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Corporate Venture Capital and CSR Performance: an Extended Resource Based View's perspective

Abstract

The purpose of this paper is to extend the Resource Based View (RBV) theory of companies, integrating it into a multidisciplinary context of analysis. Authors tested an empirical model in which corporate venture capital (CVC) impacts on corporate social responsibility (CSR) performance with the aim of creating a sustainable competitive advantage. The authors performed a longitudinal analysis, based on the Generalized Least Square (GLS) model, on 100 American and European companies reported in the Fortune Global 500 ranking from 2015 to 2019. The findings reveal that CVC programs have a positive impact on firm's environmental and social outcomes. They also broaden the boundaries of RBV theory analysis and contribute to corporate venture capital and corporate social responsibility literature. Additionally, authors develop insights applicable to practitioners to successfully implement CVC practices and CSR strategies jointly.

Keywords: Corporate social responsibility performance; Corporate venture capital; Resource based view; Corporate social responsibility strategy; ESG practices;

1. Introduction

The Resource Based View (RBV) theory has been one of the pillars of management studies for the past 30 years (Nason & Wiklund, 2018), and it postulates that the management of corporate resources is one of the key elements to create a company's sustainable competitive advantage (Wernerfelt, 1984; Barney, 1991). In particular, resources are valuable, rare, imperfectly imitable and non-substitutable (VRIN), and they are capable of generating a competitive advantage and increasing the performance of a firm. Over time, the RBV paradigms have seen the development of new theoretical frameworks for understanding which types of resources create a competitive advantage. In this regard, the management of knowledge and, consequently, the development of the Knowledge Based View (KBV) have seen increasingly central roles in management literature, which focuses on knowledge as a VRIN resource of competitive advantage (Del Giudice & Maggioni, 2014; Del Giudice & Della Peruta, 2016; Martín-de Castro, 2015). Moreover, in parallel with the scientific community's increase in interest on aspects related to corporate social responsibility (CSR), a new theoretical framework has also been developed: Natural Resource Based View (NRBV) (Hart, 1995; Hart & Dowell, 2011). It argues that the development of competitive advantage may include the management of environmental and social issues that arises from CSR decisions. In fact, Freeman (1994), in his pivotal research, stated that the firm must include ethical and moral values, in addition to the objectives of creating value, with regard to all the company's stakeholders for long-term success.

In this theoretical context, the relevance of issues related to the environment and social problems has seen an exponential interest on the part of both scholars and practitioners in recent years. For instance, Galloway et al. (2017) highlighted how modern production processes, based in particular on the use of plastics, have led to massive pollution of the oceans with dramatic implications for the ecosystem and for the health and future of the human race. The scientific community is questioning and looking for solutions to avoid disastrous consequences. Based on our best knowledge, we argue that a company's ability to innovate can represent one possible solution. Specifically, the innovation processes may create new resources and knowledge capable of changing the characteristics of the company, allowing it to achieve its goals (Brunswick & Vanhaverbeke, 2015; Ferraris et al., 2017; Santoro et al., 2018). Innovation may have also implications for a firm's CSR strategies, which have goals linked to environment and social aspects (Bos-Brouwers, 2009). Based on these assumptions, this study aims to extend the theoretical dictates of RBV in a context linked to the creation of resources through innovation that not only improves economic / financial performance but also issues related to the environment and society.

Practically, we can identify two ways to develop innovation: closed innovation and open innovation (OI) (Chesbrough, 2003; Chesbrough & Crowther, 2006). Closed innovation sees the internal development of new resources and skills through the classic R&D process. OI usually sees the acquisition of knowledge outside the company boundaries (Ferraris et al., 2017; Miglietta et al., 2018a). To do this, the company has several strategic choices, such as the acquisition of new businesses through extraordinary financial transactions (Mergers & Acquisitions), alliances, or joint ventures (Miglietta et al., 2017; 2018b). In particular, in recent years, large companies have begun to implement new projects related to open innovation, including Corporate Venture Capital (CVC) programs. CVC consists of an established company investing in the capital of a start-up with the aim of acquiring new knowledge and accelerating its technological development (Anokhin et al., 2016; Da Gbadji et al., 2015). However, the ability of CVC programs to influence a company's CSR strategies with the aim of increasing its internal knowledge and resources needs an extensive analysis (Hegeman & Sørheim, 2021).

Hence, from a theoretical point of view, we have focused on RBV as a theoretical framework to understand if CVC programs are able to develop unique resources and skills within the company, focusing in particular on their impact in that area of company that deals with implementing CSR activities. The effect that CVC programs may have in the development of unique resources related to the company's CSR activities could lead to the development of a competitive advantage as well as to the basis of the RBV. Therefore, with the aim of extending RBV, the goal of this study is to answer the following question: Do corporate venture capital programs have an impact on firms' CSR performance? To answer this research question, our study is based on an empirical analysis of European and American companies reported in the Fortune Global 500 ranking from 2015 to 2019. In particular, to understand the impact of CVC on CSR, we carried out a longitudinal analysis based on the generalized least squares random-effect model (Da Gbadji et al., 2015).

