{ICSRPI}_i + \varphi_{19} \text{Crisis}_t + \varphi_{20} \text{Country}_i + \\ & \varphi_{21} \text{Year}_t + \varphi_{22} \text{Industry}_i + \varepsilon_{it} + \eta_i \text{ [Equation 1]} \end{aligned}$$

As regards the dependent variable, EcoInnovation, following García-Sánchez et al. (2020a), it is a numerical variable extracted from the ESG items available in EIKON. It is a score that represents the degree of eco-innovation in each company in relation to the companies that operate in their sector.

The independent variables LpInstInv and CpInstInv represent the voting rights associated with the presence of institutional investors with a participation greater than 5% in the company's stock capital, grouped according to their investment horizon. Thus, long-term institutional investors (LpInstInv) group pension funds and endowment funds,

government institutions and families, whereas short-term institutional investors (CpInstInv) correspond to banks or financial institutions, cross holdings - company in another - and other institutional investors (Brickley et al., 1998; Chen et al., 2007; Ferreira & Matos, 2008; Brossard et al., 2013).

The individualized effect of ownership by each category of institutional investors will allow us to observe whether the interests of both generic categories of institutional investors converge ($\phi_1 > 0$ and $\phi_2 > 0$) or diverge ($\phi_1 > 0$ and $\phi_2 < 0$). The variable $LpInstInv * CpInstInv$, designed to reflect the interaction of these effects, shows the existence of corrective (divergence: $\phi_3 < 0$ or $\phi_3 > 0$) or potentiating (convergencia: $\phi_3 > 0$) effects associated to disperse ownership structures.

In order to avoid biased results, we incorporate a set of control variables, selected according to previous studies (Ghisetti et al., 2015; Tsai & Liao, 2017; Jové-Llopis & Segarra-Blasco, 2018), which correspond to firms' resources and capabilities, monitoring mechanisms and institutional pressures.

According to the resources and capacities theory, larger and more profitable companies have a greater volume of human and financial resources to invest in eco-innovation strategies (Schaltegger & Synnøestvedt, 2002; Kesidou & Demirel 2011; Przychodzen & Przychodzen, 2015). Such capacities are complemented as the company is older, because it has developed routines for environmental innovation and know-how derived from the continuity over time of its environmental strategies (Rehfeld et al., 2007); and it has greater access to external financing (Magri, 2009; Johnson & Lybecker, 2012), especially when investments require long periods of time to offer adequate returns (De Massis et al., 2018 ; Zulfiqar & Thapa, 2018). All these factors are represented in the model using the variables Size (logarithm of total assets), ROA (profitability, represented by the return on assets ratio), Cash (fund maneuver, representing the company's liquidity), Leverage (proportion of debt that a company supports compared to its own resources) and Age (age of the firm).

Additionally, the development of the eco-innovation technological capabilities is associated with the investment in physical capital and R&D that a company has made because these investments favour the development of new products and processes (Horbach et al., 2012; Cainelli et al., 2015). Likewise, export also influences companies to develop proactive environmental strategies and be more eco-innovative (Horbach, 2008; Cainelli et al., 2012; Cainelli & Mazzanti, 2013). Therefore, the variables InterSales (percentage of sales in international markets), CAPEX (intensity of the investment in physical capital with respect to total sales) and NonCAPEX (intensity of investment in R+D+i with respect to total sales) were also included in the model.

The board of directors is the body responsible for approving business strategies and ensuring the protection of stakeholders and shareholders' interests (Prado-Lorenzo and García-Sánchez, 2010). In this sense, considering that independent directors have a key role in monitoring management (Fama and Jensen, 1983), they tend to positively affect the effectiveness of activism by institutional investors (David et al., 2001). Furthermore, CSR committees are created to improve the firms' social and environmental behaviour. Thus, in order to control the monitoring role that the main internal corporate governance

mechanisms can play on innovation strategies, we include variables that identify the level of independence, diversity and specialization of the board of directors, as well as its size and activity. The control variables considered correspond to BSize (number of directors); BActivity (number of board meetings); BIndependence (percentage of independent directors on the board); BDiversity (percentage of female directors on the board); and CSRcommitte (a dummy variable that takes a value of 1 if the firm has been created a CSR committee, and 0 otherwise).

