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## **B Corp certification and its impact on sustainable SMEs: a study on investment attraction and economic benefits**

Miguel Ángel Escribano Poza

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Research Dissertation

# **B Corp Certification and its Impact on Sustainable SMEs: A Study on Investment Attraction and Economic Benefits**

**Presented by : Miguel Ángel Escribano Poza**

**Date: 14/06/23**

**University advisor : Geoffroy Enjolras**

**M2 Advances in Finance & Accounting  
2022 - 2023**



Research Dissertation

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Attraction and Economic Benefit**



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## ABSTRACT

In the pursuit of enhancing their credibility with investors and facilitating access to new financial resources, sustainable small and medium enterprises (SMEs) often undertake the process of obtaining certifications from reputable third-party entities. One such organization of significance is B Lab, renowned for its provision of the B Corp certification, which is awarded to enterprises that successfully meet the organization's rigorous environmental and social standards. This master's dissertation studies the relationship between B Corp certification and the capacity of certified SMEs to attract new investments. To investigate the economic benefits of B Corp certification for SMEs and the role of social and environmental sustainability in driving economic interest, the study employs a complete theoretical framework, a literature assessment, and an intensive empirical analysis using the R program. The empirical models confirm that B Corp certification has a positive impact on the ability of certified SMEs to attract new investments, with higher funding levels and increased funding success, although the influence may vary across industry sectors, and additional factors beyond BIA ratings play a role in funding outcomes.

**KEYWORDS** : B Corp certification, Small and Medium Enterprises, Funding rounds, Empirical research, Corporate social responsibility CSR

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## INTRODUCTION

At a time when stakeholders are increasingly becoming environmentally conscious, from a small business perspective it makes sense to capitalise on that by demonstrating your commitment to solid social responsibilities that will result in measurable social and environmental impact. Growing social and environmental awareness has opened doors for creative, mixed entrepreneurial strategies that aim to significantly improve society while continuing to operate profitably (Doherty et al., 2014). To achieve sustainability, state and non-state market actors must be involved in governance, whether at the local, national, or international levels. In fact, scholars, policymakers, and business leaders have acknowledged that private governance and public-private governance are essential examples of "governance beyond government" for solving some of the most urgent social and ecological problems, including addressing climate change, eradicating poverty, and halting deforestation. Corporate social responsibility (CSR) activities, including as conduct codes, sustainability reporting, and the adoption of voluntary norms in the social and ecological sphere, can be considered in this context as an example of private governance. Voluntary CSR and sustainability standards involving governments, non-governmental organizations, and businesses have arisen as a potential form of public-private governance in efforts to cooperatively realize public values and corporate goals. The use of these public-private governance models has grown significantly in recent years, and public authorities and policymakers are increasingly acknowledging their value. Public-private governance as a result has been integrated into the range of policy settings (Marx, 2011).

Companies want to get financial and economic benefit from their CSR operations in addition to advancing social objectives. Firms must make sure their stakeholders can recognize and evaluate their "CSR quality," which is defined as a firm's CSR promises, actions, and performance, to maximize the return on their efforts. Firms encounter at least two problems here. First, because internal processes predominate, the relative observability of an organization's CSR quality is typically low (Johnston, 2005). Second, because the CSR idea is fundamentally controversial, businesses must create unique interpretations of the notion that consider their unique circumstances (Matten et al., 2008). The ability of stakeholders to evaluate various interpretations may be compromised by the coexistence of numerous firm-specific meanings attributed to CSR. Information asymmetries in firm-stakeholder relationships are a result of these issues. Firms seek sensegiving and sensemaking communication strategies using a variety of platforms and messaging to expose their genuine CSR quality to eliminate information asymmetries. However, research shows that the majority of stakeholders appear to believe that businesses do not speak about CSR honestly, and instances of corporate wrongdoing and symbolically implemented CSR have created questions about the credibility of businesses (Basu, 2008).



Thus, a major difficulty for businesses is effective CSR signalling. Voluntary sustainability standards serve as an example of private governance in the context of public objectives, and they provide a means for businesses to prove that their CSR efforts are credible. CSR standards in this context not only have a function in disciplining firm behavior, but also function as a signaling device. To reach the highest standards of environmental and social performance, companies often collaborate with third parties and apply for environmental certifications. Several approaches have emerged to help companies tackle this new shift and put social and environmental impact right next to financial return on the priority list. Amongst these initiatives, we can identify the Sustainable Development Goals of the United Nations, the ISO26000, the Global Reporting Initiatives, Conscious Capitalism and the B Corp certification. This latter one is a set of standards that has been developed by a non-profit, the B Lab, with the aim of helping companies with a certified measurement of social and environmental progress that could be openly marketed using the name (David et al., 2020). The group assesses an organization's social and environmental impact and awards the B Corp accreditation to those who successfully meet its requirements. To get the B Corp certification, companies must pass the B Impact Assessment (BIA), in which five areas are assessed: Governance, Workers, Community, Environment and Client. The rigorous audit procedure by B Lab adds credibility to the certification. To become accredited as B Corps, organizations voluntarily modify their fundamental operating procedure.

In 2019, Villela et al. (2019) defined the B Corp certification as “maybe the best available tool” to measure extra-financial performance. This suggestion is supported by the significant increase in popularity that the B Corp Movement has undergone in the past few years. Nonetheless, it appears that, within 3 years, one third of the certified companies decided to quit this Movement. This raises questions on the significance of the B Corp certification and on its future relevance. Indeed, there is a gap in the literature that fails to determine the reasons why the B Corp Movement is losing members while becoming increasingly important in the eyes of its stakeholders. The B Corp Movement has drawn a lot of interest in academia for this and many other reasons. The phenomena, its effects on a company's environmental performance, and its role in creating a more circular economy have been the subject of an increasing amount of academic research (Diez-Busto, Sanchez-Ruiz and Fernandez-Laviada, 2021).

A certification like B Corp could be a helpful tool from a financial standpoint for a company to stand out, recruit brilliant employees, gain exposure to investors, and attract new, socially conscious customers and clients. However, there is limited research investigating whether B Corp certification provides investors with greater confidence in environmentally and socially responsible companies. Therefore, this master's dissertation aims to explore the emergence of B Corp certification over the past decade. The primary focus of this research is to examine the potential impact of obtaining B Corp

certification on companies' ability to attract new investments. Furthermore, this study aims to investigate whether this relationship is contingent upon the extent of social and environmental impact improvements achieved by the certified companies over time. Additionally, the dissertation aims to study the possible benefits of firms aligning with recognized standards, such as B Corp, in enhancing their likelihood of securing funding rounds. Lastly, we investigate the potential positive effect of B Corp certification on Small and Medium Enterprises.

# LITERATURE REVIEW

## I. CORPORATE SOCIAL RESPONSIBILITY

The concept of corporate social responsibility (CSR), which refers to firms having a duty to society and a wider range of stakeholders than just their shareholders, became popular in the 1960s. Since then, CSR has received more attention from academic and professional circles worldwide (Wang et al,2016). Bowen (1953) defines the social responsibilities of business at that time as “the obligations of businessmen to pursue those policies, to make those decisions or follow those lines of action which are desirable in terms of the objectives and values of society.” He did not simply talk about decisions made within the company; he focused on the decisions made by these managers and their responsibilities to society. In contrast, modern CSR places more emphasis on institutional and corporate policies than the managerial decision-making of specific individuals. Economic, legal, ethical, and charitable responsibilities are the four categories Carroll (1979) defines for business's social obligations. Even though this categorization has faced criticism in recent years, many people still use it today (Enderle, 2010).

Carroll explains the justification for corporate social responsibility in his book, saying that "after considering the pros and cons of CSR, most businesses today embrace the concept, but insist on linking discretionary aspects of corporate citizenship with business objectives and strategy" (Carroll, 2009, p. 21). Therefore, executives keep insisting that there needs to be a "business case" for CSR.

Firms with better CSR performance face lower capital constraints, which are market frictions that may prevent a firm from funding all desired investments (Cheng et al, 2014). There are various causes for this. First, higher CSR performance is associated with increased stakeholder engagement, which lowers the probability of short-term opportunistic behavior (Eccles et al., 2012; Benabou and Tirole, 2010), hence lowering overall contracting costs (Jones, 1995). Second, firms with better CSR performance are more likely to disclose their CSR activities to the market (Dhaliwal et al., 2011) to signal their long-term focus and differentiate themselves (Spence, 1973; Benabou and Tirole, 2010).

Numerous theoretical and empirical studies have examined the relationship between CSR and financial performance. Neoclassical economics-based studies stated that CSR unnecessarily increases a corporation's costs, placing the firm at a competitive disadvantage with its rivals. (Friedman, 1970; Aupperle, Carroll, and Hatfield, 1985; McWilliams and Siegel, 1997; Jensen, 2002). Predominantly based on agency theory, some studies have argued that employing valuable firm resources to engage in CSR results in significant managerial benefits rather than financial benefits to the firm's shareholders (Brammer and Millington, 2008). However, other academics contend that CSR can benefit society by

improving access to important resources (Waddock and Graves, 1997), attracting and retaining higher quality employees (Turban and Greening, 1997), enabling improved marketing of goods and services (Moskowitz, 1972), creating unforeseen opportunities (Fombrun, Gardberg, and Barnett, 2000), and helping to establish social legitimacy (Hawn, Chatterji, and Mitchell, 2011). Additionally, CSR may work similarly to advertising, boosting demand for goods and services while lowering price sensitivity among consumers (Dorfman and Steiner, 1954; Sen and Bhattacharya, 2001), and even enabling firms to develop intangible assets (Gardberg and Fombrun, 2006; Waddock and Graves, 1997). From a stakeholder theory point of view (Freeman, 1984; Freeman, Harrison, and Wicks, 2007; Freeman et al., 2010), which suggests that CSR includes managing multiple stakeholder ties concurrently, scholars have argued that CSR can mitigate the likelihood of negative regulatory, legislative, or fiscal action (Freeman, 1984; Berman et al., 1999; Hillman and Keim, 2001), attract socially conscious consumers (Hillman and Keim, 2001), or attract financial resources from socially responsible investors (Kapstein, 2001). By selecting a sample of worldwide non-financial listed firms, Martnez-Ferrero and Frias-Aceituno (2015) investigated the association between CSR and firm performance as well as the direction of causality. Their findings supported the presence of a beneficial and reciprocal relationship between CSR and financial performance.

Advocates of Freeman's school contend that as business exist in society, they are social institutions and should give back to the community (Bello et al., 2016). For an enterprise to be sustainable, it must meet the needs of its major stakeholders (Supriti Mishra & Suar, 2010). According to Baric (2017), the success of the business in its goal of differentiating itself from competitors and building sustained competitive advantage depends heavily on the quality of the relationship between the firm and its stakeholders.

The relationship between CSR and the success of commercial organizations has been examined in several studies. The relationship between these two, however, has emerged as the most contentious topic in the literature on CSR due to conflicting prior findings (Fassin et al., 2015). Concerning the connection between CSR and business performance, no agreement has been established. According to research, there is either no association at all (Hao et al., 2011; Liping et al., 2016), positive correlation (Oeyono et al., 2011), negative correlation (W. Yang et al., 2016), or no correlation at all (Oeyono et al., 2011). Among others, Galant and Cadez (2017) acknowledged that measurement difficulties with regard to both of the categories of interest are to blame for the results' inconsistent nature. Research examining the relationship between CSR and firm success will be required as long as the conclusion on the link remains debatable in theory and practice.

Recent research focuses on how capital markets function as an intermediary mechanism for CSR to generate long-term benefit. Lee and Faff (2009), for instance, demonstrate that companies with

high CSR ratings have lower idiosyncratic risk, whereas Goss (2009) demonstrates that companies with low CSR scores are more likely to encounter financial distress. Furthermore, Goss and Roberts (2011) discover that companies with the lowest CSR ratings pay seven to 18 basis points more on their bank loans than companies with higher scores, but Ioannou and Serafeim (2013) demonstrate a beneficial impact of CSR on sell-side analysts' recommendations. Similarly, Dhaliwal et al. (2011) discover that the firm's cost of capital decreases because of the voluntary disclosure of CSR operations, which also draws focused institutional investors and analyst coverage. El Ghoul et al. (2011) examines a sample of American businesses and discover that those with higher CSR ratings have lower equity capital costs.

To improve performance and gain a competitive advantage, businesses make beneficial investments. However, the unique capital restrictions that each organization must deal with directly affect the capacity to finance such strategic expenditures. The investment function, which is derived from the firm's profit-maximizing optimization, postulates that investment is dependent on capital's marginal productivity, interest rates, and tax laws (Mankiw, 2009). As Stein (2003: 125) notes, according to this paradigm 'nothing else should matter: not the firm's mix of debt and equity financing, nor its reserves of cash and securities, nor financial market 'conditions,' however defined.' However, later research on the equity and debt markets demonstrates that cash flow is also crucial in determining the firm's degree of investment. The ability of a firm to grow over time is significantly and adversely affected by financial constrained firms' tendency to reduce investments in a variety of strategic activities, such as investments in inventory and R&D activities, pricing for market share, and labor hoarding during recessions. Understanding that capital-constrained organizations are compelled to forgo investments they would otherwise make is crucial for understanding firm survival and success. In other words, they are profitable investment opportunities that are not being pursued because of finance issues. Therefore, it follows that, all things being equal, the easing of capital restrictions for such enterprises would allow them to make more profitable investments and perform better. For instance, Faulkender and Petersen (2012) found that the American Jobs Creation Act (AJCA) of 2004 did, in fact, cause significant increases in investment, but only among the subgroup of enterprises that were capital restricted. They used the AJCA as a temporary shock to the cost of internal financing.

The impact of capital limitations on a firm's decisions to enter and leave markets or industries has been examined in a second group of studies. Holtz-Eakin et al., (1994a) found that the quantity of an individual's inheritance—considered an exogenous shock to one's wealth—had a significant beneficial effect on the likelihood of becoming an entrepreneur. They did this using personal tax return data on entrepreneurs. A follow-up study demonstrates that businesses created by entrepreneurs with greater inheritances (therefore, less capital limitations) are likewise more likely to endure (Holtz-Eakin et al.,

1994b). By comparing the post-entry growth trajectory of newly established firms and firm-level data from 16 economies, Aghion, Fally, and Scarpetta (2007) describe a comparable mechanism.