The results confirm that CVC programs have a positive impact on CSR performance due to their positive impact on a firm's environmental and social outcomes. These results lead to the following theoretical contributions. First, we contribute to resource based view theory, expanding the boundaries of the domain. We underline that CVC programs are able to enhance CSR performance through the acquisition of unique and inimitable resources. In particular, previous studies have highlighted the role that VRIM resources have on a firm's performance, but not on how these are generated through CVC programs to enhance CSR performance (Kim et al., 2018; Wang & Sarkis, 2017; Nirino et al., 2020). Second, we contribute to corporate venture capital literature by evaluating the relationship with CSR performance (Benson & Ziedonis, 2009; Belderbors et al., 2018; Wadhwa et al., 2016). We argue that CVC is a specific form of open innovation which can impact a firm's

CSR strategies and suggest that firms that want to have better CSR outcomes may also consider including open innovation in their strategies. Third, we contribute to the CSR literature. From a financial point of view, studies have basically focused on understanding the benefits of CSR strategies on a firm's performance (Nirino et al., 2020; Kim et al., 2018; Wang & Sarkis, 2017). However, less prominence was given to the elements that can influence environmental and social outcomes. Hence, we argue that there are distinctive resources and skills acquired outside the company that are capable of having a positive effect on CSR.

Through our results, we also contribute from a managerial point of view. VRIN resources and knowledge acquired through CVC may be addressed by managers who understand how to manage them to enhance CSR performance. We also consider the establishment incentive mechanisms (e.g., incentives linked to sustainability objectives) linked to the achievement of the CSR objectives established ex-ante to speed up this process (Kim et al., 2012). Furthermore, since policymakers expect companies to implement CSR-related actions (e.g., reduction of pollution, better working conditions, and gender gap), they should consider giving incentives to help them to successfully develop CVC programs for new entrepreneurial activities, which can also have a positive effect on the CSR aspects addressed by the policymakers.

The paper is organized as follows. In the next section, the literature review and the development of the hypotheses are reported. Then, we report the methodology followed by the results obtained. Next, the results are discussed and the main contributions of the work are presented. The paper concludes with the limits of the research and future lines of research.

2. Literature review and hypotheses development

2.1. Resource based view and corporate venture capital

Resource based view (RBV) theory is the basis of numerous studies in the management and strategic management fields (Kraaijenbrink et al., 2010). The main concept underlying by RBV (Wernerfelt, 1984) is the heterogeneity of resources available to companies, which cause different performances over time (Barney 1991). These resources can be classified in three different types: physical, organizational, human and knowledge (Pereira & Bamel, 2021; Priem and Butler, 2001). In particular, among these resources, knowledge is recognized as one of the key elements in the process of performance and competitive advantage for companies. It is an integral part of that process that makes VRIN enterprise resources. Pioneer of the theories on knowledge within the firm is Grant (1996) who argues that knowledge is one of those elements within the firm that has unique characteristics: appropriateness, aggregation and transferability. As Grant (1996) defines, appropriateness is the firm's ability to obtain higher returns from the resources in its possession than its competitors. As far

as aggregation is concerned, it influences the efficiency of the transferability of knowledge within the subjects operating in the company, the transferability of knowledge is what definitively determines whether or not a company has a competitive advantage. The integration of these three key concepts within the RBV led Grant (1996) to develop the Knowledge Based View (KBV) as an integral part of the more general aforementioned theory.

Generally, RBV examines the relationship between the resources owned by companies and their performance (Branco & Rodrigues, 2006). In particular, valuable, rare, imperfectly imitable and non-substitutable (VRIN) resources allow companies to generate a competitive advantage, which allows superior performance to their competitors over time (Barney, 1991). However, it is necessary that the company not only owns these resources but that it is an organization that is capable of managing them properly. Thus, RBV aims to explain why companies in the same sector have divergent performances. In practice, the principles on which the RBV is based can be summarized in two postulates: a company's resources determine performance; and these resources must be VRIN (Barney, 1991). Moreover, there is another aspect to consider which is how these kinds of resources are managed. In fact, as pointed out by Bates and Flynn (1995), the strategic management of resources is a fundamental element for maintaining superior performance in the long term. For instance, if VRIN resources are given to two different companies, and one implements them properly and the other does not, the first gains the competitive advantage over the other.

However, a firm's ability to generate a sustainable competitive advantage has been criticized by the assumption that resources, skills and organizations are constantly changing, making the concept of "sustainable" over time not applicable to competitive advantage (Fiol, 1991, 2001). Nevertheless, Kraaijenbrink et al. (2010) stressed that the company is not a static entity but it is constantly evolving as it operates in a dynamic market context. Dynamism, which is found in the so-called dynamic capabilities, is the firm's ability to use its distinctive resources to change and adapt quickly to new situations in the competitive context (Santoro et al., 2020). Moreover, as suggested by Teece (2018), dynamic capabilities allow the firm to profit in the long term, which is an integral part of the concept of sustainable competitive advantage.

Hence, the ability of a company to generate a sustainable competitive advantage is possible only if it is able to "evolve" together with the context in which it operates (Battisti et al., 2019). To "evolve", companies must be able to innovate and acquire new skills and resources both internally and externally, in order to increase performance (Anning-Dorson, 2018; Ferraris et al., 2017). Hence, the firm's inability to innovate adequately puts its competitive advantage at risk. Innovation, based on RBV, allows companies to continuously create those processes and set strategic decisions that can guarantee the management of VRIN resources (Bates & Flynn, 1995).