Institutional pressures at country and sector level are identified by the NCSRPI and ICSRPI composite indicators developed by Amor-Esteban et al. (2018a and 2018b). We also included two variables representing (i) possible economic shocks and environmental conditions that can affect investments in eco-innovation, such as the years corresponding to the last economic recession: Crisis (Gallego-Álvarez et al., 2014); and (ii) opportunities for growth and abundance of resources: Munificence (García-Sánchez et al., 2020a).

In addition, ‘Country’, ‘Year’ and ‘Industry’ were included as control variables. Finally, the model also incorporates an error term (ε_{it}) which is divided into two elements: the specific effect of the company η (to control unobservable heterogeneity) and μ (that refers to the traditional random perturbation). We use the estimator proposed by Arellano and Bond (1991), based on the generalized method of moments.

5. EMPIRICAL RESULTS

5.1. Descriptive statistics

Table 1 depicts the descriptive statistics for the variables included in the model. Specifically, frequencies for categorical variables and mean (standard deviation) for the numerical ones are shown. In this regard, it can be seen that the average level of EcoInnovation is 0.47 (+0.31). The voting rights of long-term institutional investors are 6.78%, and those of short-term institutional investors are 16.43%. The main institutional investors are cross holdings (9.25%), financial institutions (5.82%) and families (5.02%). Board independence is 51.39% (+30.19) and the gender diversity is 11.43% (+11.48). A CSR committee has been created by 43% of the firms. In relation to profitability, the average value of ROA is 4.27%.

Insert Table 1 about here

Table 2 corresponds with the bivariate correlations between the dependent, independent and control variables. The coefficients suggest the absence of multicollinearity problems.

Insert Table 2 about here

5.2. Results analysis model

Table 3 summarizes the results obtained from the estimation of the model proposed to test the research hypotheses (Equation 1). It can be seen that long-term institutional investors have a positive impact on the development of eco-innovation projects (Eco-innovation), significant at 99%, (LpInstInv: coeff. = 0.00143; p-value = 0.000). This effect is maintained in all specifications of the model. This result is in line with most prior

studies, which document a positive effect of long-term institutional investors on general innovation (Kochhar & David, 1996; Brickley et al., 1998; Brossard et al., 2013; Luong et al., 2017) as well as on CSR (Cox et al., 2004; Harjoto & Jo, 2008; Oh et al., 2011).

The presence of short-term institutional investors also shows a positive relationship with Eco-innovation, for a 99% confidence level (CpInstInv: coeff. = 0.000410; p-value = 0.000). Hence, similarly to Kochhar and David (1996), our results suggest that “the myopic investor hypothesis” is not acceptable as, regardless of the institutional investors’ investment horizon, institutional ownership is positively associated to the firm’s investment in long-term innovative projects in the field of environmental protection. Thus, both types of institutional investors have a positive effect on eco-innovation. These results allow us to accept the H1b hypothesis regarding a convergence of interests between the different generic categories of institutional investors with regard to CSR.

As stated earlier, the lack of stakeholder pressure to eco-innovate is considered a main barrier that inhibits the development of eco-innovations (Del Río et al., 2010). In this sense, our findings confirm the salient role of institutional investors as key stakeholders influencing corporate strategies and decisions and, specifically, their capacity to, directly or indirectly, exert pressure on firms to develop eco-innovations. Thus, to the extent that institutional investors may impose financial constraints on firms (Hansen & Lott, 1996; Bena et al., 2017), they can simultaneously act as a source of coercive pressures – institutional theory – (Chen et al., 2018) and as “a proxy for contextual constraints and resources” – resource-based theory – (Roud & Thurner, 2018, p. 1216) affecting the firms’ propensity and capability to eco-innovate.

Additionally, we observe that there is an enhancing effect on eco-innovation associated with ownership dispersion. This evidence derives from the effect of the variable LpInstInv * CpInstInv (coeff. = 1.53e-05; p-value = 0.000) and allows us to accept the H2b hypothesis, indicating that the advantages that long-term institutional investors identify in eco-innovation are accepted by short-term institutional investors, so that both jointly promote eco-innovation. In other words, the interests of long-term and short-term institutional investors converge, in such a way that an ownership structure characterized by the diversity of shareholders (i.e., the presence in the company’s stock capital of different types of institutional investors) would enhance the individualized positive effect that each type of investor has on eco-innovation.