For a thorough overview of this third stream of research, see Levine (2005). It contends that capital limitations have a disproportionately greater negative impact on smaller, more recent, and riskier businesses, directing resources to those with the highest marginal returns. As a result, industrial expansion is more rapid in nations with better finance systems that can relax these restrictions. Given the idiosyncratic levels of constraints faced by companies of various sizes, scholars turned to capital constraints as an explanation for why small companies pay lower dividends, become more highly leveraged, and grow more slowly. For instance, Carpenter and Petersen (2002) demonstrate that small U.S. enterprises' internal capital limits their ability to develop their assets, and that firms that can raise additional external money experience better growth rates. Using a sample of Indian businesses, Becchetti and Trovato (2002) discovered qualitatively comparable findings, while Desai, Foley, and Forbes (2008) confirmed the relationship in the context of a currency crisis. Finally, Beck et al. (2005) demonstrate that firm performance is susceptible to different financial restraints and that small businesses are disproportionately impacted owing to stricter restrictions by analyzing survey data from international corporations. In conclusion, research to date has shown that finding ways to loosen capital restrictions is essential for business survival and growth, industry expansion, and even national development.

Hennessy and Whited (2007: 1705) assert that "a CFO can neither create nor destroy value through his financing decisions in a world without frictions" based on neoclassical economic assumptions that postulate a flat supply curve for funds in the capital market at the level of the risk-adjusted real interest rate. At levels of capital that exceed the firm's net worth, however, the supply curve for funds is upward sloping rather than horizontal due to market imperfections like informational asymmetries (Greenwald, Stiglitz, and Weiss, 1984; Myers and Majluf, 1984) and agency costs (Bernanke and Gertler, 1989, 1990). In other words, capital providers are reimbursed for their information (and/or monitoring) costs by charging a higher interest rate when the likelihood of agency costs is high and the amount of capital the company needs for investments exceeds its net worth (and is, therefore, uncollateralized).

Therefore, the supply curve for funds is successfully made less steep by adopting and putting into practice company methods that lessen informational asymmetries or the likelihood of agency costs. By enabling the firm to make significant investments that would not have been profitable otherwise and/or by influencing the capital structure decisions of the firm, improved access to funds reduces the idiosyncratic capital constraints the firm is facing, favorably affecting its strategic objectives (Hennessy and Whited, 2007).

It is argued that the adoption and implementation of CSR strategies that lead to superior CSR performance result in lower idiosyncratic capital constraints for the firm because of two complementary mechanisms (Cheng et al., 2014). First, a company's commitment to and involvement with stakeholders based on trust and cooperation are captured by exceptional CSR performance (Andriof and Waddock, 2002; Jones, 1995). Therefore, according to Jones (1995:420), "firms that contract with their stakeholders on the basis of mutual trust and cooperation will experience reduced agency costs, transaction costs, and costs associated with team production because ethical solutions to commitment problems are more efficient than mechanisms designed to curb opportunism." According to Jones (1995: 422), these agency and transaction expenses would include "monitoring costs, bonding costs, search costs, warranty costs, and residual losses." Additionally, better engagement with stakeholders can increase a company's revenue or profit generation, which helps to maintain superior profitability, through higher quality relationships with clients, business partners, and coworkers. This, in turn, enhances customer interaction and new product development. In other words, superior stakeholder engagement may directly limit the likelihood of short-term opportunistic behavior (Benabou and Tirole, 2010) and it also represents a more efficient form of contracting with key stakeholders (Jones, 1995) that could lead to enhanced revenue or profit generation which, in turn, is rewarded by the markets.

Second, previous research has demonstrated that companies with superior CSR performance are more likely to publicly disclose their CSR strategies by issuing sustainability reports (Dhaliwal et al., 2011) and are more likely to provide third-party assurance of such reports, increasing the credibility of such reports (Simnett et al., 2009). As a result, CSR reporting: (1) promotes openness with regard to organizations' social and environmental impacts and their governance structure; and (2) may trigger changes in internal control systems that further enhance regulatory compliance and reporting accuracy. As a result, the knowledge asymmetry is further reduced and there are fewer capital constraints because more reliable information about the company's CSR plans is now available in addition to its financial disclosures (Hubbard, 1998). Moreover, the resulting changes in internal managerial practices (Ioannou and Serafeim, 2011) may also reduce the likelihood of agency costs in the form of short-termism.

In brief, it is said that companies that excel in corporate social responsibility (CSR) are less likely to encounter individual capital restrictions. This is due to two reasons: firstly, they benefit from reduced agency expenses and an increase in revenue and profits because of effective engagement with stakeholders. Secondly, they experience a reduction in information asymmetry due to the implementation of more extensive and credible CSR disclosure practices, leading to greater transparency.

Cheng et al. (2014) provided evidence that firms with better CSR performance face lower capital constraints. They argued that this negative relation between CSR performance and capital constraints materializes via two distinct mechanisms. First, better CSR performance is associated with superior stakeholder engagement that, in turn, significantly reduces the likelihood of opportunistic behavior and introduces a more efficient form of contracting with key constituents. In other words, by encouraging managers to adopt a long-term rather than a short-term focus, stakeholder engagement based on mutual trust and cooperation decreases possible agency costs. Additionally, greater stakeholder engagement improves the company's ability to generate revenue or profits through fostering better relationships with clients, partners, and staff. Second, companies that perform better in CSR are more likely to publicly disclose their CSR efforts, which leads to increased accountability and transparency (Dhaliwal et al., 2011). Greater transparency lessens informational imbalances between the company and investors, hence reducing perceived risk. Cheng, Ioannou and Serafeim (2014) demonstrate that firms with better CSR performance face a capital supply curve that is actually less steep, contrary to the literature's contention that market frictions like informational asymmetries and agency costs are the primary causes of firms' upward sloping supply curves in the capital markets. These findings have ramifications for the ongoing discussion about whether CSR programs result in value creation and, more importantly, how they do so. They showed that companies with stronger CSR records are better positioned to access capital markets financing. The ability of businesses to make successful strategic investments that they otherwise would not is positively impacted by the relaxation of capital restraints, and stock market performance is likewise positively impacted. This capital allocation process is significantly impacted by CSR since market players are more inclined to allocate limited capital resources to companies that perform well in this area. Additionally, they demonstrated that both the social and the environmental aspects of CSR activities minimize capital restrictions at a more fine-grained level by breaking down the CSR performance into its constituent parts.

## II. CSR LABELS AND CERTIFICATIONS

Differentiation by CSR attributes might increase consumer welfare, but it also creates an asymmetric-information problem. Labeling can be used to signal CSR to consumers and to address this market failure. Most CSR labels are provided to businesses following a certification process completed by an impartial organization (a private or public third party), assuring that the production process fulfills a specific standard of quality. However, many businesses decide to make CSR claims in marketing campaigns and on product packaging even though they are not accredited. This practice is often seen as one element of a more general brand-building strategy aimed at generating consumer awareness and loyalty (Hoeffler and Lane Keller, 2002; Blumenthal and Bergstrom, 2003) These CSR claims could be entirely or partially unsupported, and they could correspond to superficial or



nonexistent CSR engagements; they are therefore unreliable quality indicators. Their widespread use has allegedly increased consumer skepticism of CSR programs, particularly when those projects are thought to lack values that prioritize helping others (Bronn and Vrioni, 2001; Ellen et al., 2006). However, according to economic theory, the interaction of business owners' social preferences, media, non-governmental organization (NGO) or state oversight, and reputation may be enough to encourage organizations to self-regulate (i.e., not deceive customers about their CSR commitments; McCluskey, 2000; Baron, 2001, 2007; Baksi and Bose, 2007). Brands play the same signalling role as certified labels.

The popularity of third-party certifications has grown as the field of management system standards (MSS) has matured (Heras-Saizarbitoria and Boiral, 2013). The definition of management system standards in the literature, also known as meta-standards, is "voluntary codes, guidelines, or processes used by organizations to formalize, systematize, and legitimize a very diverse set of managerial activities or tasks" (Boiral and Heras-Saizarbitoria, 2015, p. 390). According to these authors, "standardization constitutes a mechanism of coordination and an instrument of regulation comparable with other instruments, such as public regulations, markets, hierarchies, or formal organizations". They claimed that "standards are important for the promotion of economic efficiency, as they provide a basis for reducing information-related transaction costs."

The management system standards issued by the International Organization for Standardization (ISO) are the most famous. With members from 164 nations and a portfolio of over 22,000 standards, guidelines, and certificates on topics like health and safety, services, transportation, climate change, and sustainable development, ISO is an international standard-setting organisation (ISO, 2023).

The MSS itself, in general, "do not denote compliance with an objective or result," but rather provide "guidelines to systematize and formalize a series of company processes into procedures and to document this implementation" (Boiral & Heras-Saizarbitoria, 2015, p. 390). In accordance with MSS, adherence to ISO, Fairtrade, Forestry Standards Council (FSC), and B Corp standards is all evaluated and confirmed by third-party accreditors to testify to such standards' conformance.

Several ideas have been put out in respect to many of the various ISO standards, even though the literature does not provide consensus regarding the reasons for the general application of MSS and related certifications. According to Bansal and Roth (2000), who concentrate on the ISO 14001 environmental management standard, three main factors—ethical, competitive, and relational—drive businesses to adopt this standard. Environmental responsibility is a component of ethical motivation, pursuing competitive advantage is the driving force behind competitive motivation, and improving stakeholder relations is the driving force behind relational motivation.

Furthering his investigation of ISO 9000, Boiral (2012) uses the degree-purchasing syndrome in education to frame the preparation for and acquisition of the ISO certification. "ISO management standards and certifications audits are ultimately what organizations want them to be," he claims (2012, p. 652). "They can be tools for the improvement of practices or just organizational degrees useful for marketing purposes, or both." Standard-setting has developed into a rapidly expanding sector of its own because of increased interest in the veracity of policies and activities (EcoLabel Index, 2022).

As was previously mentioned, there are many reasons why socially conscious companies would want to operationalize and truly integrate social responsibility into every aspect of their enterprises. Due to this, there are now many standards and a complex landscape of guidelines for CSR implementation that can be found in codes of conduct, principles, auditable standards, or reporting frameworks (EcoLabel Index, 2022). Companies are resorting to certificates as an unbiased sign of the validity of their CSR since they are being pressed more and more to show that their actions and policies adhere to various social and ethical standards set forth by third parties (Heras-Saizarbitoria & Boiral, 2013). So much so that according to research conducted in 2013 by the Organisation for Economic Cooperation and Development (OECD), the quantity of environmental labeling and information schemes more than quintupled between 1988 and 2009 (Gruère, 2013). Although that trend peaked in 2021, there are still over 455 eco-labels in 199 countries, according to a global database of eco-labels (EcoLabel Index, 2022).

The proliferation of ethical branding, self-regulation, and third-party certification rests on the assumption that consumers believe they are an effective means of product differentiation. The importance of certification is championed, and it is expected that customers can rely on it to give them fair information about how products are sourced, produced, and/or distributed to final consumers. The company can assert legitimacy, authenticity, and "truth" in adhering to recognised best practices to a greater extent the more widely accepted and recognized the label or standard is (Heras-Saizarbitoria & Boiral, 2013).

The ability of businesses to "measure, track, and optimize their sustainability impact" is restricted by internal processes, which makes it challenging to assess the validity of CSR programs (Wang et al., 2016, p. 535). These assertions, which can be correct, misleading, or erroneous, are frequently not supported by evidence. As a result, it is not surprising that researchers have discovered that sometimes consumers find it difficult to distinguish between a company's objectives and its behavior.

Over time, 'greenwashing' has become the critical term for the false representation of corporate actions. Greenwashing originally referred to misrepresentations of environmental effects, but many

researchers have extended a broader meaning to greenwashing to also include misrepresentations of social and economic concern (Lyon & Maxwell, 2011; Seele & Gatti, 2015). According to Seele and Gatti (2015, p. 3), "a green message must combine with a falsity (information-related element) and an accusation of being misleading (external-distortion element)" to be deemed "greenwashing". Most academics concur that organizations are under pressure to spread messages of social and environmental responsibility to project credibility and authenticity, which heightens the temptation to make exaggerated claims in order to compete in the market (Hrasky, 2012; Testa et al., 2018).

Companies have sought differentiation through third-party CSR labeling and certification to counteract the distrust that greenwashing has generated (Chipperfield, 2013; Testa et al., 2018). In the past, certifications at the product level have dominated the market. When it comes to third-party certification, businesses nowadays have a wide range of options. In terms of their scope, concentration, reputation, and price, certifications differ. As a result, there don't seem to be any literature reviews or synthesis of study findings that concentrate on the depth and breadth of CSR certifications. This has led to a widely fragmented body of research on certifications.

#### *A. B Corp Certification : Motivations and Adoption*

The number of certifications has dramatically increased for product attribute certifications over the past thirty years (Delmas & Gergaud, 2021). A certified B Corp represents adopting a collective identity like that of Fairtrade certification for coffee and LEED certification for green buildings for the entire organization, in contrast to and consistent with the more recent trend, where B Corp certification is applicable to the entire organization rather than at the product or process level. Many certified businesses will then include the B Corporation symbol on their products, brands, corporate reports, and websites as a public testament to their commitment to broad stakeholder values, like other well-known certifications like those just mentioned and the Forest Stewardship Council.

As certified B Corps continue to gain global adoption, scholarly research interest is increasing (Gehman, et al., 2019; Diez-Busto, 2021). Role modeling this possibility is crucial because early adopters saw certification as a potent tool for societal change (Stubbs, 2015). Hickman et al. (2014) investigated what influences businesses' mission alignment and orientation toward sustainability through B Corp certification. They conclude that pursuing B Corp certification is a sign of sustainable company operations and CSR dedication.

Several academics looked more closely at the B Corp certification process to investigate the impact of outside factors. According to Kim and Schifeling (2016), companies have been "forced" to pursue B Corp certification as a reaction to more traditional companies stepping up their efforts to be perceived as "green" and to "help consumers sort through the marketing hype to find businesses and products

that are truly socially and environmentally responsible", as a signal of authenticity (p. 32). Additionally, they contend that businesses selected B Corp accreditation as a capitalistic critique to "join the movement of creating a new economy with a new set of rules" (p. 49), rather than solely because of the leader's inclination. In line with this discovery, Kim et al. (2016) discovered that the number of new B Corp entry into a given industry was positively correlated with the presence of larger CSR activities in that industry.