The innovation management literature suggests that, in the current market scenario, companies can create a sustainable competitive advantage through an innovation process that exploits internal and external innovation (Ferraris et al., 2017). In fact, companies have two ways to innovate: closed and open innovation (Almirall & Casadesus-Masanell, 2010). In closed innovation, companies follow their own strategies to develop different research projects on certain technologies, relying on internal knowledge and skills obtained over the years (Battisti et al., 2019). Open innovation (OI) can be described as the result of two mechanisms acting simultaneously: inbound OI and outbound OI. The first identifies, selects and utilizes external ideas in business activities, while the outbound OI tries to create value with a firm's knowledge, transferring it outside its boundaries (Brunswick & Vanhaverbeke, 2015, Santoro et al., 2019). The objective of OI is to guarantee that, if VRIN resources are used properly, the company will gain a competitive advantage (Chesbrough et al., 2014).

In practice, to do OI, companies have two options: either to acquire an established company or to carry out corporate venture capital programs (CVC) (Da Gbadji et al., 2015). In general, venture capital (VC) allows entrepreneurs and start-ups to raise funding to develop their innovative ideas (Gompers, 1996). As underlined by Gompers and Lerner (2001), VC plays a key role in financing those firms that might have issues in raising capital from investors. These firms are usually at the beginning of their life cycle, not so well known and are generally small in size. These features increase the overall risks for potential investors, who require an adequate return on the capital invested (Alakent et al., 2020). However, the VCs act as institutional investors, financing companies with a very high potential return by acquiring shares that are liquidated in the medium to long term.

Following the venture capital perspective, companies have begun to apply the same principles in developing corporate venture capital (CVC) programs to expand technological development and firm knowledge through external investments following the OI paradigm (Anokhin et al., 2016; Da Gbadji et al., 2015). In particular, CVC consists of an established company investing in the capital of a young private company (Gomper & Lerner, 2001). These investments enable companies to have opportunities in developing new ideas and new technologies. In particular, they allow companies to expand their knowledge beyond their boundaries (Ferraris et al., 2017; Lee et al., 2018). Overall, through VC programs, firms are able to create and manage a unique set of resources, expecting the creation of an SCA (Li et al., 2021).

2.2. Corporate venture capital and corporate social responsibility

Over the years, literature has shown that CSR strategies can bring numerous benefits to a company. CSR deals with issues that go beyond the company's profit goal, including environmental protection, working conditions and stakeholder relations (Branco & Rodrigues, 2006). This has led CSR to be

characterized as multidisciplinary. From this point of view, scholars have tried to understand, first of all, the benefits that CSR can bring to corporate performance and value creation (Surroca et al., 2010; Nirino et al., 2019). From a financial point of view, aspects connected to the risk of the company and the impact on the cost of capital were also investigated (El Ghouli et al., 2011). Other researchers have investigated the strategic, managerial and the so-called green human resource management implications of corporate governance mechanisms that influence CSR (Kim et al., 2018; Renwick et al., 2013). Instead, others have focused on business models related to sustainability (Franceschelli et al., 2018).

In managerial terms, the CSR strategies can be separated into two main components: the governance that distinguishes them; and the outcomes that are generated by the investments made to achieve the objectives (Wang & Sarkis, 2017). Wang and Sarkis (2017) defined CSR governance as “*the control mechanisms that companies voluntarily adopt to integrate social and environmental concerns in their business operations. It also includes core strategies adopted by companies to interact with their stakeholders*”. The outcomes of CSR are divided into social and environmental outcomes (Nirino et al., 2019). For instance, the social outcomes focus on assessing employee rights, working conditions and gender equality; and environmental outcomes, for example, evaluate the supply chain and the impacts that business decisions have on the environment.

However, there are two cases in which a company pursues CSR strategies: the normative case and the business case (Branco & Rodrigues, 2006). In the first case, the company follows the pressures of the institutional context in which it operates, trying to be CSR-compliant in order not to face sanctions (e.g., a failure to reduce the pollution of production processes). Instead, in the second case, CSR strategies are pursued because the company believes that they have direct and indirect positive impacts on the company's performance. For example, Nirino et al. (2021) have shown how companies with fewer outbreaks of legal disputes and, therefore, with higher CSR outputs perform better than companies with higher disputes and lower CSR outputs. Furthermore, what would also seem to influence CSR within the company is the level of engagement that managers have with respect to issues such as environmental protection and workers' rights (Surroca & Tribó, 2008). This means that the personal characteristics of managers have a significant influence on CSR choices. From this point of view, Wang and Sarkis (2017) pointed out, however, that managers can implement CSR strategies only to increase their prestige at the expense of shareholder value.