Therefore, our findings provide evidence that ownership dispersion can be “good for firm value” (Konijn et al., 2011, p. 1331) by balancing the shareholders’ interests and, thus, mitigating the agency problem generated by the entrenchment hypothesis in the case of concentrated ownership, i.e., the fact that dominant shareholders may impose their view and own interests (Peng & Yang, 2014).

Insert Table 3 about here

In relation to the control variables, we show that the companies promoting eco-innovation strategies are those that have greater capacities and resources, operate in munificent sectors that offer greater opportunities for growth and availability of resources, and have higher access to international markets. These results are in line with the resource-based theory’s tenets and confirm those of Berrone et al. (2013) and García-Sánchez et al.

(2020a), respectively. However, unexpectedly, there is a negative relationship between internationalization and eco-innovation, which suggests the existence of two different strategic approaches between international listed companies.

Regarding the internal control mechanisms, eco-innovation is positively affected by the size of the board of directors, whereas board independence and board diversity are negatively associated to eco-innovation. In this sense, our results are in line with those of Baysinger and Hoskisson (1990), who found that the presence of independent directors is negatively associated with general innovation. These results could indicate that the complexity of this kind of proactive environmental strategies requires a diversity in the directors' experience and training, as well as the presence of executives who implement them and who have a greater knowledge of the company's day-to-day. Such specialization is currently not achieved through the creation of a CSR committee.

6. COMPLEMENTARY ANALYSIS

As noted by Brossard et al. (2013) and García-Sánchez et al. (2020b), within each generic category of institutional investors (long-term/pressure resistant versus short-term/pressure sensitive) different types of investors are included, whose characteristics, monitoring capabilities, influence and attitude towards environmental sustainability and innovation may differ. Consequently, each specific type of institutional investor could exert different pressure on companies to develop eco-innovation. Therefore, a more focused analysis of the relationship between institutional ownership and eco-innovation accounting for each specific type of institutional investors as well as the possible existence of a corrective (enhancing) effect derived from the divergence (convergence) of interests among investors belonging to the same generic category would be interesting. As stated earlier, we consider three long-term institutional investors (pension funds and endowment funds, government institutions, and families) and three short-term institutional investors (financial institutions, cross holdings, and other investors).

In relation to families, they often invest in a single firm of which they own a significant proportion of shares and maintain a close relationship, which could make them reluctant to force managers to make risky investments, such as eco-innovation (Brossard et al., 2013). However, they have a “strategic” interest in the company in which they invest and, as a result, considering that eco-innovation contributes to increasing the company's long-term value, it can be expected that they tend to promote such projects. In this sense, Hsu et al. (2014) found a positive effect of family ownership on innovation.

As regards governments, they have a key role in seeking sustainable development (GRI, 2015) and promoting eco-innovation (Del Río et al, 2010). Furthermore, they have a long-term orientation and, usually, do not pursue profit objectives (Eng and Mark, 2003). Prior studies document a positive effect of government participation in the firms' stock capital on corporate sustainability (Prado-Lorenzo et al., 2009; Rees & Rodionova, 2013). As regards eco-innovation, in a recent study, Roud & Thurner (2018) found that ownership by government boosts eco-innovation.

Previous literature also documents a positive relationship between ownership by pension funds and endowments and the firms' environmental performance (Rees & Rodionova, 2013; Dyck et al., 2019). Similarly, some authors provide empirical evidence of a positive effect of ownership by pension funds on firms' R&D (Kochhar & David, 1996; Zahra, 1996; David et al., 2001). The high level of public scrutiny and regulatory pressures to which these investors are subjected (Cox et al., 2004; Brossard et al., 2013) favour their activism in these fields (Oh et al., 2011; García-Sánchez et al., 2020b) as they have to fulfil the fiduciary duty of maximizing their portfolio's long-term value (David et al., 2001). Nevertheless, at the same time, such reasons could make pension funds averse to risky investments in eco-innovation projects.

Financial institutions have a short-term orientation and strong links with the companies in which they invest (Brickley et al., 1988; Kim & Yi, 2015), so that they may not be inclined to actively influence managers to develop eco-innovation as its outcomes are uncertain and may be obtained in the long-term. However, in the role of lenders of such companies, financial institutions are interested in their long-term survival (Prado-Lorenzo et al., 2009); consequently, in order to increase the firms' value and reduce risks, they could promote eco-innovation projects.