Gehman and Grimes (2017) aimed to comprehend why businesses pursued certification while passing up possibilities to market membership. According to Gehman and Grimes' research with 49 companies, (a) alignment with a company's mission, purpose, values, or identity (b) validating and legitimizing a company's commitment to sustainability (c) innovation and practice improvement (d) membership as a community—are the main drivers of B Corp membership. According to their research, pursuing B Corp accreditation was most frequently motivated by congruence with the organization's mission, purpose, values, or identity (p. 2311). They speculate that the reason why their businesses sought B Corp membership was for "identity enactment and validation" (p. 2311).

A special edition of the *Journal of Business Venturing*, edited by Moroz et al. (2018), had six articles about B Corp certification and official Social Purpose Company designations. Incorporating imprinting theory into entrepreneurship According to Moroz et al. (2018), Certified B Corps are a powerful example of social entrepreneurship. According to their argument, the B Corp certification "offers an explicitly temporal perspective, punctuated by distinct and potentially impactful experiential events, that reveal the prosocial motivations, opportunity processes, and actions entailed in entrepreneurship" (p. 119).

Four other pieces that specifically addressed certified B Corps were published in this special issue. Using the B Corp certification as an example, Grimes et al. (2018) expanded on their earlier research to examine the influence of identity on early acceptance of certifications. Women-owned firms were discovered to have a twofold increase in certification eligibility and a threefold increase in certification retention rates (p. 130). They contend that early adoption of certifications, especially those lacking in legitimacy or gaining it, is "not driven by efforts to gain social approval, but efforts to authenticate values that the owners perceive as contextually distinctive" (p. 148). They contend that these distinctive features do not simply relate to identity or gender but go beyond to role identities and social identities; a sense of affirming one's authenticity.

A few more articles that are specific to B Corps have been published since the release of the special issue. According to Parker et al. (2019), pursuing third-party B Corp certification entails trade-offs because it typically results in a 20–61% short-term income deceleration compared to companies that

have not yet obtained certification. Given the tiny size of the majority of certified B Corporations, they claim that the internal resources diverted to comply with certification take limited attention away from topline revenue development. Furthermore, they claim that compared to their older and larger certified B Corp competitors, the smallest and young certified B Corps (those with fewer than 10 employees and under 10 years of age) face this slowdown more severely.

According to Gehman et al. (2019), organizations seek for and promote sustainability certifications for reasons other than financial ones in response to Parker et al.'s findings. They further contend that the growth penalty experienced by newly certified firms may be because many stakeholders do not yet value or understand what it means to be a recognized B Corp. In addition, they question whether metrics should be developed to attest to societal well-being and social impact. They conclude by arguing that founders' motivations for pursuing B Corp certification may differ and that conventional measures of organizational performance may not be appropriate for businesses choosing to pursue sustainability certifications.

Building on the conclusions of Parker et al. (2019), Pollack et al. (2021) recently conducted research to further investigate the degree to which obtaining B Corp certification has a detrimental impact on the financial performance of the smallest and youngest B Corps. They looked at the connection between prosocial motivation, or the desire to act in ways that benefit others, and entrepreneurial orientation (EO), which was defined as a behavioral characteristic of a venture typically composed of three or more coexisting strategic concepts of innovation, risk-taking, and proactivity. In contrast to Parker et al.'s (2019) proposed growth penalty, they found that pursuing B Corp certification did not lead EO to decrease; rather, they found that those businesses pursuing B Corp certification had lower EO at the beginning and that this lasted through time. While EO remained constant, they found that prosocial motivation was positively related to EO and that companies with higher levels of prosocial motivation saw increased EO over time.

Finally, in order to investigate the effects of B Corp certification on both financial and nonfinancial goals, Patel and Dahlin (2022) undertook quantitative research on a sample of 355 B Corps and 623 non-B Corp enterprises. They discovered that while B Corp accreditation increases sales in the short term, it has little effect on financial stability over the following three to five years. They contend that the B Corp accreditation didn't lead to either economic growth or financial stability. They contend that their findings need investigating a wider variety of reasons for pursuing B Corp certification, and they speculate that stewardship or benevolence may present an interesting area of study for the future.

Independently by deciding to apply for the certification or not, the BIA is a free tool that can be used by any company for improving their social and environmental performance. Understanding what

they were doing well and what they could do better has proven to be incredibly illuminating for many companies (Honeyman and Jana, 2019). In this regard, there has been a significant rise in the number of businesses that express interest and dedication in becoming B Corps throughout time. This pattern demonstrates how society is becoming more interested in hybrid business models, where firms combine social, environmental, and economic objectives. Villela et al. (2019) investigated the various factors that impact a company's decision to become part of the B Corp community. They discovered that a strong dedication to social and ethical business practices is the main motivation behind this choice. This is particularly evident among companies that were initially established as social enterprises, as they perceive a significant alignment between their values and principles and those of the B Corp movement. Additionally, there are those who are inspired by the prospect of helping to establish a B Corp movement in their home nations and promoting superior business practices. According to certain research, entrepreneurs and founders who want to achieve social objectives view the B Corp Certification as an important tool for establishing their credibility and reputation (Gamble et al., 2020). The certification is the beginning of a challenging path where entrepreneurs can evaluate themselves, compete with other community members on their effect, and learn how to further integrate their business's social, environmental, and financial activities. In addition, according to their website, B Lab audits ten percent of all B Corps every year to make sure the firms are following their promise. Organizations may better explain who they are, what they believe in, and how they and their product stand out from the competition thanks to this arduous path. This context contributes to reinforcing trust with partners and stakeholders, and it simplifies access to investors who share the same concern about social and environmental impact.

According to Honeyman & Jana (2019), many businesses recognize the value of establishing connections with a community of leaders who share their desire to use business to improve the world. Entrepreneurs who become a part of the B Corp movement are enthusiastic about the connections they make with their peers and the new relationships they form within this community. Companies may benefit from using this certification to attract new customers and clients. Many people still find it difficult to accept the companies' goals for and level of commitment to their social responsibility initiatives (Ferreti, 2020).

B Corps helps firms to attract talent. Studies have indicated that young people are not only interested in achieving a work-life balance, which refers to having enough time and energy to enjoy their personal lives outside of work. They also aim for work-life integration, which means pursuing something they feel passionate about and fulfilling both their financial and higher purpose needs. If a company become a B Corporation, it can attract, retain, and motivate employees through the

company's higher purpose and the B Corp community's collective aim to redefine business success worldwide.

In fact, obtaining B Corp certification can help recruit the most qualified MBA students. Due to student demand, some prestigious business schools, such as Columbia, New York University, and Yale, now forgive the student loans of their MBA graduates who work for Certified B Corporations. According to the Wall Street Journal, "more companies are using the B Corp logo, an independent seal of environmental and social credentials, to lure young job seekers who desire an employer committed to both a social mission and profitability."

Using the B Impact Assessment framework can serve as a valuable tool for engaging your team and establishing a strong, purpose-driven company culture. New generations of employees have a stronger desire than ever to align personal and corporate values. People are not only searching for financial reward, but also for positions that fulfil their passions and their need to contribute for a higher purpose. A successful example of this approach was demonstrated at Etsy. After earning the required 80 points to obtain B Corp certification, Chad Dickerson, Etsy's CEO, felt a sense of pride in the accomplishment. However, he also recognized that it was just the beginning of the company's ongoing efforts to build a better business (Godelnik, 2014)

To further improve Etsy's social and environmental performance, Dickerson and his executive team organized a B Corp Hack Day, where the entire workforce could set aside their regular duties to brainstorm ideas for enhancing their B Corp score. The initiative generated 22 innovative proposals, including a carbon footprint tracking program, promoting women's leadership, strengthening partnerships with local community organizations, and increasing access to art studios for employees. These efforts also gained recognition in a Harvard Business Review article.

### III. INFORMATION ASYMMETRIES

#### A. *Signalling*

The signalling theory, which grew out of the work of Akerlof (1970), Spence (1973), and Stiglitz (1985), is a significant body of academic research in economic contract theory that focuses on information asymmetries between various entities, such as people or organizations. Signalling theory is particularly interested in how one entity—the agent or insider—may take steps to convey its underlying quality to lessen information asymmetries. This fundamental feature is frequently difficult or impossible for another entity—the principal or an outsider—to observe. As a result, "problems of social selection under conditions of imperfect information" are at the center of signalling theory (Connelly et al., 2011).

The definition of a signal is a snapshot pointing to an unobservable signaler quality at a specific moment in time. They represent transmitted images or messages from one entity to another. The term "quality" refers to the signaler's characteristics or capacities to meet the requirements of a third party who is observing the signal (Connelly et al., 2011).

The fundamental premise is that an entity that lacks certain information will typically be ready to pay a material premium to an entity that can expose its qualities through signals. In essence, signalling theory develops hypotheses regarding action plans in the context of costs and benefits under various degrees of opacity or transparency, from the perspectives of both the signaller and the signal receiver. According to signalling theory, businesses disseminate information that individuals or constituency groups may use to generate opinions about the company, its values, and its general future course (Jones et al, 2001). It primarily addresses "the deliberate communication of positive information in an effort to convey positive organizational attributes" that represent imperceptible underlying qualities and can be a powerful explanation for the conduct of firms and their constituents and their patterns of interaction.

Connelly et al. (2011) condensed a few important theoretical ideas in their review of signalling theory. These include: (1) signals of quality and intent; (2) the efficacy of signalling by high-quality and low-quality firms; (3) signal honesty and signal fit; and (4) signal frequency and consistency

**Signals of quality and intent.** In ST, a fundamental difference is drawn between information signaling an organization's quality and intent. To gain credibility with signal receivers, a certain organizational attribute must be communicated through quality signals (such as CSR quality). The phrase "indicate future action, possibly conditional on the receiver's response" is used to describe signals of purpose (Connelly et al. (2011), p. 60). Firms communicate with stakeholders about their goals or resolutions via these signals.

**Efficacy of signalling by high-quality and low-quality firms.** Even while it's crucial, a signal's ability to be observed does not guarantee its effectiveness. According to Connelly et al. [29], signals must also have the quality of being expensive. Signals that require signallers to incur expenditures reveal that certain signallers may be more able than others to do so. Even if they result in financial losses, some businesses may pursue social projects (Windsor,D, 2001). The signal may therefore convey the idea that the signaller is more trustworthy or sincere in its claim to possess a particular trait.

**Signal honesty and signal fit.** Signal honesty is defined as "the extent to which the signaller actually has the underlying quality associated with the signal" (Connelly et al. (2011), p. 45), bearing some resemblance to the distinction between signal intent and signal quality previously discussed. It has to do with the coupling of formal plans and subsequent actions. The level of correlation between a signal



and the unobservable characteristic of the signaller is known as signal fit. This notion implies that situations may occur in which a signaller sends out signals that do not correlate well with the signaller's unobservable quality (Busenitz, L, 2005).

Such misalignment is typically viewed as greenwashing in the context of CSR (Laufer, 2003). Poor signaling, which may be brought on by either the integrity of the signaller or the quality of the signal, is the reason of the difference between the signal and the signaller's quality, whether actual or perceived. Signal reliability, which is closely related to the idea of credibility (Connelly et al., 2011), is made up of signal fit and signal honesty.

**Signal frequency and consistency.** Businesses can improve the efficacy of their signaling by emitting a wider range of observable signs or by emitting more signals often, which is referred to as signal frequency. Connelly et al. (2011) highlighted the potential for signalers to repeatedly signal to keep lowering information asymmetries and improve the efficacy of the signaling process. This is especially true when a company employs various signal kinds to deliver the same message (Balboa, M et al., 2007). Signal consistency, which Connelly et al. defined as the agreement between several signals from one specific source, is a term linked to signal frequency. Signal consistency could reduce the issue of communication being less effective as the receiver becomes confused by mismatched or contradictory messages.

### *B. Certifications and the Theory of Institutions*

The concept of new institutionalism has also been used to examine certifications. According to DiMaggio and Powell (1983), external influences cause organizations to become more homogeneous. These forces are described as "coercive," "mimetic," and "normative" in their seminal work (DiMaggio and Powell, 1983, p. 147). Pressure from outside stakeholders leads to "coercive isomorphism" (DiMaggio and Powell, 1983, p. 150). For instance, Bansal and Roth (2000) identify consumer pressures and competition as reasons for ecolabelling adoption. According to DiMaggio and Powell (1983, p. 150), "mimetic isomorphism" is the tendency of an organization to replicate the acts or behaviors of another organization when there are perceived benefits to doing so. According to various studies cited by Heras-Saizarbitoria and Boiral (2013), both ISO 9001 and ISO 14001 have seen widespread acceptance and have therefore evolved into competitive expectations, notably across national boundaries. Additionally, they note that firms were driven to comply to prove their validity and that, in order to prevent unfavorable outcomes, organizations were more motivated to adhere to standards than to exceed them. According to DiMaggio and Powell (1983, p. 152) "Normative isomorphism" is the process by which expectations and standards set by professions are met. This pressure is most

closely related to that of certification. Heras-Saizarbitoria and Boiral (2013) reference several authors in their analysis who argue that when a standard-setter has authority by issuing a seal or label that certifies compliance, this turns into a normative pressure. Within the context of their work, critical scholars have highlighted that such standards can be implemented superficially by the “quest for social legitimacy rather than the search for improvement of internal practices”.

The underlying premise of the theory of institutions is that organizations require social legitimacy and credibility to survive and flourish. Organizations are expected to behave in a way that is accepted as appropriate in the larger context, which includes abiding by the prevalent laws, rules, values, and conventions. As a result, legitimacy is the widespread belief that a particular action is being taken by a given entity is "socially desirable" and within the bounds of the institutional frameworks that have been socially built. This concept was further examined and recreated by Deephouse et al. (2017) as the "perceived appropriateness of an organization to a social system in terms of rules, values, norms, and definitions" as the word "desirable" started to raise concerns due to its nod to reputation and status.