From a theoretical point of view, CSR lays its foundations mainly on stakeholder theory (Carroll, 1979; Freeman, 1994) and on the resource based view (RBV) (Branco & Rodrigues, 2006). The stakeholder perspective is based on the assumption that the company has relationships with different economic actors, which have their own interests. This leads the company that wants to achieve its

objectives to respect the interests of its stakeholders. However, this leads to conflicts in maximizing shareholder value, which should be the company's only objective (Damodaran, 2015). Many scholars argue that the needs of the shareholders cannot be satisfied if the needs of the other stakeholders are left unsatisfied (Hawkins, 2009). As demonstrated, companies with high investments in CSR have a higher reputation among stakeholders and higher performance (Nguyen & Adomako, 2021; Stickel, 1992). Considering the case of listed companies, following the perspective of maximizing shareholder value and, thus, maximizing share price, a decline in reputation, due to ethical controversies, brings down the share price and increases negative expectations of the firm's future (Nirino et al., 2021).

On the other hand, RBV focuses on developing skills, knowledge and corporate culture, which can develop within the company, leading over time to a sustainable competitive advantage (Branco & Rodrigues, 2006; Vrontis et al., 2021). Those increase a firm's intangible assets, creating firm-specific resources that are inimitable, unique and not replaceable, thus enhancing a firm's performance (Barney, 1991). In fact, the development and management of intangible assets is a key factor in CSR and financial performance (Nirino et al., 2020, Surroca et al., 2010). Also, the increase in reputation, consumer confidence and the image that the company is able to transmit to the market is the basis of the benefits of CSR on performance (Bianchi et al., 2019).

However, if developing a competitive advantage is fundamental in increasing the performance of the company, it is also true that performance can influence investments in CSR (Surroca et al., 2010). In particular, Waddock and Graves (1997) stated that social performances are consequences and the cause of the company's performance. In fact, high performances increase investments in CSR, which in turn will increase performance, creating a *virtuous cycle*. In the *virtuous cycle*, a key role is played by the company's innovation process (Surroca et al., 2010). McWilliams and Siegel (2011) underlined that CSR concerns (e.g., reduction of pollution and the use of eco-sustainable materials) can only be addressed through the innovation of products and services.

Therefore, the success of CSR strategies can only be pursued by the management of innovation. In the current competitive context, innovation processes can be enhanced from an application of the principles of open innovation (Chesbrough, 2006; Santoro et al., 2018). Generally, OI's objectives are pursued through CVC programs within company strategies (Da Gbadji et al., 2015). Firm's corporate investments in CVC programs can bring benefits in terms of both CSR and innovation performance ((Bos-Brouwers, 2009; Li et al., 2021; Wadhwa et al., 2016). From an RBV point of view, the implementation of CVC programs, within the corporate strategy, is able to acquire new VRIMs that not only directly influence the financial performance of the company but also positively influence the CSR outcomes (Benson & Ziedonis, 2009).

Branco and Rodrigues (2006) had already highlighted a positive relationship between R&D and CSR. In fact, the innovation processes are able to create new VRINs that are capable, if correctly managed, of increasing the CSR outputs. For example, the development/purchase of a new patent, capable of creating a new innovative production process that reduces the company's emissions or water waste, has a positive impact on the environmental outputs of the CSR. Innovation can also have benefits for the social outputs of CSR. For example, broadband connections have allowed people to be able to work from wherever they want, leading to a higher quality of life for them, which translates into better CSR social performance for society. It is presumed that the innovation pursued through CVC programs, from an RBV point of view, is able to generate VRIN resources that positively influence the outputs of the strategic choices of CSR. Based on these considerations we lead to the following hypotheses:

HP1: Corporate venture capital programs positively impact firms' environmental outcomes

HP2: Corporate venture capital programs positively impact firms' social outcomes

3. Methodology

3.1. Sample, data gathering and research design

As suggested by Chesbrough (2003), CVC is mostly influenced by a firm's dimension and financial resources. With this consideration, we based our study on Fortune Global 500 firms (Da Gbadji, 2015). The rank includes the 500 largest worldwide companies in 2019, which reported revenues of US\$33 trillion and profits of US\$2.1 trillion, generating a workforce of 70 million people around the world. The data were collected for a period covering the years 2015 to 2019, developing panel data. In the panel data analysis, the data are collected for several years and for several individuals (time series and cross-section data). Hsiao and Pesaran (2008) indicated multiple advantages of applying panel data study over cross-sectional or time series studies:

- (i) It offers more accurate model parameters from an inferential point of view.
- (ii) It allows us to control the impact of omitted variables.
- (iii) It can minimize estimation biases.

There are four different approaches to panel data analysis:

- (i) Pooled analysis
- (ii) Random effect models
- (iii) Fixed effect models
- (iv) Dynamic panel models

The choice of which model is the most appropriate is fundamentally based on two assumptions: the objective of the analysis and the problems related to the assumptions of the error term (e_{it}) of the regression model. Choices and tests regarding the choice will be reported in the paragraph of the analysis of the results.