As regards cross holdings, although they have high incentives to monitor and influence their portfolio companies' management (Harford et al., 2011), prior studies (Rees & Rodionova, 2013; García-Sánchez et al., 2020b) found that ownership by cross holdings has a negative effect on the adoption of CSR-related practices. Finally, following García-Sánchez et al. (2020b), we have created a broad category named "other investors", which groups the remaining types of institutional investors (i.e. charities, mutual funds, index funds, foundations,...).

Table 4 shows the results of the complementary analysis model. In this regard, in relation to short-term institutional investors, ownership by cross holdings (CrossHold: coeff. = 0.000609; p-value = 0.000) and other institutional investors (OtherHold: coeff. = 0.000769; p-value = 0.000) is positively associated with the development of strategies of eco-innovation by the companies in which they invest. As regards cross holdings, our results contradict prior studies' findings (Rees & Rodionova, 2013; García-Sánchez et al., 2020b) which document that ownership by cross holdings negatively influences CSR practices. However, we do not find a potentiating effect on eco-innovation derived from the presence in the company's stock capital of both types of institutional investors (CrossHold * OtherHold property structure: coeff. = 0.00000861; p-value = 0.434).

Ownership by financial institutions is negatively associated with environmental proactivity (Financial: coeff. = - 0.000153; p-value = 0.000). This result contradicts prior studies' findings (Oh et al., 2011; Rees & Rodionova, 2013) regarding a positive effect of ownership by financial entities on the firms' environmental performance. However, the opposition of these investors to eco-innovation is corrected by the presence of other holdings (Financial * OtherHold: coeff. = 0.0000399; p-value = 0.000), although this corrective effect is not extended to the presence of cross holdings (Financial * CrossHold: coeff. = - 0.0000293; p-value = 0.000).

Insert Table 4 about here

Regarding long-term institutional investors, we show that pension funds have a negative effect on the implementation of eco-innovation strategies (Pension: coeff. = -0.00913; p-value = 0.000). This result contradicts prior empirical evidence indicating a positive relationship between ownership by pension funds and both the firm's environmental performance (Rees & Rodionova, 2013; Dyck et al., 2019) and innovation (Kochhar & David, 1996; Zahra, 1996; David et al., 2001). However, this effect is corrected by the presence of the other two typologies of long-term institutional investors (Pension * Govern: coeff. = 0.000485; p-value = 0.000 and Pension * Family: coeff. = 0.000607; p-value = 0.000).

Notwithstanding, although, in line with Roud and Thurner's (2018) findings, our results indicate that government and families are positively related to environmental proactivity by the companies in which they invest, there being a slight corrective effect of ownership by both types of investors on their individual impulses towards eco-innovation (Govern * Family: coeff. = - 0.000127; p-value = 0.000).

These results provide evidence that not all institutional owners have the same effect on corporate eco-innovation, so that ownership dispersion can reduce agency costs by mutual monitoring among different investors (Maury & Pajuste, 2005; Konijn et al., 2011). Overall, the findings suggest that ownership dispersion involves the implementation of environmental strategies that reconcile the interests of the different categories of investors, having an effect, corrective or enhancing, on eco-innovation, depending on the case.

7. CONCLUSIONS

Although there is ample literature examining the drivers of eco-innovation (Hojnik & Ruzzier, 2016; Keshminder & Del Río, 2019; Cecere et al., 2020), the effect of institutional ownership on eco-innovation has not been analysed. Drawing on insights from several research fields (i.e., innovation, CSR and financial literatures), this paper aims to fill this research gap by analysing the effect of institutional ownership on eco-innovation, by examining the role that institutional investors play in promoting eco-innovation. Specifically, we focus on the analysis of the corrective or enhancing effect that can be derived from ownership dispersion associated with the presence in the companies' stock capital of institutional investors with different investment horizons.

The results obtained for a sample of 6,454 international listed companies for the period 2002-2017 indicate the convergence of the short-term institutional investors' interests with the long-term institutional investors' demands, which has a positive effect on the implementation of proactive environmental strategies, such as eco-innovation. Additionally, this positive effect is enhanced by disperse ownership structures associated with the participation in a company's stock capital of both types of institutional investors, increasing the firm's commitment to environmental sustainability.