There are two distinct approaches to legitimacy: strategic and institutional. In this perspective, legitimacy is seen as a tactical resource in and of itself. Institutional legitimacy highlights the influence of external, cultural, and contextual elements in the creation of organizations and the metrics used to assess them (Suchman, 1995). The difference, according to Suchman (1995), is "a matter of perspective, with institutional theorists taking the viewpoint of society looking "in," whereas strategic theorists adopt the viewpoint of organizational managers looking "out."

Building on this, Suchman (1995) offers three types of organizational legitimacy: pragmatic, moral, and cognitive legitimacy.

- Pragmatic legitimacy emerges from a self-interested exchange with the organization’s most immediate stakeholders.
- Moral legitimacy specifically refers to “the right thing to do,” also known as normative legitimacy, from the universal values and morality of society and an evaluation of what society deems socially appropriate (Suchman, 1995, p. 579).
- Cognitive legitimacy is a “taken-for-grantedness” assumption, and can be broadly defined as how well organizations execute their activities from their stakeholder’s point of view (Suchman, 1995, p. 575)

More recently, Bowen (2019), using the perspective of industry self-regulation (ISR), widened the body of knowledge on pragmatic and moral validity. In addition to extending recent studies beyond pragmatic considerations of ISR benefits, Bowen addressed issues between pragmatic and moral legitimacy. He also brought attention to the dual experience for ISRs, since enterprises are frequently drafting the regulations and determining how to participate. Most recently, in a 10-year longitudinal

study conducted in France of 14 firms, Hudson and Descubes (2021) found that organizations are increasingly turning to CSR 53 certifications. They suggest that certain certifications are growing in their legitimacy and propose that organizations view the voluntary nature of CSR as congruent with moral legitimacy, citing that legislation would, in fact, “detract” from such legitimacy (p. 43). They also found that some organizations pursued certification for instrumental reasons based on perceived value by their internal and external stakeholders; thus, having positive business implications.

#### IV. SMALL AND MEDIUM ENTERPRISES

Small and medium enterprises (SMEs) account for over 90% of firms worldwide. In 2010, joint research by the IFC and McKinsey estimated that there were 420–510 million formal and informal micro, small, and medium-sized businesses operating worldwide, with most of those businesses—365–445 million—found in emerging nations. SME's are essential to the global economy. They account for most occupations in developing nations and are one of the biggest contributors to employment. Additionally, SMEs make a significant contribution to the total value added in these economies. Despite this, SMEs suffer more financing challenges than larger companies since they have limited access to outside funding and must pay higher transaction costs and risk premiums. A further 15% of SMEs are underfinanced, and nearly 70% do not use external borrowing from financial institutions. 14% of the GDP of all emerging economies (Ramalho and Croci, 2018). These barriers for acquiring new resources from external parties are mainly attributed to their inability of narrowing the gap of information asymmetry (Islam et al, 2018). Debt financing is usually not an option for such enterprises, since they are not yet profitable and lack tangible assets (Denis and David, 2004). Consequently, entrepreneurial finance is mostly focused on alternative sources of capital, such as crowdfunding, venture capitalists (VC) and business angels (BA), as well as friends and family lenders (Bergset, 2018).

Despite claims that CSR affects businesses of all sizes, most of the academic and professional research to date has consistently focused on large multinational corporations (Bikefe et al., 2020; Bondy & Starkey, 2014; Grimstad, et al., 2020). The concern that the current standards and guidance to implement sustainable business practices may not be appropriate for SMEs as they were developed for larger business frameworks and infrastructure is growing as the contribution of SMEs to the overall economy is recognized more and more (Grimstad et al., 2020; Maldonado-Erazo et al., 2020).

The concern that the current standards and guidance to implement sustainable business practices may not be appropriate for SMEs as they were developed for larger business frameworks and

infrastructure has grown with the increased recognition of SMEs' contribution to the overall economy (Grimstad et al., 2020; Maldonado-Erazo et al., 2020).

SMEs support CSR and are linked to the social, ecological, and economic advancement of society. As a result, they are associated with the CSR movement. Developing countries experience societal and ecological problems, such as labor and human rights violations and environmental degradation, but by engaging in CSR activities, firms can help to mitigate these problems. CSR is a strategic tool that may be utilized to increase customer loyalty and happiness, employee motivation, and public fund availability for SMEs. These benefits come from an improved company reputation and increased sales. CSR is a crucial element in maintaining a positive business reputation and is regarded as a crucial strategic asset that contributes to a firm's competitive advantage, according to Park et al. (2014). CSR is thought to be an effective method for enhancing financial performance, intangible assets, and competitive power. Its connection to business reputation, however, is only recently discovered and poorly understood (Šontaitė-Petkevičienė, 2015).

According to Torugsa et al.(2012), SMEs can achieve high financial yield by proactively making progress in their CSR programmes. Juarez (2017) confirmed that social and economic CSR actions have a definite influence on the business performance of SMEs. According to Roblek et al. (2014), businesses that adhere to the sustainability concept and invest in new inventive concepts like "ecoinnovation" and "social innovation" are predicted to provide superior value and social development in a competitive, low-carbon, and knowledge-based economy. Businesses may be more effective and efficient in society, which will favorably impact their business models and help them achieve higher levels of sustainability, by enhancing corporate responsibility policies and creating distinctive nonfinancial reporting (Vukic et al., 2020).

According to Spence (2016), the extension of CSR ideas to the context of small businesses can be accomplished through the ethic of caring. According to Spence (2016), prioritizing human relationships and valuing emotions are related to the use of informal systems of governance and informal communication techniques. In contrast to their bigger counterparts, she argues that examining SMEs via a feminist lens of care allows researchers to analyze the extremely personalized and intimate nature of the interactions small business executives have with their employees and other critical stakeholders.

External stakeholders are increasingly requesting that SMEs publicly commit to CSR as their impact and overall size continue to grow (Hudson & Descubes, 2021; Kechiche & Soparnot, 2012). In addition, it has been thought that adopting sustainable business practices may give them a competitive edge

and be associated with other significant organizational outcomes (Bikefe et al., 2020; Kechiche & Soparnot, 2012).

Growing evidence suggests that CSR initiatives implemented by SMEs can have positive strategic effects when they are in line with their primary business objectives (Bikefe et al., 2020). Legislation, managerial and owner values, stakeholder participation, and the business case have all been linked to the motivation for CSR engagement (Bikefe et al., 2020; Tang and Tang, 2018).

Although SMEs engage in CSR practices and actions, they do so less frequently than their bigger corporate counterparts. According to scholars, this is because people are afraid of criticism, lack the necessary skills and resources, and rely on informal word-of-mouth advertising from colleagues, clients, and third parties (Lee-Wong & More, 2016).

There is a need for studies that are specifically focused on SMEs because SMEs are more than just "little big firms" (Pedersen, 2009). The size, structure, resources, and management of large and small businesses differ, which has a big impact on their ability to carry out CSR projects, why they want to do it, and how much they do it. The resources and competencies of SMEs are severely constrained, and they frequently use informal methods and lack strategic approaches to CSR (Bikefe et al., 2020). A new set of theoretical and conceptual frameworks must be created to address the competitive challenges and institutional constraints that SMEs face, according to research that has started to examine the potential value proposition of implementing sustainable business practices in SMEs.

## V. RESEARCH QUESTIONS AND HYPOTHESIS

In recent years, as it was mentioned before, there has been a growing interest in understanding the impact of B Corp certification on the evolution of organizations. B Corp certification has gained significant attention as a means for businesses to demonstrate their commitment to sustainability and responsible business practices. Numerous studies (Gamble et al., 2019; Villela et al., 2019; Parket et al., 2019; amongst others) have explored the motivations behind obtaining B Corp certification and its perceived benefits. It has been observed that organizations often view certification as a tool for reputation building, with less emphasis on making substantial internal changes to improve their B Impact Assessment (BIA) scores. Several types of research have supported this perspective, revealing that B Corps enjoy reputational and legitimacy gains, expanded networking opportunities, and even potential financial advantages.

However, while there is evidence of the reputational benefits associated with B Corp certification, it remains unclear whether such certification translates into tangible financial outcomes for certified

SMEs. Specifically, it is important to investigate whether B Corp certification enhances the ability of SMEs to attract new investments, which can play a crucial role in their growth and sustainability.

Building upon the existing body of research, this master's thesis aims to explore the relationship between B Corp certification and the ability of certified SMEs to attract new investments. We propose the following hypothesis:

***H1a: B Corp certification has a positive effect on the ability of certified SMEs to attract new investments.***

***H1b: The presence of B Corp certification, along with factors such as certification cycles, firm sizes, industry categories, and funding round scheduling, will significantly influence the amount raised by certified SMEs through different types of investments, including equity crowdfunding, seed funding, Serie A funding, and debt financing.***

The hypothesis posits that the presence of B Corp certification serves as a credible signal of a company's commitment to social and environmental responsibility. This certification is expected to enhance the reputation and attractiveness of SMEs to potential investors, consequently increasing their likelihood of securing funding. Additionally, larger firm sizes are often associated with greater resources, financial stability, and a higher level of operational capacity. These factors may provide advantages to SMEs in terms of their ability to demonstrate growth potential and manage potential risks, making them more appealing to investors.

By examining the relationship between B Corp certification, firm size, and funding success, this study aims to contribute to the understanding of the funding dynamics in the sustainable and socially responsible business sector.

Furthermore, we hypothesize that the strength of this effect is dependent on the SMEs' level of social and environmental impact improvement over time. In other words, we anticipate that SMEs with higher BIA ratings will benefit more from B Corp accreditation in terms of attracting new investments.

***H2: The beneficial effect of B Corp certification on investment attractiveness is greatest for SMEs with higher BIA ratings that demonstrate greater social and environmental impact improvement.***

Moreover, our aim is to examine whether the influence of B Corp certification on the appeal for investment differs among different industry sectors. To answer this question, we propose the following hypothesis:

***H3: The impact of B Corp certification on investment attractiveness varies by industry sector, with some gaining a higher positive impact than others.***

This thesis attempts to add to the understanding of the possible financial benefits that B Corp certification can bring to SMEs by investigating these assumptions, as well as to shed light on the role of social and environmental impact improvement in affecting investment attractiveness outcomes. To examine the data and test the provided hypotheses, relevant statistical procedures, such as regression analysis, will be used throughout the study. This study's findings have the potential to add useful insights and empirical research to the existing literature.

## METHODOLOGY

### I. B CORP CERTIFICATION

The B Lab is a social movement organization focused on prosocial organizing (Sharma et al., 2018). To establish an organizational architecture that would drive an economic change toward a more socially and environmentally sustainable future, Jay Coen Gilbert, Bart Houlahan, and Andrew Kassoy made the decision to found the B Lab in June 2006 (Marquis et al., 2011). Houlahan was chosen as the new president and was in charge of operations and certification while Kassoy oversaw capital efforts and Gilbert sought out new companies to join (Cao et al., 2017). The B Lab was founded on the principle that market-based organizations can be used to further higher social and environmental goals (Ballesteros-Sola et al., 2018).

In 2007, year of the B Lab launch, the initial number of B Corps was 43. In 2015, 16,000 companies had used the B Impact Assessment (BIA) and there were more than 1,700 B Corps existing (Gehman & Grimes, 2017). In 2018, there were 2,441 certified B Corps spread in 40 different countries and 130 sectors (Winkler et al., 2018).

Even though other B Lab organizations have sprouted up all over the world, the US B Lab is the only one that can provide the B Corp accreditation (Vilella et al., 2019). The fact that businesses freely self-select into this certification by adhering to an audit of their procedures is a crucial element of it (Cao et al., 2017). Additionally, it was decided that certification would be an ongoing process to guarantee that businesses would continually raise their bar for participation and impact as they develop over time. Indeed, a revised examination of the CBCs is required after the third year of certification. This enables the businesses to improve their performance in accordance with the most recent benchmarks and criteria (Honeyman & Jana, 2019).

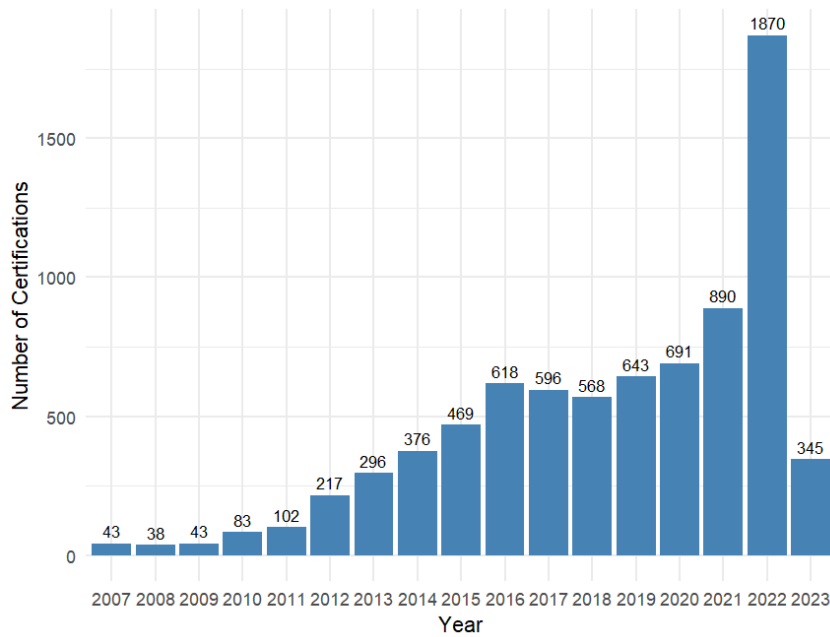
The B Corp model does not represent a new kind of corporate legal entity, but it offers a framework that any company in the world can use to build a better business. According to Honeyman and Jana (2019), this framework is relevant for business-to-business (B2B) or a business-to-consumer (B2C) business, a sole local proprietor or a global brand, a start-up or a third-generation family business, a limited liability company or a partnership, an employee-owned company or a cooperative, a C corporation or an S corporation, or even when deciding on the right structure for a new business. Through the certification process, companies must demonstrate and show their social and environmental performance, legal accountability, and public transparency. The BIA is the certification tool of the B Lab measuring the impact of the companies desiring to certify as B Corps (Bauer & Umlas, 2017). The BIA is a self-administered synthesis of CSR best practices concerning various impact areas



(Villela et al., 2019) on which a set of questions are incorporated. This set depends on 3 factors: company's size (number of employees and annual sales), sector (type of activities) and geographical location (Moroz, 2018). According to these 3 criteria, the BIA will create a customized 'track' for the respondents of the survey. Each of the questions of this adapted track is weighted by the B Lab and its weight is indicated on the questionnaire. Following the BIA, the B Lab thoroughly audits the assessment's results, and if the applied firm satisfies all the criteria, it will be certified. The company joins the B Corp community and the accreditation is good for three years. Companies may compare their outcomes to those of thousands of enterprises thanks to B Lab, which compiles anonymized data from BIA users. This setting provides access to tools and best practice manuals that businesses may use to gradually enhance their social and environmental performance. Compared to what was formerly required for satisfying the standards, this certification necessitates investing more resources. Additionally, businesses that pass the audit process are required to sign an agreement with the B Lab and pay an annual fee that currently ranges from 1,000€ to 500,00€ depending on the region and the company's annual revenues. Companies must retake the evaluation and earn the required minimum score once more after the three-year mark to keep their accreditation.