Regarding the sample, some previous studies on CVC based their analysis only on American companies (Basu et al., 2011), while Da Gbadji et al. (2015) extended the analysis to include all worldwide firms. However, CSR performance are also influenced by the political and economic contexts, so we have focused our attention on Western companies where climate and social concerns have more similar characteristics. Further, our data collection is based on different resources. First, ESG and accounting measures were collected from Thomson Reuters (Nirino et al., 2021). Information on corporate venture capital was obtained directly from Thomson Reuters after having thoroughly searched Google and the websites of each company. To have a homogeneous sample, we considered only the European- and American-listed companies reported in the Fortune ranking. This was done as the ranking includes unlisted companies, and ESG data is not available for this type of firms. Companies from other continents have not been included as the laws and directives regarding the environment and other aspects relating to CSR differ from those in force in Europe and America. The final sample consists of 100 firms.

3.2. Variables description

To assess the impact of CVC on firms' CSR, we used two different measures (Wang & Sarkis, 2017; Nirino et al, 2021). In the literature, it is generally possible to find different sources to evaluate a firm's CSR effort. Following previous studies methodology (e.g., Nirino et al., 2020, Nirino et al., 2021; Wang & Sarkis, 2017), we adopted the ESG measures developed by Thomson Reuters, in particular for the ability to promptly evaluate the actions implemented by the companies in terms of CSR effort.

To evaluate the impact of CVC on social outcomes, we used, as dependent variable, Thomson Reuters social pillar score. For the environmental outcomes, we considered Thomson Reuters environmental pillar score. Social score is composed by four main categories: community, human rights, product responsibility and workforce. Each of these categories includes multiple items that lead the score to have a minimum value of 0 to a maximum value of 100. The environmental score is made of three distinct categories: emissions, innovation and resource used. As with the social score, the environmental score also has categories with different items that bring the score evaluation from a minimum of 0 to a maximum of 100.

As independent variable, we used a dummy related to CVC. In particular, we defined a value equal to 1, if companies have CVC programs, and 0, if otherwise (Li et al., 2021; Da Gbadji et al., 2015). Many companies have different direct investment strategies that deal with CVC investments. The most emblematic case is Alphabet's Google Ventures, with more than 300 active investments worth US\$5 billion. However, not all companies have already decided to have a CVC strategy and do not follow open innovation practices.

We also included many control variables to avoid problems related to omitted variables (Smelser & Baltes, 2001). First, we controlled for governance mechanism related to CSR (Jo & Harjoto, 2011; Harjoto & Jo, 2011). In many studies, CSR measures are not split into outcomes and governance; however, as underlined by Nirino et al. (2019), not separating the various indicators leads to endogeneity problems and distorts the final results. Therefore, to avoid this issue, it is necessary to separate the governance, which influences the choices regarding investments in CSR, and the measures that evaluate the effectiveness of these strategies. Hence, the effects of governance on outcomes need to be controlled. Further, following previous studies, we controlled for several firms' characteristics. We controlled for a firm's liquidity level, of which the literature generally accepts that the current ratio can be considered a reliable measure (Li et al., 2012). Current ratio is determined as the ratio between the firm's current assets and current liabilities. Third, we controlled for firm performance, measured as return on asset (ROA) (Surroca et al., 2010). Indeed, firms with higher performance have shown to be more inclined to invest in CSR strategies. We also checked for firm size, measured as the natural logarithm of total asset (Nirino et al., 2020). Larger companies have more resources to invest in both CSR and CVC programs. We used the logarithmic scale to avoid high standard deviation given by the difference between smaller and larger companies. Further, we controlled for the ratio between external sources of financing and the company's equity (leverage ratio) (Surroca et al., 2010; Battisti et al., 2020). This relationship influences the attention that a company has for its shareholders and creditors, which ultimately affects the outcomes of the CSR. We checked for local conditions on innovation. If innovation is one of the key elements in improving CSR outcomes, then it is necessary to control how these aspects are encouraged by the legislators of each state. To do this, we considered the Global Innovation Index, which, on a scale from 0 to 100, evaluates the ability of a nation to allow companies to innovate during the year (Da Gbadji et al., 2015). In addition, we checked in which industry the company operates. In particular, following the approaches of previous studies (Santoro et al., 2020), we considered a dummy variable with a value of 1, if the company is a manufacturing, or 0, if it is a service company. Moreover, we controlled for the company's propensity for innovation (Da Gbadji et al., 2015; McWilliams & Siegel, 2011), which can influence the outcomes of CSR as well as the local context. Finally, to consider the local context,

we added three dummies variables to identify where the corporate headquarters are located. Specifically, we considered three identifiers: US, North Europe and South Europe (Da Gbadji et al., 2015). A summary of the variables is shown in Table 1.

See Table 1

4. Empirical analysis and results

4.1. Descriptive analysis

The descriptive statistics of our analysis are reported in Table 2. Our dependent variables have an average value of 77.27 (environmental score) and 77.89 (social score), with a standard deviation equal to 16.87 and 14.37. Regarding the independent variable (CVC), it has a mean value of 0.70 and standard deviation of 0.45.

In Table 3, we reported the correlation between variables. CVC is positively correlated with both environmental outcomes (0.337) and social outcomes (0.372). The other values obtained among the independent variables are not particularly high. However, to avoid multicollinearity problems in the regression model, we applied the variance inflation factors (VIF) test (Hair, 1995). Multicollinearity is present when there is a linear relationship between independent variables, which leads them to lose their independent characteristics. The mean value of VIF is 2.80, with none exceeding the threshold of 10, which is generally accepted in the literature (Van de Vrande, 2013).