We also found evidence of the existence of divergences between the individual types of institutional investors in relation to eco-innovation. Thus, it has been observed that financial institutions and pension funds have a short-term orientation focused on the search for immediate economic returns and, therefore, ownership by such investors is

negatively related to eco-innovation, whereas the remaining types of institutional investors adopt long-term orientation and, hence, their participation in a company's stock capital is positively associated with eco-innovation. Moreover, the presence on the company's capital of different types of institutional investors belonging to the same generic category (long-term and short-term) has a corrective effect on the interests of the remaining investors belonging to the same category.

As far as we are aware, this study is the first attempt to jointly consider the relationship between different types of institutional investors and eco-innovation, and to carry out an empirical analysis of such a relationship. Thus, this research contributes to literature by identifying a new driver of eco-innovation – institutional ownership - the effect of which has not been previously studied. Furthermore, our results shed light on the different impact that each type of institutional investor can have on the development of proactive environmental strategies related to eco-innovation. Additionally, this study's findings extend the understanding of the implications of ownership dispersion on corporate strategies aimed at enhancing firm value. Finally, this study complements prior empirical evidence by using an international approach encompassing 71 countries and considering a long analysis period (2002-2017), which contributes to the generalization of our results.

To sum up, our findings advance the current understanding concerning the role of institutional ownership on corporate strategies and policies (McCahery et al., 2016) by providing updated, international empirical evidence of the individual and joint effect of ownership by institutional investors with different investment horizons on a specific type of business policies: those related with eco-innovation projects. Furthermore, this paper's findings have several practical implications both for firms and policy makers. Firstly, our findings could help firms to design their ownership structures and relationships with institutional investors. Secondly, the understanding of the effect of institutional ownership on eco-innovation could assist policy makers when designing public policies aimed at promoting eco-innovation, for example fostering ownership dispersion.

Despite the interest and usefulness of its findings, this study has some limitations that should be considered in their analysis. The main limitation is that we have only considered the sign (positive or negative) of the relationship between institutional ownership and eco-innovation without deepening the causes behind such a relationship, i.e., our results do not allow us to distinguish whether the positive association between institutional ownership and eco-innovation is due to the active influence of institutional investors (active investors) or whether, on the contrary, it is only the result of the choice made by institutional investors of the companies in which to invest, by selectively choosing those companies that are more innovative (superior investors). In other words, we have not analysed whether our findings are produced by "reverse causality".

In this regard, future research should study this possibility. Future studies could also consider the effect of other institutional investors (for example, foreign investors) as well as different types of eco-innovations. Finally, in order to provide a more complete picture of the relationship between institutional ownership and environmental performance, this study could be extended by analysing how institutional investors affect other dimensions of environmental sustainability; namely, emission reduction and resources use reduction.

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Table 1. Descriptive statistics

Variable	Mean	Std.Dv.	Variable	Mean	Std.Dv.	Variable	Frequency
EcoInnovation	0,47	0,31	Size	15,74	3,02	CSRCommittee	0,43
LpInstInv	6,78	15,35	Leverage	12,18	8,89		
CpInstInv	16,43	20,59	ROA	4,27	86,16		
LpInstInv*CpInstInv	59,35	199,13	Cash	45,50	153,00		
Pension	0,27	2,20	InterSales	30,66	68,18		
Govern	1,49	8,64	CAPEX	112,07	5104,84		
Family	5,02	12,96	NonCAPEX	159,34	6944,85		
Pension*Govern	0,54	15,49	Age	33,11	30,69		
Pension*Family	1,23	21,98	BSize	10,24	3,66		
Govern*Family	1,48	31,44	BIndep	51,39	30,19		
Financial	5,82	9,24	BDiversity	11,43	11,48		
CrossHold	9,25	19,14	BActivity	88,08	10,98		
OtherHold	1,35	7,81	Munificence	-0,22	0,43		
Financial*CrossHold	19,07	90,18	NCSRPI	-1,82	8,95		
Financial*OtherHold	3,30	39,07	ICSRPI	0,04	3,02		
CrossHold*OtherHold	7,56	83,23					