## II. DATA COLLECTION AND SAMPLE

Crunchbase and the data available from the B Lab platform are the two sources of data used in this dissertation. Crunchbase is a platform that provides business-related information for organizations. Specifically, data regarding the firm's year of establishment, the number of funding rounds, amount of raised capital, type of investment, size, industry and country of operation were used. This collection includes data on about 2636448 firms. The B Lab's official website includes information about the certified companies, including the year of certification, the sector and industry in which they operate, and the B assessment score. By April 2023, 7884 distinct companies had information available on the B Lab website. As we can see in the next figure, there has been an important increase in the number of first certification in the recent last years.



**Figure 1: Sum of the companies that have firstly become B corps for each year since B Corp began in 2007.**

To build a comprehensive dataset for certified B Corp SMEs, the two datasets were merged based on the names of the companies and the websites of such companies. The R programming language was employed to merge the datasets. As there was no shared foreign key between the databases, a series of data transformations were carried out to clean and merge the datasets. To ensure data quality, the data was filtered to exclude records in Crunchbase with missing values in the "domain" and "name" columns, as well as B Corp data with missing values in the "website" column. Subsequently, the website columns in both datasets were modified by removing certain characters, such as "https," to facilitate more accurate matching, using the `gsub()` function in R. After cleaning the data and merging the two datasets we obtained a comprehensive dataset made of 4872 unique firms. As the current and former number of B Corps available in the B Corp dataset is 7884 firms, the selection process resulted in 61.79% of this quantity.

After filtering, cleaning, and merging both databases, we proceeded to filter the data to exclusively obtain information on small and medium-sized enterprises (SMEs). To accomplish this task, the data underwent filtration, adhering to the European Commission's definition, which stipulates that a small and medium-sized enterprise (SME) must have a maximum of 250 employees (European Commission, 2003). While firms certified as B Corps are primarily SMEs, it is worth noting that, according to the B Corp website (B Corp, 2023), an increasing number of large enterprises are also joining their movement. By excluding these larger enterprises, we were left with a total of 3200 unique SMEs in our dataset. In addition to the certified B Corporations, our study incorporates a sample of 2993 non-certified firms. This inclusion allows us to provide valuable insights and comparisons between the certified and non-certified firms.

In this dissertation, it is pertinent to underscore certain fields that deserve particular emphasis. A crucial aspect to address is the field of B\_Corporation, which plays a significant role in this study. B\_Corporation is represented as a binary variable, taking a value of 0 when a company is not certified and 1 when it becomes a B Corp. This variable remains 0 during the initial periods for all firms and transitions to 1 in subsequent years.

**Table 1 Overview of the field B\_Corporation**

<b>B Corporation</b>	<b>Firms</b>	<b>Percentage</b>
1	3200	51.66%
0	2993	48.34%
<b>Total</b>	<b>6193</b>	<b>100%</b>

The field overall score represents the grade obtained based on the B Impact Assessment score. To maintain certification, companies are required to undergo recertification and complete a fresh B Impact Assessment every three years, resulting in periodic changes to their scores.

**Table 2 Summary of the field Overall Score**

<b>Overall Score</b>	
<b>Statistic</b>	<b>Value</b>
Minimum	78.20
1st Quartile.25%	86.10
Median	100.80
Mean	159.57
3rd Quartile.75%	191.80
Maximum	872.50

In the case of the "category\_list" and "category\_groups\_list" fields, the individual items within these lists were transformed into distinct dummy variables. Each item, separated by commas (e.g., "Brand Marketing, Consulting, Graphic Design"), was assigned a value of 1 if it was mentioned and 0 otherwise, effectively creating new variables for each item. This transformation will prove to be useful when conducting descriptive statistics.

**Table 3** The following are the top 10 most frequently occurring categories among our sample firms.

Category	Frequency
Professional Services	1300
Software	1070
Sales and Marketing	880
Commerce and Shopping	863
Information Technology	747
Design	695
Media and Entertainment	693
Financial Services	684
Health Care	635
Internet Services	596

Another field that is fundamental for this research "total\_funding\_usd" and all the fields related to the funding rounds. Those fields describe the amount of US dollars raised by a given firm that reveals its funding amount. Within our sample, there are a total of 2996 individual funding rounds. Among these, there are 1024 firms that have participated in at least one funding round.

**Table 4 Summary of the field Total\_Funding\_USD**

Total Funding	
Statistic	Value
Minimum	0.00\$
1st Quartile.25%	129196.25\$
Median	1721500.00\$
Mean	12372345.37\$
3rd Quartile.75%	9250000.00\$
Maximum	579768542.00\$

For the applications of the models, it has been created a panel data with the information of the funding rounds. Previously, a pivot of the data has been done to create new columns to be more precise about the type of the investment. The type of investment that can be found in our sample are (Investopedia, 2023):

1. Series A: The first significant round of funding after the initial seed capital. It is usually aimed at helping the company grow and develop its product or service.
2. Series B: The second round of financing that occurs after a company has achieved certain milestones or demonstrated growth potential. It is often used to scale operations and expand market reach.
3. Series C: The third round of funding, which typically occurs when a company has established a solid market presence and aims to further accelerate growth, expand into new markets, or acquire other businesses.
4. Series D: Subsequent funding rounds that follow Series C. They represent further rounds of financing as a company continues to scale its operations and pursue growth opportunities.
5. Angel: Early-stage funding provided by individual investors (angels) who offer capital, mentorship, and expertise to startups in exchange for equity.
6. Pre-Seed: The initial stage of funding before the seed round, usually involving small amounts of capital to support concept validation or the development of a minimum viable product (MVP).
7. Seed: The first official round of funding for a startup. It helps the company launch its product or service and covers initial operational expenses.
8. Debt Financing: Funding obtained through loans or other forms of debt. This type of financing requires repayment with interest over a specified period.
9. Grant: Non-repayable funds awarded to startups or organizations by government bodies, foundations, or institutions to support specific projects or initiatives.

10. Equity Crowdfunding: A method of raising funds from a large number of people, often through online platforms, in exchange for equity in the company.
11. Product Crowdfunding: Crowdfunding campaigns that offer early access to a company's product or service in exchange for financial support.
12. Convertible Note: A debt instrument that can convert into equity at a later stage, usually during a future funding round.
13. Private Equity: Investment in companies that are not publicly traded, typically involving larger amounts of capital and more mature businesses.
14. Non-Equity Assistance: Funding or support provided to startups or organizations without requiring equity in return, such as mentorship, networking, or business development assistance.
15. Post-IPO Equity: Additional equity financing raised by a company after its initial public offering (IPO) to fund further growth or strategic initiatives.
16. Secondary Market: The market where existing shares of privately held companies are bought and sold between investors, often providing liquidity to early investors and employees.
17. Undisclosed: Funding rounds where the specific details or terms are not publicly disclosed.
18. Corporate Round: Funding provided by established corporations to startups as a strategic investment or partnership opportunity.
19. Post-IPO Debt: Debt financing obtained by a company after going public, which can be used for various purposes, such as refinancing existing debt or funding acquisitions.

### III. MODELS

#### A. Fixed effects model

Understanding how BCorp certification affects financing quantities is critical for evaluating the certification's efficacy in fostering sustainable and socially responsible practices among SMEs. A panel data analysis is used to investigate this association, integrating company fixed effects and year fixed effects to account for unobserved heterogeneity and time-specific characteristics. To evaluate the link between BCorp certification and financing levels, the fixed effects model is used. The following is the general equation for the fixed effects model with panel data applied to our study:

$$Y_{\{it\}} = \alpha + \beta_{\{1\}}X_{\{1it\}} + \beta_{\{2\}}X_{\{2it\}} + \dots + \beta_{\{n\}}X_{\{nit\}} + \lambda Firm_{\{i\}} + \delta * Year_{\{t\}} + \epsilon_{\{it\}}$$

Where:

- $Y_{\{it\}}$  represents the dependent variable for firm  $i$  in year  $t$ .
- $X_{\{nit\}}$  denotes the independent variables for firm  $i$  in year  $t$
- $\alpha$  is the intercept term.
- $\beta$  measures the effect of the BIA score on the funding amount, while controlling for firm and year fixed effects
- $Firm_{\{i\}}$  represents the fixed effects at the firm level, capturing the unobserved heterogeneity across firms.
- $Year_{\{t\}}$  represents the fixed effects at the year level, capturing the time-specific factors.

- $\epsilon_{\{it\}}$  is the error term.

By including firm fixed effects ( $\lambda Firm_{\{i\}}$ ), it can be controlled for time-invariant firm-specific characteristics that may influence the dependent variable but are not explicitly assessed or accounted for in the model. This helps to account for unobserved corporate heterogeneity that may influence funding amount. Likewise, by inserting year fixed effects ( $\delta * Year_{\{t\}}$ ), it can be controlled for time-specific elements that affect all firms in a particular year but are not represented by the independent variables. This helps to account for common time-specific shocks or trends that may impact the funding amount.

The output provides the estimated coefficients for each variable in the regression model, along with their standard errors, t-values, and p-values.

The coefficient estimates represent the expected change in the response variable for a one-unit increase in the corresponding predictor variable while holding other variables constant.

The t-values measure the number of standard deviations the coefficient estimate is away from zero. It is used to assess the statistical significance of the coefficient. Generally, smaller p-values indicate more statistically significant results.

The p-values indicate the probability of observing the coefficient estimate (or an even more extreme value) if the null hypothesis (no relationship between the predictor variable and the response variable) is true. Lower p-values suggest stronger evidence against the null hypothesis.

The fixed effects model estimates the coefficients ( $\beta$ ) of the independent variable(s) while controlling for firm and temporal effects. The coefficients show the average influence of the independent variable(s) on the dependent variable, taking firm and year fixed effects into consideration.

The analysis is conducted using panel data comprising our sample of certified SMEs and their corresponding funding amounts over a specific time period. The data is transformed into panel format, and the fixed effects model is estimated using the “plm” package in R. Running the regression with the BIA score as the independent variable and the funding amount as the dependent variable, while adjusting for firm and year fixed effects, is what the estimate entails.

### *B. Pooled OLS regression model*

Another panel data model that can be used is the Pooled OLS regression model. It can be used to investigate the correlation between various variables, namely "overall\_score," "certification cycle," "year\_fundround," and "size" with the amount raised by SMEs through different types of investments.

In this study, we have focused on four primary types of investments, namely seed funding, series A funding, debt financing, and equity crowdfunding. These types of investments were chosen based on their high frequency of occurrence and relevance.

In general, these models' equation are like:

$$Y_{\{i\}} = \beta_{\{0\}} + \beta_{\{1\}} * variable_{\{1\}} + \beta_{\{2\}} * variable_{\{2\}} ... + \beta_{\{n\}} * variable_{\{n\}} + \varepsilon$$

where:

- $Y_{\{i\}}$  is the dependent variable for observation  $i$ .
- $variable_{\{1\}}, variable_{\{2\}}, \dots, variable_{\{n\}}$  are the independent variables.
- $\beta_0, \beta_1, \beta_2,$  and  $\beta_n$  are the coefficients estimated by the regression model for the intercept.
- $\varepsilon$  is the error term, representing the unobserved factors and random variation that affect the dependent variable.

The Pooled OLS model assumes that no individual-specific fixed effects or time-specific random effects exist. It aggregates all the data and estimates a single set of coefficients for all people and time periods for the independent variables.

The purpose is to determine whether or if there is a statistical relationship or correlation between these variables and the amount raised through different types of investment by SMEs. By estimating these regression models, it may be determined the significance and size of the independent variables' impact on the dependent variable. The regressions aid in identifying the variables that may influence the type of investment. It allows you to see if variables like `overall_score` (which could represent the overall quality or attractiveness of the investment opportunity), `company_size`, `certification_cycle`, and `year_fundround` (which represents the year the funding round occurred) have a significant impact on the amount raised.

### C. Fixed effect logit model

The fixed effect logit model will be used to estimate the effect of B Corp certification on the likelihood of funding success for SMEs while controlling for individual firm specific characteristics that remain constant over time.

The formula used in the fixed effect logit model is:

$$\text{logit}(P(Y_{\{i\}} = 1)) = \beta_{\{0\}} + \beta_{\{1\}} * X_{\{i\}} + \alpha_{\{i\}}$$

Where:

- $Y_{\{i\}}$  represents the binary outcome variable, such as funding success, for the  $i$ -th SME.
- $X_{\{i\}}$  represents the independent variable(s) of interest, such as B Corp certification, for the  $i$ -th SME.



- $\alpha_{\{i\}}$  represents the individual-specific fixed effect, capturing unobserved heterogeneity across firms that remain constant over time.
- $\beta_{\{0\}}, \beta_{\{1\}}$  are the coefficients to be estimated.

The model implies that the success probability ( $P(Y_i = 1)$ ) is related to the independent variable(s) via the logit link function, which converts the linear combination of the independent variables and fixed effects to a probability scale between 0 and 1. The fixed effects  $\alpha_{\{i\}}$  account for time-invariant individual-specific characteristics that may affect the outcome variable but are not directly observable. Including these fixed effects helps control for unobserved heterogeneity across firms.

The calculated coefficients, such as  $\beta_{\{1\}}$ , represent the effect of the independent variable(s) on the outcome variable's log-odds while adjusting for individual-specific fixed effects. After controlling for fixed effects, a positive coefficient for B Corp certification would imply that acquiring the certification relates to a greater log-odds (or probability) of funding success for SMEs.