See Tables 2 and 3

4.2. Results

To test our research hypotheses, we ran the generalized least squares random-effect model (Da Gbadji et al., 2015). Although fixed effect models are usually applied more than random models in social studies, studies based on random effects have seen a marked increase (Beck & Katz, 1995; O'Connell & McCoach, 2008). Moreover, as underlined in detail by Bell and Jones (2015), “*If the assumptions made by RE models are correct, RE would be the preferred choice because of its greater flexibility and generalizability*”. However, to understand which model was best for our data, we tested both by applying the Hausman test (Hausman, 1978). Our hypotheses were tested through the following regression models:

$$ENV_t = \beta_0 + \beta_1 CVC_t + \sum_i \beta_i Control + e_{it}$$

$$SOC_t = \beta_0 + \beta_1 CVC_t + \sum_i \beta_i Control + e_{it}$$

The results of the regression models are reported in Table 4. In both HPs, we suggested a positive impact of CVC on environmental and social outcomes. Both effects obtained from the regression models are positive ($b_1 = 6.855$; $b_2 = 9.434$) and significant ($p_1 < 0.05$; $p_2 < 0.004$). Therefore, our two hypotheses can be confirmed.

As regards the control variables, we achieved positive and significant results for governance ($b_1 = 0.076$, $p < 0.01$; $b_2 = 0.085$, $p < 0.01$), size ($b_1 = 12.17$, $p < 0.01$; $b_2 = 5.400$, $p < 0.01$), industry ($b_1 = 8.074$, $p < 0.05$; $b_2 = 4.277$, $p < 0.05$), and for the companies with headquarters in America ($b_1 = 5.542$, $p < 0.01$; $b_2 = 7.534$, $p < 0.1$). Furthermore, having the headquarters in northern Europe was positive and significant only in the model that considers environmental outcomes as a dependent variable ($b_1 = 7.548$, $p < 0.1$).

Regarding the goodness of fit of the models, Model 1 has R-squared equal to 0.427, adjusted R-squared of 0.392 and an F value of 12.22. Model 2 has R-squared equal to 0.375, adjusted R-squared 0.337 and F value of 9.84. From this point of view, the model presents a satisfactory level of detail.

See Table 4

5. Discussion and conclusions

In our study, we investigated the relationship between corporate venture capital investments and corporate social responsibility. In particular, we proposed CVC as a strategy to acquire VRIM resources that are capable of increasing the environmental and social performance outcomes of a company's strategic CSR decisions. Our hypotheses draw from RBV theory (Barney, 1991), extending the theoretical context suggesting that enterprises' CVC programs are able to create unique resources and knowledge within the enterprise that can improve the outputs of CSR strategies and at the same time, through this interaction, develop a sustainable competitive advantage. However, the literature has poor evidences on interconnection between CVC and the benefits gained by investing in companies to improve environmental and social impacts. We tried to fill this gap with our study. To verify our hypotheses, we tested data from the 100 biggest companies reported in the Fortune Global 500, from 2015 to 2019.

In particular, starting with a view to open innovation (Chesbrough, 2006), the benefits that investments in start-ups with high technological value can bring to the company are manifold. Through the RBV perspective, CVC investments may be able to develop a sustainable competitive advantage for the company. This is due to two main reasons: technological development and the acquisition of VRIN resources (Ferraris et al., 2017). For large companies to acquire resources and

develop new technologies to remain competitive, they can no longer rely on internal development, which is considered a slow process. Investments in CVC might eliminate this problem. Start-ups with high growth potential have the intellectual resources and ability to adapt faster than the big giants (Cusumano et al., 2019). The synergy of these two types of companies can only bring benefits for both one and the other. Small companies get the capital to develop their business, while the companies that invest in these firms incorporate knowledge and new resources, which the classic internal R&D systems make slow and steady (Cusumano et al., 2019).

Therefore, as underlined by Benson and Ziedonis (2009), CVC programs allow businesses to acquire resources and capabilities to improve business performance. However, in the current market scenario, companies are also considering other types of objectives linked to social and environmental aspects (Torugsa et al., 2013). In fact, the current economic context is characterized by an increasingly strong pressure on companies from both stakeholders and governments and institutions on issues related to sustainability and business. In particular, start-ups, given their nature, are able to satisfy these requests more easily than large corporations. From this point of view, the CVC programs would seem able to positively influence the outputs of the activities related to CSR, responding at the same time to the requests of stakeholders, including governments and institutions.

Specifically, our study has set itself the goal of finding out if the CVC programs were able to increase not only economic/financial performance but also environmental and social performance, and it looked for a link of effect from CVC and CSR. The basic assumption is that resources and capabilities, according to a theoretical approach linked to the RBV, are able to improve the latter. The RBV, in its classical theoretical construct, has always focused on the development of a company's competitive advantage, capable of improving economic/financial performance compared to competitors. With a new company's objectives, the RBV should focus also on the resources and capabilities that increase other types of performance. The company's ability to generate new resources and knowledge through CVC programs also has a significant impact on its CSR strategies. In fact, the acquisition of new companies can create new processes and new routines by improving employees' commitment. Furthermore, employees will be more motivated and linked to the company if they see that the company is concerned with issues that go beyond just earnings (Mirvis, 2012).