Table 2. Bivariate correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 EcoInnovation	1																
2 LpInstInv	-0,02	1															
3 CpInstInv	-0,07	-0,16	1														
4 LpInstInv*CpInstInv	-0,03	0,43	0,18	1													
5 Pension	0,00	0,14	0,00	0,13	1												
6 Govern	0,05	0,52	-0,08	0,14	0,01	1											
7 Family	-0,06	0,81	-0,14	0,39	0,00	-0,05	1										
8 Pension*Govern	0,00	0,10	-0,02	0,04	0,17	0,15	-0,01	1									
9 Pension*Family	-0,01	0,14	-0,02	0,06	0,32	-0,01	0,11	0,02	1								
10 Govern*Family	0,02	0,15	-0,02	0,06	0,00	0,13	0,09	0,01	0,01	1							
11 Financial	-0,12	-0,11	0,24	0,08	-0,01	-0,07	-0,08	-0,01	-0,02	-0,02	1						
12 CrossHold	-0,02	-0,11	0,83	0,13	0,01	-0,04	-0,10	-0,01	-0,02	-0,01	-0,20	1					
13 OtherHold	0,01	-0,04	0,32	0,06	0,00	-0,02	-0,03	-0,01	-0,01	-0,01	-0,06	-0,03	1				
14 Financial*CrossHold	-0,03	-0,04	0,33	0,09	0,00	-0,02	-0,04	0,00	0,00	-0,01	0,24	0,25	-0,02	1			
15 Financial*OtherHold	-0,01	-0,02	0,14	0,04	0,00	-0,01	-0,01	0,00	0,00	0,00	0,11	-0,03	0,30	0,03	1		
16 CrossHold*OtherHold	0,00	-0,03	0,22	0,02	0,00	-0,01	-0,03	0,00	0,00	0,00	-0,04	0,10	0,38	0,01	0,09	1	
17 Size	0,32	0,00	0,11	-0,02	0,07	0,16	-0,11	0,03	0,04	0,01	-0,20	0,20	0,05	0,00	0,00	0,04	1
18 Leverage	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
19 ROA	0,02	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	-0,01	0,01	0,00	0,00	0,00	0,00	0,03
20 Cash	0,04	0,01	0,03	0,00	0,03	0,02	0,00	0,00	0,00	0,00	-0,01	0,03	0,01	0,00	0,00	0,00	0,08
21 InterSales	0,09	0,00	0,01	0,00	0,01	-0,01	0,01	0,00	0,00	0,00	-0,01	0,01	0,01	0,02	0,00	0,00	0,02
22 CAPEX	-0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-0,01	0,00	0,00	0,00	0,00	0,00	-0,02
23 NonCAPEX	-0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	-0,02
24 Age	0,26	-0,06	-0,05	-0,05	-0,01	0,00	-0,07	-0,01	0,00	0,02	-0,05	-0,03	0,02	-0,02	0,00	0,01	0,22
25 BSize	0,13	0,00	0,01	-0,01	-0,03	0,04	-0,02	-0,01	-0,01	0,01	-0,08	0,03	0,03	-0,02	0,01	0,03	0,16
26 BIndep	-0,05	-0,06	-0,11	-0,05	-0,01	-0,04	-0,04	-0,01	-0,01	-0,02	0,13	-0,16	-0,04	-0,03	-0,01	-0,04	-0,18