# RESULTS

## I. DESCRIPTIVE STATISTICS

In total, the sample consists of 3200 unique firms of certified firms. Based on the information provided in Appendix 1, a significant portion of the observed firms originate from North America and various European countries. Consequently, one can posit that most of these firms are part of developed nations.

There are a total of 2815 distinct financing rounds in our sample. There are 1024 firms that have participated in at least one funding round among these. Only firms that successfully obtained certification and participated in at least one investment round were included in the pie chart displayed in Appendix 2. According to the graph, only 27.5% of these companies were certified prior to their first founding round. This observation illustrates the fact that most of the organizations obtained certification at a later stage, and typically after becoming certified, they get their first round of funding. As shown in Appendix 3, the number of enterprises with at least one funding round has increased over time.

Table 5 details the investments made in BCorp-certified SMEs by various sorts of investors. We can learn a lot about the impact of BCorp certification on SMEs by evaluating these investment trends. Understanding investment dynamics is critical for assessing the impact of BCorp certification on promoting sustainable and socially responsible behaviors among SMEs.

Table 5 Amount raised and number of investments by investor types

Investor Type	Invested Amount (\$)	Number of Investments
venture_capital	70651011790	1277
private_equity_firm	1840000000	46
private_equity_firm,venture_capital	576262038	66
accelerator,venture_capital	553758000	178
accelerator	250800000	338
angel_group	54072564	42
incubator	13108260	12
micro_vc	1847170	5



The table displays the quantity and number of investments made by various investor types. It demonstrates the presence of venture capital firms, with a total investment value of \$70651011790 spread across 1277 investments. Private equity firms are also heavily involved, investing \$1840000000 in 46 enterprises. Accelerators, angel clubs, incubators, and micro-VCs have also made investments.

**II. THE IMPACT OF B CORP OVERALL SCORE ON FUNDING ROUNDS IN SMEs**

We can assess the association between BCorp certification, as indicated by the BIA score, and investment quantities in SMEs by analyzing the estimated coefficients from the fixed effects model. A positive and statistically significant BIA score coefficient would imply that a higher BCorp certification score relates to increasing investment quantities, demonstrating that investors appreciate certified SMEs' social and environmental performance. A non-significant or negative coefficient, on the other hand, would show that BCorp certification has no substantial impact on funding levels.

Furthermore, including company fixed effects accounts for time-invariant firm-specific characteristics that may influence funding quantities but are not explicitly quantified or included in the model. Firm fixed effects represent firm heterogeneity, allowing us to isolate the influence of BCorp certification in particular. Similarly, incorporating year fixed effects accounts for time-specific elements that affect all firms in a particular year but are not represented by the independent variable. This takes into account typical shocks or trends that may have an impact on financing quantities, such as macroeconomic conditions or industry-specific factors.

We get useful insights into the influence of BCorp certification on fostering sustainable and socially responsible behaviors among SMEs by using this panel data analysis and investigating the link between BCorp certification and financing levels while accounting for company and year fixed effects.

This section illustrates the analysis of the B Corp grades effect on the SME's ability to attract new investments. The following table summarizes the outcomes of the fixed effects model.

Coefficients:

**Table 6 Model estimations for the effect of B Corp scores on funding rounds**

<b>Variable</b>	<b>Estimate</b>	<b>Std.Error</b>	<b>t-value</b>	<b>Pr(&gt; t )</b>
Overall_score	-4771.8	6284.5	-0.7593	0.4477

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
-1.24e+08	-3.71e+05	5.83e+04	0	1.63e+05	2.14e+08

#### Residuals

- Total Sum of Squares: 4.7798e+17
- Residual Sum of Squares: 4.7796e+17
- R-Squared: 3.9633e-05
- Adj. R-Squared: -0.22104
- F-statistic: 0.576525 on 1 and 14546 DF, p-value: 0.44769

The coefficient for the field “overall\_score” is -4771.8. This coefficient shows the estimated effect of BCorp certification's overall score on the total amount raised by SMEs. A negative coefficient in this situation indicates that an increase in the overall score relates to a decrease in the total amount raised, but the coefficient is not statistically significant (p-value > 0.05).

The R-squared value is 3.9633e-05, showing that the overall BCorp certification score explains a very little part of the variation in the total amount raised by SMEs. The adjusted R-squared value is -0.22104, indicating that include the overall score as an independent variable has no effect on model fit.

The F-statistic evaluates the model's overall significance. The F-statistic is 0.576525 in this situation, with a p-value of 0.44769, indicating that the whole model is not statistically significant.

In conclusion, there is no sufficient evidence to support the premise that the overall score of BCorp certification has a major impact on the total amount generated by SMEs based on the findings. The low R-squared and modified R-squared values imply that other factors not included in the model may have a greater impact on SMEs' funding levels.

### III. RELATIONSHIP BETWEEN INVESTMENT TYPE AND DEPENDENT VARIABLES IN FUNDING ROUNDS

This section illustrates the analysis of the relationship between the type of investment, independent variable, and the dependent variables (such as overall\_score, size, certification\_cycle, year\_fundround). The following table summarizes the outcomes of the study of the relationship between Equity Crowdfunding and the dependent variables.

Coefficients:

Table 7 Model estimations for the analysis of the relationship between Equity Crowdfunding and the dependent variables

Variable	Coefficient	Std_Error	t_value	p_value
(Intercept)	-35,096,459.66698	28,459,904.634	-1.23318964	0.217929889
overall_score	-30.58338	2,112.154	-0.01447971	0.988451503
certification_cycle	14,945.50952	50,308.800	0.29707545	0.766499362
size 1-9	97,179.06029	131,896.312	0.73678376	0.461507232
size 10-49	218,182.82469	132,396.702	1.64794758	0.099824015
size 50-249	116,325.52355	148,367.214	0.78403793	0.433290071
year_rounds	17,357.98843	14,065.331	1.23409737	0.217591708
catgr_Professional.Services	-6,277.80722	108,442.441	-0.05789069	0.953852660
catgr_Apps	261,116.06017	173,755.951	1.50277478	0.133360012
catgr_Design	129,064.66591	185,460.922	0.69591299	0.486720395
catgr_Information.Technology	-98,108.14203	108,574.700	-0.90360039	0.366526382
catgr_Mobile	-78,773.70948	166,194.918	-0.47398386	0.635663117
catgr_Privacy.and.Security	199,345.63600	499,832.998	0.39882448	0.690147377
catgr_Software	-18,278.33637	90,771.025	-0.20136752	0.840471252
catgr_Agriculture.and.Farming	9,714.62667	131,224.177	0.07403077	0.941007610
catgr_Community.and.Lifestyle	47,994.82439	93,807.082	0.51163327	0.609073308
catgr_Commerce.and.Shopping	-81,191.31097	89,330.737	-0.90888437	0.363732231
catgr_Manufacturing	320,961.93999	107,779.621	2.97794645	0.003004798
catgr_Real.Estate	-18,740.97622	117,894.836	-0.15896350	0.873744689
catgr_Artificial.Intelligence	5,029.28042	273,818.650	0.01836719	0.985351295
catgr_Data.and.Analytics	25,698.43519	191,770.736	0.13400603	0.893437339
catgr_Science.and.Engineering	-152,235.82144	145,066.117	-1.04942370	0.294354882
catgr_Other	-152,108.76594	84,980.103	-1.78993389	0.073908066
catgr_Consumer.Goods	17,651.59305	96,450.190	0.18301253	0.854842580
catgr_Transportation	-148,590.27565	108,840.034	-1.36521710	0.172634979
catgr_Media.and.Entertainment	-73,523.75734	241,820.473	-0.30404273	0.761188076
catgr_Music.and.Audio	97,090.11311	829,871.621	0.11699414	0.906899144
catgr_Financial.Services	25,035.71936	105,656.288	0.23695437	0.812763344
catgr_Payments	-77,873.56633	290,228.174	-0.26831842	0.788535363
catgr_Food.and.Beverage	200,085.63904	81,338.355	2.45991744	0.014143890
catgr_Sales.and.Marketing	-214,681.99478	188,646.668	-1.13801106	0.255515483
catgr_Education	-14,660.09244	137,494.393	-0.10662320	0.915119266
catgr_Events	47,048.28331	390,851.313	0.12037387	0.904222446
catgr_Internet.Services	88,239.33271	109,207.465	0.80799726	0.419373892
catgr_Administrative.Services	-14,499.23542	129,416.031	-0.11203585	0.910827944
catgr_Hardware	143,232.92671	138,482.378	1.03430436	0.301360513
catgr_Navigation.and.Mapping	268,050.74844	378,869.613	0.70750131	0.479496688
catgr_Gaming	-32,981.17739	247,983.822	-0.13299729	0.894234752
catgr_Health.Care	-27,772.64272	83,616.858	-0.33214167	0.739884340
catgr_Content.and.Publishing	-77,470.39326	781,340.156	-0.09915066	0.921047784
catgr_Sports	-145,797.94596	154,805.036	-0.94181655	0.346620050
catgr_Consumer.Electronics	-124,951.44121	192,396.939	-0.64944610	0.516268735
catgr_Advertising	192,625.27639	326,031.905	0.59081726	0.554838608
catgr_Clothing.and.Apparel	246,392.64323	205,212.925	1.20066825	0.230296768
catgr_Government.and.Military	-265,821.37649	746,130.563	-0.35626657	0.721751126
catgr_Sustainability	111,964.07807	87,725.521	1.27629996	0.202283956
catgr_Lending.and.Investments	98,913.31109	166,240.311	0.59500196	0.552039518
catgr_Travel.and.Tourism	-76,654.09360	158,207.963	-0.48451476	0.628176155
catgr_Energy	-210,399.57175	130,901.252	-1.60731519	0.108448079
catgr_Natural.Resources	5,199.31029	138,801.122	0.03745871	0.970130227
catgr_Video	-67,361.56048	917,009.614	-0.07345786	0.941463318
catgr_Messaging.and.Telecommunications	58,762.53596	760,087.840	0.07731019	0.938399459
catgr_Biotechnology	-51,892.51464	221,153.413	-0.23464487	0.814554806

---Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residuals:

Min.	1st Qu.	Median	3rd Qu.	Max.
-770385	-240414	-110993	20447	6554460

- Total Sum of Squares: 3.9808e+14
- Residual Sum of Squares: 3.6714e+14
- R-Squared: 0.077736
- Adj. R-Squared: 0.0074163
- F-statistic: 1.10547 on 52 and 682 DF, p-value: 0.2886

The intercept term ( $\beta_0$ ) reflects the predicted value of the dependent variable (equity\_crowdfunding\_raised\_amount\_usd) when all independent variables (overall\_score, certification\_cycle, and year\_fundround) are zero. The intercept, in this case, is predicted to be -3.5096e+07. However, the p-value (0.217930) suggests that the intercept is not statistically significant.

Overall Score ( $\beta_1$ ): The overall\_score coefficient is calculated to be -30,583. It is, however, not statistically significant (p-value: 0.99), demonstrating that changes in the total score have no effect on the amount raised via equity crowdfunding.

Certification Cycle ( $\beta_2$ ): The certification\_cycle coefficient is calculated to be 14946. It is not, however, statistically significant (p-value: 0.7665), demonstrating that the certification cycle has no effect on the amount raised through equity crowdfunding.

Year Fundround ( $\beta_3$ ): The year\_rounds coefficient is expected to be 30302. It is statistically significant (p-value: 0.022), demonstrating that variations in the year of the fundround affect the amount raised through equity crowdfunding.

The coefficients for different size categories represent the expected differences in the equity crowdfunding raised amount compared to the reference category. For example, the coefficient for size 10-49 is 218180, indicating that, on average, firms with 10-49 employees have 218,180 units higher equity crowdfunding raised amount compared to firms with 0-1 employees. However, the p-values for size categories are generally not statistically significant.

The coefficient for the "Food and Beverage" category is 200090. This suggests that, on average, firms categorized under "Food and Beverage" have a higher equity crowdfunding raised amount compared to the reference category. The positive coefficient indicates an expected increase in the raised amount for firms in this category. Additionally, the p-value associated with this coefficient is 0.014144, which is below the conventional significance level of 0.05. This indicates that the association between the "Food and Beverage" category and the equity crowdfunding raised amount is statistically

significant. In other words, there is evidence to suggest that being categorized under "Food and Beverage" is associated with a higher amount raised through equity crowdfunding.

The coefficient for the "Apps" category is 2.6112e+05. This indicates that, on average, firms categorized under "Apps" have a higher equity crowdfunding raised amount compared to the reference category. However, the p-value (0.133360) suggests that this result is not statistically significant at the conventional significance level.

Catgr\_Design, catgr\_Information.Technology, catgr\_Mobile, and other category variables are similar to the "Apps" category, the coefficients for these variables represent the expected differences in the equity crowdfunding raised amount compared to the reference category. Positive coefficients indicate higher amounts, while negative coefficients indicate lower amounts. However, the p-values for most of these category variables are not statistically significant, indicating that the associations may not be reliable.

Overall, the size 10-49 appears to be the sole meaningful predictor of the amount raised through equity crowdfunding, based on the statistics. The "catgr\_Food.and.Beverage" and "catgr\_others" term has a considerable influence as well, however the total score and certification cycle have no effect on the dependent variable.

The R-squared value (0.077736) suggests that the independent variables in the model can explain about 7.77% of the variation in the equity crowdfunding raised amount. The adjusted R-squared value (0.0074163) accounts for the number of variables and observations, indicating that the model only explains a small percentage of the variation.

F-statistic: The F-statistic evaluates the model's overall significance. The F-statistic value in this situation is 1.10547, and the accompanying p-value is 0.2886. We cannot reject the null hypothesis that all the coefficients are zero because the p-value is bigger than the standard significance level of 0.05, indicating that the entire model is not statistically significant.

The following table summarizes the outcomes of the study of the relationship between Seed and the dependent variables.