From this point of view, the results we obtained expand the dictates of RBV. In general, evidence shows that CVC programs are able to improve innovative processes and technologies in companies' hands (Belderbors et al., 2018). Going beyond, our results show that CVC programs are able to even improve environmental and social performance. Already, Bento et al. (2019) highlighted how venture capital is inclined to invest in and develop companies that deal with sustainability and safeguarding the planet. These firms need unique resources to differentiate them from competitors, leading to a

know-how process that is able to respond to the expectations of venture capital and customers. Our result goes further, suggesting that corporate venture capital programs, implemented by companies, are able to acquire resources and capabilities from acquired companies, as in the case of venture capital, to increase CSR performance. This implies that companies are investing in CVC to increase their CSR performance, because, based on RBV, they are and will be sources of a fundamental competitive advantage to compete in a market where both customers and investors are increasingly sensitive to environmental and social issues.

5.1 Theoretical contributions

Based on considerations reported in the previous paragraph, our study leads to several theoretical and managerial contributions.

First, we expand the boundaries of RBV theory, which is based on the assumption that the competitive advantage of the company is given by unique and inimitable resources. However, as underlined by Hegeman and Sørheim (2021) previous studies have focused on the VRIM resources the firm has, but not on how these are generated through CVC programs to enhance CSR performance. Our results found a cause and effect relationship between these two. The CSR literature generally suggests a positive impact of these strategic choices on performance (Kim et al., 2018; Wang & Sarkis, 2017; Nirino et al., 2020), i.e. a higher level of CSR corresponds to better performance, which is also the basic assumption of competitive advantage. With our study, we suggest that the resources obtained through CVC are able to create a competitive advantage expressed not by economic/financial performances but by environmental and social ones.

Second, we contribute to CVC open innovation literature. Previous studies have mainly focused on the role of the CVC as an open innovation tool to improve the technological performance of the company (Benson & Ziedonis, 2009; Belderbors et al., 2018; Wadhwa et al., 2016). Through our study, it was possible to identify a positive effect of CVC operations on the social and environmental aspects related to the company. According to inductive reasoning, this implies that the innovation, resources, new processes and know-how acquired through CVC programs are tools for achieving CSR objectives, whether these are imposed by legislation or pursued voluntarily by the company, as a strategic choice.

Third, we contribute to the CSR literature. In fact, the literature on CSR is extensive and debated from multiple points of view, and it is based on different theoretical constructs. In general, from a financial point of view, scholars have focused on understanding the benefits of CSR to business performance. Instead, less prominence was given to the elements that can influence the performance (outcomes) of CSR strategies, seen as an objective that is now parallel to the objective of creating

value. We believe that these objectives are not distinct but closely connected to and interdependent with each other. Through our study, we indicate how CVC programs manage to have a positive effect on CSR outcomes. The distinctive elements of CSR are clear (e.g., better working conditions, ethics and sustainability); however, in a dynamic context, the elements that can influence the success or failure of the CSR are to be highlighted more from a theoretical point of view, and in our research we highlight CVC as one of these.

5.2 Managerial implications

The results of our study allow us to develop applications also of a managerial nature. Businesses pursuing CSR goals may consider CVC programs as a tool to achieve those goals. VRIN resources and knowledge acquired through this process must be addressed by managers who must understand how to manage them to achieve the company's CSR objectives for a competitive advantage. However, managers must be careful not to steal resources from other areas, risking compromising the value-creation process. From this point of view, the company should be seen as a balanced system, capable of maximizing both the CSR objectives and the creation of value and remembering the interconnection (*virtuous cycle*) between these two, and that better CSR performances correspond generally to better economic/financial performance. The establishment of an incentive system that is also linked to CSR objectives, as well as to value, could help this process. However, this can represent a risk and a cost to society. For example, managers who do not believe in CSR risk implementing CSR strategies that they only communicate their commitment to implement, but they, then, do not materialize in reality. This is a critical aspect, which was also highlighted by Kim et al. (2012). Furthermore, since policymakers oblige companies to follow rules related to CSR (e.g., reduction of pollution, better working conditions and gender gap), giving incentives to implement CVC programs and to develop new entrepreneurial realities can also have an effect on the CSR aspects addressed by the policymakers. For instance, the plastic tax has an impact on all those companies that use plastics in their production processes, such as acquiring a company, through a CVC program, that allows the development of a new process to reduce plastic. That would have a double positive impact on the company's CSR performance by a reducing the tax owed and increasing performance.

5.3. Limitations and future research lines

Despite the results and contributions, our research has some limitations.