27	BDiversity	0,03	0,01	-0,02	0,00	-0,01	0,02	-0,01	0,02	-0,01	0,01	0,08	-0,06	0,00	0,01	0,00	-0,01	-0,09
28	BActivity	0,04	0,03	0,03	0,01	0,01	0,03	0,01	0,00	0,02	0,01	-0,07	0,06	0,01	0,01	0,01	0,00	0,04
29	CSRCommittee	0,19	0,00	0,00	0,00	0,00	0,04	-0,03	0,01	0,02	0,01	-0,02	0,00	0,02	0,01	0,02	0,00	0,10
30	Munificence	0,11	0,02	0,07	0,01	0,04	0,03	-0,01	0,02	0,02	0,01	-0,02	0,07	0,03	0,01	0,00	0,01	0,21
31	NCSRPI	0,12	0,05	0,02	0,02	0,03	0,01	0,04	0,00	0,01	0,01	-0,15	0,07	0,04	0,04	0,01	0,03	-0,01
32	ICSRPI	0,17	-0,01	0,04	0,00	0,00	0,02	-0,03	0,00	0,00	0,00	-0,04	0,06	0,00	0,01	-0,01	0,01	-0,07
33	Crisis	0,00	0,03	0,12	0,04	0,05	0,05	0,00	0,02	0,03	0,02	0,12	0,07	0,00	0,06	0,01	0,00	0,10
		18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	
18	Leverage	1																
19	ROA	0,00	1															
20	Cash	0,00	0,00	1														
21	InterSales	0,00	0,01	0,00	1													
22	CAPEX	-0,01	-0,03	0,00	0,00	1												
23	NonCAPEX	-0,01	-0,05	0,00	-0,03	0,02	1											
24	Age	0,00	0,01	0,01	0,08	-0,01	-0,02	1										
25	BSize	0,00	0,01	0,00	0,00	0,00	0,00	0,07	1									
26	BIndep	0,01	-0,01	-0,02	-0,01	0,00	0,01	0,00	-0,13	1								
27	BDiversity	0,00	0,00	-0,02	-0,01	0,00	0,01	0,04	0,05	0,27	1							
28	BActivity	0,00	-0,01	0,00	0,02	0,00	-0,02	0,02	-0,12	-0,29	-0,02	1						
29	CSRCommittee	-0,01	0,00	0,01	0,03	-0,01	-0,01	0,07	0,16	-0,01	0,15	0,18	1					
30	Munificence	0,01	0,03	0,03	0,00	0,00	-0,02	0,13	-0,01	-0,05	0,04	0,07	0,10	1				
31	NCSRPI	0,01	0,01	-0,02	0,15	0,02	-0,01	0,09	-0,04	-0,10	0,00	0,22	0,05	0,05	1			
32	ICSRPI	0,00	0,00	0,02	0,13	0,02	-0,01	0,08	-0,03	-0,01	-0,05	0,04	0,05	0,03	0,04	1		
33	Crisis	0,00	0,00	0,02	0,00	0,00	0,02	0,05	-0,14	-0,01	0,22	0,05	0,17	0,38	-0,03	-0,02	1	

Table 3. Basic model

	<i>Model 1</i>			
	<i>Coeff.</i> <i>(std.dv.)</i>	<i>Coeff.</i> <i>(std.dv.)</i>	<i>Coeff.</i> <i>(std.dv.)</i>	<i>Coeff.</i> <i>(std.dv.)</i>
LpInstInv	0.00134*** (5.28e-05)		0.00141*** (3.67e-05)	0.00143*** (4.60e-05)
CpInstInv		9.95e-06 (8.05e-05)	0.000341*** (4.17e-05)	0.000410*** (3.66e-05)
LpInstInv*CpInstInv				1.53e-05*** (4.23e-06)
Size	0.0507*** (0.00131)	0.0486*** (0.00133)	0.0469*** (0.00117)	0.0531*** (0.00110)
Leverage	2.10e-07*** (1.21e-08)	3.39e-07*** (1.25e-08)	2.47e-07*** (1.06e-08)	9.25e-08*** (1.10e-08)
ROA	-1.53e-05 (4.66e-05)	-5.60e-05 (4.91e-05)	-4.50e-05 (4.35e-05)	8.20e-06 (5.82e-05)
Cash	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
InterSales	-0.000191*** (6.10e-05)	-0.000233*** (6.03e-05)	-0.000247*** (4.81e-05)	-2.81e-05 (4.93e-05)
CAPEX	2.02e-07*** (8.63e-09)	2.17e-07*** (9.51e-09)	1.90e-07*** (8.74e-09)	1.96e-07*** (1.02e-08)
NonCAPEX	3.85e-08** (1.69e-08)	1.13e-08 (1.04e-08)	3.35e-08** (1.59e-08)	-9.95e-09 (2.20e-08)
Age	0.000 (0.000)	0.000 (0.000)	0.0118*** (0.000590)	0.0112*** (0.000583)
BSize	0.000653*** (7.41e-05)	0.000930*** (6.65e-05)	0.000867*** (6.37e-05)	0.00135*** (6.05e-05)