Coefficients:

**Table 8 Model estimations for the analysis of the relationship between Seed and the dependent variables**

Variable	Coefficient	Std_Error	t_value	p_value
(Intercept)	-116,405,271.162	55,799,934.924	-2.08611840	0.03733891
overall_score	1,334.244	4,141.197	0.32218802	0.74740899
certification_cycle	-16,231.312	98,637.989	-0.16455437	0.86934351
size 1-9	193,075.768	258,602.610	0.74661183	0.45555520

size 10-49	8,218.774	259,583.700	0.03166136	0.97475137
size 50-249	-400,055.729	290,896.298	-1.37525205	0.16950488
year_rounds	57,942.168	27,577.203	2.10108934	0.03599953
catgr_Professional.Services	33,428.464	212,617.759	0.15722329	0.87511541
catgr_Apps	660,528.009	340,674.744	1.93888165	0.05292793
catgr_Design	-440,474.094	363,624.107	-1.21134459	0.22618292
catgr_Information.Technology	-241,550.989	212,877.074	-1.13469705	0.25690092
catgr_Mobile	-697,787.098	325,850.200	-2.14143523	0.03259267
catgr_Privacy.and.Security	398,614.513	979,997.970	0.40675035	0.68431897
catgr_Software	-189,024.262	177,970.284	-1.06211137	0.28856108
catgr_Agriculture.and.Farming	-319,884.887	257,284.789	-1.24331053	0.21418066
catgr_Community.and.Lifestyle	60,627.365	183,922.932	0.32963462	0.74177728
catgr_Commerce.and.Shopping	139,531.867	175,146.382	0.79665857	0.42592658
catgr_Manufacturing	-442,932.653	211,318.201	-2.09604592	0.03644608
catgr_Real.Estate	42,869.145	231,150.606	0.18545980	0.85292355
catgr_Artificial.Intelligence	-297,078.144	536,862.757	-0.55335957	0.58019857
catgr_Data.and.Analytics	-370,566.326	375,995.448	-0.98556067	0.32469825
catgr_Science.and.Engineering	684,224.868	284,423.998	2.40565097	0.01640888
catgr_Other	78,324.607	166,616.307	0.47008968	0.63844123
catgr_Consumer.Goods	-73,923.488	189,105.143	-0.39091210	0.69598430
catgr_Transportation	-195,605.949	213,397.300	-0.91662804	0.35966160
catgr_Media.and.Entertainment	-594,327.718	474,125.505	-1.25352404	0.21044460
catgr_Music.and.Audio	104,074.069	1,627,088.462	0.06396337	0.94901813
catgr_Financial.Services	-116,720.164	207,155.087	-0.56344339	0.57331820
catgr_Payments	424,854.645	569,036.104	0.74662160	0.45554930
catgr_Food.and.Beverage	-162,807.848	159,476.112	-1.02089176	0.30766772
catgr_Sales.and.Marketing	550,187.456	369,870.241	1.48751480	0.13734108
catgr_Education	-302,731.517	269,578.492	-1.12298097	0.26184074
catgr_Events	976,115.518	766,322.941	1.27376523	0.20318055
catgr_Internet.Services	-23,831.828	214,117.704	-0.11130246	0.91140925
catgr_Administrative.Services	143,721.501	253,739.644	0.56641327	0.57129922
catgr_Hardware	27,383.582	271,515.586	0.10085455	0.91969557
catgr_Navigation.and.Mapping	73,415.766	742,831.013	0.09883239	0.92130039
catgr_Gaming	635,226.263	486,209.681	1.30648625	0.19182766
catgr_Health.Care	-55,670.810	163,943.460	-0.33957323	0.73428248
catgr_Content.and.Publishing	-88,992.144	1,531,935.205	-0.05809132	0.95369290
catgr_Sports	-405,391.609	303,518.619	-1.33564000	0.18211253
catgr_Consumer.Electronics	-80,765.454	377,223.213	-0.21410521	0.83052901
catgr_Advertising	-406,405.094	639,234.717	-0.63576818	0.52514080
catgr_Clothing.and.Apparel	-25,963.120	402,350.887	-0.06452855	0.94856828
catgr_Government.and.Military	2,419,046.115	1,462,901.489	1.65359468	0.09867007
catgr_Sustainability	-112,148.834	171,999.112	-0.65203147	0.51460055
catgr_Lending.and.Investments	314,033.767	325,939.199	0.96347346	0.33565147
catgr_Travel.and.Tourism	-372,307.605	310,190.571	-1.20025442	0.23045729
catgr_Energy	-283,775.789	256,651.646	-1.10568467	0.26925291
catgr_Natural.Resources	126,746.520	272,140.532	0.46573922	0.64155087
catgr_Video	258,504.341	1,797,935.638	0.14377842	0.88571792
catgr_Messaging.and.Telecommunications	-28,884.524	1,490,266.835	-0.01938212	0.98454195
catgr_Biotechnology	-611,392.056	433,604.617	-1.41002201	0.15898906

--- Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residuals:

Min.	1st Qu.	Median	3rd Qu.	Max.
-2119658	-668879	-331527	120363	18555792

- Total Sum of Squares: 1.5565e+15



- Residual Sum of Squares: 1.4113e+15
- R-Squared: 0.093261
- Adj. R-Squared: 0.024126
- F-statistic: 1.34896 on 52 and 682 DF, p-value: 0.05568

The intercept is -116,405,271.162, indicating the estimated amount of seed funding raised when all predictor variables are zero.

Overall Score ( $\beta_1$ ): The overall\_score coefficient estimate is 1334.2. However, the p-value associated with this coefficient is 0.74741, indicating that this relationship is not statistically significant.

Certification Cycle ( $\beta_2$ ): The certification\_cycle coefficient estimate is -16231. This suggests that, on average, a longer certification cycle is associated with a decrease in the seed raised amount. However, the p-value (0.86934) indicates that this relationship is not statistically significant.

Year Fundround ( $\beta_3$ ): The year\_fundround coefficient estimate is 57942. This coefficient's p-value is 0.036, which is less than the customary threshold of 0.05. This shows that the year\_fundround variable has a statistically significant effect on the seed\_raised\_amount\_usd. It implies that the year of the investment round has an impact on the amount obtained through seed funding.

The coefficients for the "size" variables represent the estimated effects of different company sizes on the amount raised. None of these coefficients are statistically significant, as their p-values are greater than 0.05.

The model incorporates an abundant number of category variables that reflect various industries or sectors. Each coefficient for a single category variable shows the projected change in the amount of seed raised in comparison to the reference category (omitted category). For example, the coefficient for "catgr\_Mobile" is -697790, showing that enterprises classified as "Mobile" have a lower average seed raised quantity than the reference group. The statistical significance of these coefficients, however, varies, with some being significant (p-value 0.05) and others not.

The R-squared value is 0.093261, indicating that the independent variables in the model explain approximately 9.33% of the variation in the seed raised amount. The adjusted R-squared value, which accounts for the number of variables in the model, is 0.024126.

The following table summarizes the outcomes of the study of the relationship between Series A and the dependent variables.

Coefficients:

Table 9 Model estimations for the analysis of the relationship between Series A and the dependent variables

Variable	Coefficient	Std_Error	t_value	p_value
(Intercept)	-144,938,599.63	146,229,871.50	-0.99116958	0.32195431
overall_score	-16,885.68	10,852.46	-1.55593037	0.12018855
certification_cycle	-90,937.11	258,491.71	-0.35179893	0.72509773
size 1-9	209,686.29	677,696.60	0.30941027	0.75710396
size 10-49	968,105.02	680,267.66	1.42312369	0.15515757
size 50-249	401,498.35	762,325.77	0.52667555	0.59859016
year_rounds	72,715.13	72,269.10	1.00617187	0.31468975
catgr_Professional.Services	470,183.47	557,188.24	0.84385031	0.39904894
catgr_Apps	456,508.56	892,775.67	0.51133625	0.60928112
catgr_Design	-53,592.27	952,917.00	-0.05624022	0.95516691
catgr_Information.Technology	-971,757.92	557,867.80	-1.74191434	0.08197426
catgr_Mobile	114,285.77	853,926.32	0.13383563	0.89357203
catgr_Privacy.and.Security	-3,449,428.62	2,568,192.55	-1.34313474	0.17967513
catgr_Software	1,051,666.68	466,390.72	2.25490482	0.02445564
catgr_Agriculture.and.Farming	-638,281.58	674,243.11	-0.94666385	0.34414538
catgr_Community.and.Lifestyle	404,547.75	481,990.29	0.83932760	0.40157961
catgr_Commerce.and.Shopping	-194,155.02	458,990.37	-0.42300456	0.67242528
catgr_Manufacturing	-500,576.02	553,782.60	-0.90392153	0.36635619
catgr_Real.Estate	122,487.86	605,755.61	0.20220673	0.83981541
catgr_Artificial.Intelligence	-92,699.71	1,406,907.95	-0.06588897	0.94748554
catgr_Data.and.Analytics	294,067.67	985,337.46	0.29844361	0.76545551
catgr_Science.and.Engineering	1,474,159.20	745,364.39	1.97776982	0.04835682
catgr_Other	-762,000.68	436,636.37	-1.74516080	0.08140727
catgr_Consumer.Goods	191,900.64	495,570.84	0.38723151	0.69870563
catgr_Transportation	1,526,898.38	559,231.12	2.73035304	0.00649002
catgr_Media.and.Entertainment	-1,065,996.33	1,242,498.07	-0.85794606	0.39122365
catgr_Music.and.Audio	545,810.40	4,263,964.41	0.12800538	0.89818245
catgr_Financial.Services	1,025,632.24	542,872.71	1.88926837	0.05927984
catgr_Payments	1,104,602.36	1,491,221.74	0.74073649	0.45910818
catgr_Food.and.Beverage	222,026.61	417,924.70	0.53125985	0.59541170
catgr_Sales.and.Marketing	-937,599.91	969,285.68	-0.96731019	0.33373189
catgr_Education	-1,168,971.41	706,460.11	-1.65468849	0.09844780
catgr_Events	2,188,867.42	2,008,233.62	1.08994661	0.27612162
catgr_Internet.Services	69,331.32	561,119.01	0.12355904	0.90170083
catgr_Administrative.Services	-1,037,880.15	664,952.67	-1.56083312	0.11902702
catgr_Hardware	-1,240,558.28	711,536.48	-1.74349217	0.08169829
catgr_Navigation.and.Mapping	-1,648,729.31	1,946,670.43	-0.84694835	0.39732101
catgr_Gaming	583,117.73	1,274,165.99	0.45764660	0.64735212
catgr_Health.Care	-259,679.76	429,631.88	-0.60442386	0.54576289
catgr_Content.and.Publishing	529,693.32	4,014,604.83	0.13194158	0.89506941
catgr_Sports	439,324.27	795,403.95	0.55232850	0.58090427
catgr_Consumer.Electronics	853,894.44	988,554.95	0.86378045	0.38801219
catgr_Advertising	1,378,232.12	1,675,184.94	0.82273430	0.41094667
catgr_Clothing.and.Apparel	-458,191.81	1,054,404.79	-0.43455020	0.66402640
catgr_Government.and.Military	-1,301,867.65	3,833,694.38	-0.33958566	0.73427312
catgr_Sustainability	685,305.52	450,742.61	1.52039214	0.12887591
catgr_Lending.and.Investments	1,266,649.21	854,159.55	1.48291876	0.13855794
catgr_Travel.and.Tourism	442,667.35	812,888.53	0.54456095	0.58623352
catgr_Energy	-872,368.69	672,583.89	-1.29704072	0.19505579
catgr_Natural.Resources	353,134.70	713,174.22	0.49515909	0.62064732
catgr_Video	-528,410.01	4,711,688.24	-0.11214876	0.91073845
catgr_Messaging.and.Telecommunications	-726,300.81	3,905,408.28	-0.18597308	0.85252117
catgr_Biotechnology	712,504.52	1,136,308.63	0.62703433	0.53084658

--- Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residuals:

Min.	1st Qu.	Median	3rd Qu.	Max.
-6243803	-1655653	-822554	57764	29833966

- Total Sum of Squares: 1.086e+16
- Residual Sum of Squares: 9.6925e+15
- R-Squared: 0.10751
- Adj. R-Squared: 0.039459
- F-statistic: 1.57986 on 52 and 682 DF, p-value: 0.0070187

The intercept is -115,477,951.38, indicating the estimated amount of Series A funding raised when all predictor variables are zero.

Overall Score ( $\beta_1$ ): The overall\_score coefficient estimate is -16886. It is not statistically significant (p-value = 0.12019). It implies a negative link between overall score and amount raised.

Certification Cycle ( $\beta_2$ ): The coefficient for "certification\_cycle" is -90937, and it is not statistically significant (p-value = 0.72510).

Year rounds ( $\beta_3$ ): The coefficient for "year\_rounds" is 72715, and it is not statistically significant (p-value = 0.31469).

The "size" coefficients represent the estimated effects of different firm sizes on the amount raised. For example, the coefficient for "size 1-9" is 209686. This means that, on average, companies in the size range of 1-9 employees have an expected increase in the seed raised amount by 209686 units compared to the reference category (larger companies), holding other variables constant. However, the coefficients for all three size categories are not statistically significant (p-values > 0.05), indicating that the relationship between company size and Serie A raised amount is not statistically supported in this model.

The coefficient for "catgr\_Software" is 1051667, indicating that companies in the software industry category are projected to raise 1051667 units more than the reference category (other industry categories), after controlling for other factors. At the 0.05 significance level, this effect is statistically significant (p-value = 0.02446). The coefficients for other "catgr\_" variables, including the "size" variable, show the estimated effects of being in certain industrial groups on the amount of Serie A raised. Some industrial categories, such as "catgr\_Science.and.Engineering" and "catgr\_Transportation," exhibit statistically significant effects (p-values 0.05), whereas others do not.

The R-squared and modified R-squared values are also used to measure overall model fit. The R-squared value in this case is 0.10751, indicating that the model explains approximately 10.75% of the variation in seed raised quantity. The adjusted R-squared value is 0.039459, which accounts for the

number of variables in the model. The F-statistic measures the overall significance of the model and has a value of 1.57986 with a p-value of 0.0070187 in this example. This implies that the model as a whole has a statistically significant link with the amount of seed raised.

The following table summarizes the outcomes of the study of the relationship between Debt financing and the dependent variables.