Our study does not indicate what resources CVC programs generate that can influence CSR performance. From this point of view, future studies must explore this aspect. Moreover, our analysis is based on European and American companies; however, the ranking we considered also has

companies from other parts of the world. Therefore, future studies may also consider to expand the research on emerging markets or carry out comparative analysis between the European countries and the US, because the amount of investments in the full risk capital of companies varies between context defined "market-based" and "bank-based". In fact, the different forms of governance can influence both Corporate Venture Capital and Corporate Social Responsibility strategies, and future studies could develop this issue. Specifically, future researchers could consider fastest-developing countries (Battisti et al., 2021) such as Middle East and North Africa (MENA), BRICS (Brazil, Russia, India, China, South Africa), MINT (Mexico, Indonesia, Nigeria and Turkey), CIVETS (Colombia, Indonesia, Vietnam, Egypt, Turkey and South Africa) and Next Eleven (Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, the Philippines, South Korea, Turkey, and Vietnam), in order to extend the debate on the Resource Based View (RBV) theory.

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Table 1: Variables' description

Variables		Definition	References
Dependent variable	ENV	Environmental score	Wang and Sarkis, 2017
Dependent variable	SOC	Social score	Wang and Sarkis, 2017
Independent Variable	CVC	Dummy variable. 1 if firm runs CVC programs, 0 otherwise.	Li et al., 2021
Control Variable	GOV	Governance score	Wang and Sarkis, 2017
Control Variable	Liq	Current ratio. Calculated as the ratio between current asset and current liabilities	Li et al., 2012
Control Variable	ROA	Return on Asset. Calculated as the ratio between firm's net income for the year and the company's assets	Surroca et al., 2010
Control Variable	Size	Natural logarithm of firm's total asset	Nirino et al., 2020
Control Variable	Lev	Ratio between financial debt and total equity	Surroca et al., 2010
Control Variable	GII	Global Innovation Index	Da Gbadji et al., 2015
Control Variable	Industry	Dummy variable. 1 manufacturing, 0 services	Santoro et al., 2020
Control Variable	R&D	Natural logarithm of R&D expenditure	Da Gbadji et al., 2015
Control Variable	US	1 if firm headquarter is located in USA, 0 otherwise	Da Gbadji et al., 2015
Control Variable	NorthEurope	1 if firm headquarter is located in North Europe, 0 otherwise	Da Gbadji et al., 2015
Control Variable	SouthEurope	1 if firm headquarter is located in North Europe, 0 otherwise	Da Gbadji et al., 2015

Table 2: Descriptive summary

Variable	Obs.	Mean	Std.Dev	min	max
ENV	423	77.27456	16.8793	0	98.24
SOC	423	77.8957	14.73092	26.65	97.87
CVC	455	.7054945	.4563219	0	1
GOV	423	71.00558	16.7154	20.41	97.77
Liq	324	1.211821	.5947667	.54	6.29
ROA	320	.0635625	.0580708	-.07	.33
Size	454	18.75414	2.0077	10.24	21.71
Lev	450	1.652956	2.99285	0	37.47
GII	455	59.00941	4.341122	46.3	68.4
Industry	455	.4065934	.4917384	0	1
R&D	227	14.19123	1.942191	7.77	17.4
US	455	5164835	.5002783	0	1
NorthEurope	455	.2967033	.4573074	0	1
SouthEurope	455	.1868132	.4573074	0	1

Table 3: Correlation matrix

	ENV	SOC	CVC	GOV	Liq	ROA	Size	Risk	GII	Indus try	R&D	US	North Europe	South Europe
ENV	1													
SOC	.528	1												
CVC	.337	.372	1											
GOV	-.164	.100	.004	1										
Liq	-.041	-.181	.010	-.109	1									
ROA	-.136	-.018	-.219	.165	.279	1								
Size	.338	.283	.187	-.050	.068	-.132	1							
Lev	-.187	.086	-.004	-.048	-.110	-.048	-.011	1						
GII	-.0297	-.107	-.166	.082	.082	.269	-.010	-.030	1					
Industry	.228	.093	-.188	.172	.172	.090	-.123	.015	.235	1				
R&D	.198	-.303	.100	.090	.253	.216	.460	.075	.149	-.077	1			
US	-.330	-.345	-.392	-.024	.247	.292	-.031	.067	.428	-.005	.147	1		
NorthEurope	-.2577	.198	.246	.192	-.170	-.124	.015	-.056	.137	.092	-.185	-.702	1	
SouthEurope	.111	.212	.207	-.211	-.111	-.230	.061	-.017	-.440	-.109	.038	-.437	-.333	1

Table 4: Econometric models

	Model1 (ENV)	Model2 (SOC)
CVC	6.855** (0.045)	9.434*** (0.004)
GOV	0.076*** (0.000)	0.085*** (0.000)
Liq	-1.233 (0.520)	-2.584 (0.146)
ROA	-2.646 (0.870)	14.250 (0.364)
Size	12.17*** (0.000)	5.400*** (0.007)
Lev	0.093 (0.685)	-0.131 (0.559)
GII	0.303 (0.532)	0.222 (0.628)
Industry	8.074** (0.042)	4.277** (0.045)
R&D	0.227 (0.810)	14.250 (0.364)
US	5.542** (0.032)	7.534* (0.098)
NorthEurope	7.548* (0.072)	5.359 (0.157)
SouthEurope	8.389 (0.204)	9.690 (0.110)
Years dummies	YES	YES
Observation	380	380
R_squared	0.427	0.375
Adjusted R	0.392	0.337
F test	12.22	9.84

Values in parentheses: * p<0.1, ** p<0.05, *** p<0.01