Table 4. Complementary analysis

	<i>Model 2</i>		
	<i>Coeff.</i> <i>(std.dv.)</i>	<i>Coeff.</i> <i>(std.dv.)</i>	<i>Coeff.</i> <i>(std.dv.)</i>
LpInstInv		0.00104*** (2.62e-05)	
CpInstInv	0.000649*** (2.85e-05)		
Financial		-0.000248*** (3.35e-05)	-0.000153*** (3.63e-05)
CrossHold		0.000578*** (0.000163)	0.000609*** (0.000122)
OtherHold		0.000791*** (8.55e-05)	0.000769*** (8.62e-05)
Financial*CrossHold		-3.24e-05*** (3.95e-06)	-2.93e-05*** (3.79e-06)
Financial*OtherHold		3.00e-05*** (3.48e-06)	3.99e-05*** (3.19e-06)
CrossHold*OtherHold		1.51e-05 (1.03e-05)	8.61e-06 (1.10e-05)
Pension	-0.0105*** (0.000267)		-0.00913*** (0.000655)
Govern	0.00314*** (9.30e-05)		0.00387*** (5.86e-05)
Family	0.00119*** (3.55e-05)		0.000527*** (4.65e-05)
Pension*Govern	0.000513*** (1.64e-05)		0.000485*** (3.64e-05)

BIndep	-0.000244*** (1.42e-05)	-0.000207*** (1.36e-05)	-0.000220*** (1.32e-05)	-0.000164*** (1.29e-05)
BDiversity	-0.000362*** (4.69e-05)	-0.000348*** (4.06e-05)	-0.000356*** (4.37e-05)	-0.000446*** (2.67e-05)
BActivity	-0.000132*** (2.38e-05)	-6.74e-05** (2.74e-05)	-6.66e-05*** (2.12e-05)	0.000101*** (1.98e-05)
CSRCommittee	-0.000320 (0.000917)	-0.000532 (0.000411)	-0.000582 (0.000690)	-0.000364 (0.000697)
Munificence	0.142*** (0.00809)	0.138*** (0.00816)	0.149*** (0.00781)	0.141*** (0.00767)
NCSRPI	-0.00167 (0.00232)	0.000261 (0.00232)	-0.000454 (0.00197)	-0.00129 (0.00183)
ICSRPI	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Crisis	-0.00482*** (0.000854)	-0.00433*** (0.000883)	-0.00505*** (0.000742)	-0.00389*** (0.000649)
Country, industry and year variables included				
m1	-5.49	-5.44	-5.49	-5.49
m2	-1.51	-1.47	-1.53	-1.52
Hansen	528.37	530.40	552.23	578.25

Pension*Family	0.000698*** (3.56e-05)		0.000607*** (9.44e-05)
Govern*Family	-0.000132*** (3.71e-05)		-0.000127*** (2.13e-05)
Size	0.0413*** (0.000980)	0.0478*** (0.00124)	0.0459*** (0.000784)
Leverage	2.73e-07*** (1.02e-08)	1.15e-07*** (9.41e-09)	1.74e-07*** (9.68e-09)
ROA	-7.97e-05* (4.27e-05)	0.000246*** (4.24e-05)	0.000270*** (3.15e-05)
Cash	0.000 (0.000)	-0.0001* (0.000)	0.000 (0.000)
InterSales	-0.000348*** (4.13e-05)	-7.47e-05*** (2.87e-05)	-0.000277*** (3.35e-05)
CAPEX	1.92e-07*** (1.09e-08)	1.95e-07*** (4.09e-09)	1.89e-07*** (3.84e-09)
NonCAPEX	1.03e-07*** (2.17e-08)	6.47e-08*** (1.09e-08)	8.57e-08*** (1.17e-08)
Age	0.000 (0.000)	0.000 (0.000)	0.0133*** (0.000178)
BSize	0.000968*** (3.05e-05)	0.000461*** (5.30e-05)	0.000657*** (5.38e-05)
BIndep	-0.000171*** (1.11e-05)	-0.000115*** (1.09e-05)	-7.33e-05*** (9.97e-06)
BDiversity	-0.000407*** (3.95e-05)	-0.000419*** (3.05e-05)	-0.000406*** (2.41e-05)
BActivity	-6.57e-05*** (2.13e-05)	-7.49e-05*** (2.08e-05)	-5.40e-07 (2.10e-05)

CSRCommittee	-0.00196*** (0.000621)	0.00211*** (0.000414)	0.00104*** (0.000360)
Munificence	0.133*** (0.00317)	0.123*** (0.00568)	0.124*** (0.00340)
NCSRPI	0.000886 (0.00187)	-0.00121 (0.00168)	-0.00166 (0.00158)
ICSRPI	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Crisis	-0.00397*** (0.000642)	-0.00285*** (0.000480)	-0.00180*** (0.000469)
Country, industry and year variables included			
m1	-5.56	-5.50	-5.59
m2	-1.54	-1.53	-1.53
Hansen	616.01	678.72	723.20