Coefficients:

Table 10 Model estimations for the analysis of the relationship between Debt financing and the dependent variables

Variable	Coefficient	Std_Error	t_value	p_value
(Intercept)	-406,715,676.582	546,945,092.06	-0.743613358	0.457366516
overall_score	-33,926.258	40,591.58	-0.835795494	0.403562678
certification_cycle	-533,891.112	966,839.19	-0.552202595	0.580990467
size 1-9	118,032.323	2,534,795.57	0.046564829	0.962873695
size 10-49	-692,958.750	2,544,412.12	-0.272345326	0.785438940
size 50-249	5,118,338.250	2,851,334.91	1.795067364	0.073085626
year_rounds	203,891.491	270,308.84	0.754290863	0.450934945
catgr_Professional.Services	-2,996,613.948	2,084,056.91	-1.437875296	0.150928116
catgr_Apps	4,728,268.397	3,339,258.01	1.415963782	0.157242635
catgr_Design	1,313,670.768	3,564,205.24	0.368573266	0.712560206
catgr_Information.Technology	-681,131.836	2,086,598.68	-0.326431643	0.744197947
catgr_Mobile	-1,625,970.031	3,193,949.38	-0.509078209	0.610862065
catgr_Privacy.and.Security	-6,008,098.790	9,605,837.01	-0.625463329	0.531876241
catgr_Software	-2,484,346.650	1,744,446.00	-1.424146491	0.154861442
catgr_Agriculture.and.Farming	233,440.269	2,521,878.44	0.092566028	0.926275518
catgr_Community.and.Lifestyle	-1,285,125.411	1,802,793.23	-0.712852363	0.476180943
catgr_Commerce.and.Shopping	-630,425.137	1,716,766.41	-0.367216607	0.713571369
catgr_Manufacturing	-2,283,141.759	2,071,318.77	-1.102264794	0.270735395
catgr_Real.Estate	-967,156.956	2,265,713.92	-0.426866317	0.669611418
catgr_Artificial.Intelligence	5,258,321.485	5,262,272.26	0.999249225	0.318028375
catgr_Data.and.Analytics	-3,074,172.599	3,685,467.83	-0.834133614	0.404497757
catgr_Science.and.Engineering	-356,126.639	2,787,894.11	-0.127740375	0.898392093
catgr_Other	860,021.654	1,633,155.51	0.526601201	0.598641778
catgr_Consumer.Goods	161,581.324	1,853,588.71	0.087172156	0.930560259
catgr_Transportation	-919,768.390	2,091,697.89	-0.439723343	0.660276798
catgr_Media.and.Entertainment	-4,553,361.670	4,647,328.32	-0.979780501	0.327541905
catgr_Music.and.Audio	4,917,525.182	15,948,549.94	0.308336821	0.757920204
catgr_Financial.Services	3,717,175.250	2,030,512.37	1.830658758	0.067587690
catgr_Payments	10,575,219.039	5,577,632.03	1.896005149	0.058381796
catgr_Food.and.Beverage	8,601.318	1,563,168.07	0.005502491	0.995611279
catgr_Sales.and.Marketing	-796,672.180	3,625,429.19	-0.219745619	0.826135029
catgr_Education	1,925,916.156	2,642,380.02	0.728856615	0.466339582
catgr_Events	4,523,486.067	7,511,416.85	0.602214756	0.547231353
catgr_Internet.Services	2,202,240.648	2,098,759.21	1.049306008	0.294408991
catgr_Administrative.Services	1,497,835.467	2,487,129.30	0.602234659	0.547218115
catgr_Hardware	787,751.978	2,661,367.21	0.295995222	0.767323834
catgr_Navigation.and.Mapping	2,510,226.122	7,281,151.44	0.344756752	0.730383537
catgr_Gaming	1,165,308.870	4,765,776.14	0.244516074	0.806904700
catgr_Health.Care	-336,259.169	1,606,956.55	-0.209252185	0.834313863
catgr_Content.and.Publishing	3,785,036.902	15,015,867.72	0.252069143	0.801063564
catgr_Sports	-817,011.076	2,975,057.58	-0.274620257	0.783691167
catgr_Consumer.Electronics	-2,917,211.045	3,697,502.25	-0.788968024	0.430404873
catgr_Advertising	-220,583.778	6,265,711.45	-0.035204905	0.971926652
catgr_Clothing.and.Apparel	-1,379,130.941	3,943,801.07	-0.349695869	0.726674911
catgr_Government.and.Military	-2,457,967.015	14,339,206.50	-0.171415832	0.863947653
catgr_Sustainability	508,247.822	1,685,917.21	0.301466656	0.763150568
catgr_Lending.and.Investments	-4,660,586.077	3,194,821.74	-1.458793779	0.145082261
catgr_Travel.and.Tourism	-1,779,291.219	3,040,455.34	-0.585205510	0.558603109
catgr_Energy	6,914,809.009	2,515,672.43	2.748692128	0.006141654
catgr_Natural.Resources	-4,141,499.051	2,667,492.86	-1.552581117	0.120987143
catgr_Video	-8,745,224.925	17,623,175.99	-0.496234330	0.619888981

catgr_Messaging.and.Telecommunications	-3,548,334.077	14,607,438.74	-0.242912816	0.808145975
catgr_Biotechnology	5,622,320.058	4,250,146.84	1.322853130	0.186327599

--- Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residuals:

Min.	1st Qu.	Median	3rd Qu.	Max.
-22214870	-3071806	-630217	1016318	253876011

- Total Sum of Squares: 1.4672e+17
- Residual Sum of Squares: 1.356e+17
- R-Squared: 0.075817
- Adj. R-Squared: 0.0053514
- F-statistic: 1.07594 on 52 and 682 DF, p-value: 0.33677

The intercept of -406715676.582 represents the estimated amount of debt financing raised when all predictor variables are zero.

Overall Score ( $\beta_1$ ): The "overall\_score" coefficient is -33926.258, and it is not statistically significant (p-value = 0.403563). As a result, the total score does not appear to have a substantial impact on the amount of debt funding raised.

Certification Cycle ( $\beta_2$ ): The "certification\_cycle" coefficient is -533890 and is not statistically significant (p-value = 0.580990). This shows that the certification procedure has no impact on the amount raised through debt financing.

Year Fundround ( $\beta_3$ ): The coefficient for "year\_fundround" is 203891.491, and it is not statistically significant (p-value = 0.450935). This indicates that the timing of the funding round does not have a significant impact on the amount raised through debt financing.

The "size" coefficients represent the estimated effects of different firm sizes on the amount raised. The "size 50-249" coefficient is statistically significant (p-value = 0.073086), showing that companies with 50-249 employees likely to raise more Debt funding than other size groups. The remaining size categories' coefficients are not statistically significant.

The coefficients and p-values indicate the impact of each category "catgr\_" on the debt financing raised amount. However, many of these coefficients are not statistically significant (p-values > 0.05), suggesting that the categories may not have a significant relationship with the debt financing raised amount in this model. The variable "catgr\_Energy" stands out with a statistically significant coefficient,

indicating that campaigns related to energy have a positive association with the debt financing raised amount.

The R-squared value of 0.075817 suggests that the model explains only a small portion of the variation in the debt financing raised amount. The Adjusted R-squared value is even lower at 0.0053514, indicating that the model's explanatory power is limited.

In summary, the results indicate that the model variables (overall\_score, certification\_cycle, year\_fundround, and size (except size 50-249)) have no meaningful impact on the amount obtained through debt financing. The variable "catgr\_Energy" appears to have a significant positive association, but further analysis and consideration of other factors are necessary to draw more conclusive insights.

#### IV. BETWEEN B CORP SUBSCORES AND OVERALL SCORE

This study's regression approach allows for the examination of many predictor variables related to B Corp subscores and their link to the B Corp score. The regression model produced interesting results, revealing the links between predictor factors and B Corp score. The computed coefficients for each variable represent the predicted change in CSR performance for a one-unit increase in the related predictor variable while maintaining other factors fixed. Here are the results of the model.

Coefficients:

	Estimate	Std. Error	t-value	Pr(> t )
(Intercept)	2.6630e-01	2.4486e-02	10.8755	<2.2e-16**
impact_area_community	9.9994e-01	3.5092e-04	2849.4485	<2.2e-16**
impact_area_customers	1.0004e+00	2.3292e-04	4295.0649	<2.2e-16**
impact_area_environment	1.0003e+00	3.4170e-04	2927.2532	<2.2e-16**
impact_area_governance	6.3390e-01	5.3033e-02	11.9529	<2.2e-16**
impact_area_workers	9.9991e-01	5.2999e-04	1886.6714	<2.2e-16**
impact_area_community_na_score	1.0051e+00	3.2148e-03	312.6440	<2.2e-16**
impact_area_customers_na_score	1.1836e+00	6.0377e-03	196.0280	<2.2e-16**
impact_area_environment_na_score	1.0048e+00	1.2883e-03	779.8817	<2.2e-16**
impact_area_workers_na_score	1.0066e+00	1.4918e-03	674.7296	<2.2e-16**
ia_community_it_civic_engagement_giving	1.9928e-03	1.7387e-03	1.1461	0.2518898
ia_community_it_diversity_equity_inclusion	2.1656e-03	1.6556e-03	1.3081	0.1910066
ia_community_it_diversity_inclusion	3.1577e-03	1.5777e-03	2.0014	0.0454801*
ia_community_it_economic_impact	-2.3808e-03	1.3462e-03	-1.7685	0.0771308
ia_community_it_job_creation	-3.8825e-05	1.4824e-03	-0.0262	0.9791076
ia_community_it_local_involvement	-1.9295e-03	1.0971e-03	-1.7587	0.0787771
ia_community_it_suppliers_distributors_product	1.0178e-03	1.3551e-03	0.7511	0.4526864
ia_community_it_supply_chain_management	-2.4694e-03	1.8994e-03	-1.3001	0.1937155
ia_customers_it_customer_stewardship	-9.9418e-04	2.6096e-03	-0.3810	0.7032622
ia_environment_it_air_climate	2.4064e-03	1.5880e-03	1.5154	0.1298290
ia_environment_it_environmental_management	-2.6085e-03	1.8036e-03	-1.4463	0.1482526
ia_environment_it_inputs	4.1391e-03	1.8091e-03	2.2880	0.0222436*
ia_environment_it_land_life	-1.1954e-03	1.8335e-03	-0.6520	0.5144681
ia_environment_it_land_office_plant	-5.8233e-03	1.5029e-03	-3.8747	0.0001102***
ia_environment_it_outputs	-1.9685e-03	2.2381e-03	-0.8795	0.3792190
ia_environment_it_water	-3.7041e-03	3.9603e-03	-0.9353	0.3497548
ia_governance_it_corporate_accountability	1.3802e-03	3.1883e-03	0.4329	0.6651514
ia_governance_it_ethics_transparency	3.7494e-01	5.3094e-02	7.0618	2.264e-12***
ia_governance_it_mission_engagement	3.5533e-01	5.2968e-02	6.7084	2.559e-11***
ia_governance_it_mission_locked	3.7010e-01	5.3025e-02	6.9797	4.018e-12***

ia_governance_it_transparency	1.5122e-03	2.5919e-03	0.5834	0.5596785
ia_workers_it_career_development	1.9041e-03	3.3250e-03	0.5727	0.5669329
ia_workers_it_compensation_wages	8.4351e-04	1.0271e-03	0.8212	0.4116044
ia_workers_it_engagement_satisfaction	-2.3828e-03	2.5891e-03	-0.9203	0.3575121
ia_workers_it_financial_security	6.1744e-04	1.1483e-03	0.5377	0.5908318
ia_workers_it_health_wellness_safety	8.1428e-04	1.3013e-03	0.6258	0.5315445
ia_workers_it_management_worker_communication	-1.5419e-03	1.8043e-03	-0.8546	0.3928906
ia_workers_it_training_education	2.9636e-03	3.3593e-03	0.8822	0.3777703
ia_workers_it_worker_ownership	-7.7206e-03	1.8408e-03	-4.1941	2.861e-05***

Table 11 Model estimations for the analysis of the relationship between Overall Score and the subscores

--- Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residuals:

Min.	1st Qu.	Median	3rd Qu.	Max.
-0.5958860	-0.0719627	-0.0059551	0.0640675	0.6559698

- Total Sum of Squares: 592000
- Residual Sum of Squares: 25.785
- R-Squared: 0.99996
- Adj. R-Squared: 0.99996
- F-statistic: 1198660 on 38 and 1984 DF, p-value: < 2.22e-16

Based on the data provided:

The intercept term has a coefficient estimate of 2.6630e-01, indicating the expected value of the response variable when all predictor variables are zero.

Several predictor variables have highly significant coefficients ( $p < 0.001$ ), such as impact\_area\_community, impact\_area\_customers, impact\_area\_environment, impact\_area\_governance, and impact\_area\_workers.

Other variables, such as ia\_community\_it\_diversity\_inclusion, ia\_environment\_it\_inputs, ia\_environment\_it\_land\_office\_plant, and ia\_governance\_it\_ethics\_transparency, also have statistically significant coefficients ( $p < 0.05$ ).

Some variables, including ia\_community\_it\_job\_creation, ia\_environment\_it\_land\_life, ia\_environment\_it\_outputs, and ia\_environment\_it\_water, have coefficients that are not statistically significant ( $p > 0.05$ ).

The R-squared value is 0.99996, suggesting that the model accounts for a significant percentage of the variance in the response variable. The adjusted R-squared is the same, indicating that adding more predictor variables has no effect on the model's explanatory ability.

In summary, the regression findings indicate that there is a very significant association between the predictor variables and the response variable, with most of the predictors having a positive effect on the answer. However, it is critical to evaluate the data context, model assumptions, and the presence of multicollinearity or other factors that may influence the interpretation of the results.

## V. EXPLORING FACTORS AFFECTING TOTAL FUNDINGS AND SUBSCORES

This study's regression approach allows for the examination of many predictor variables related to B Corp subscores and their link to the B Corp score. The regression model produced interesting results, revealing the links between predictor factors and B Corp score. The computed coefficients for each variable represent the predicted change in CSR performance for a one-unit increase in the related predictor variable while maintaining other factors fixed. Here are the results of the model.

Coefficients:

	Estimate	Std. Error	t-value	Pr(> t )
(Intercept)	-583,879.234	1,224,467.54	-0.47684337	0.6335313480
impact_area_community	12,993.289	16,849.31	0.77114642	0.4407210271
impact_area_customers	-10,889.204	12,028.63	-0.90527409	0.3654409472
impact_area_environment	20,329.172	16,764.02	1.21266669	0.2254158804
impact_area_governance	-1,584,365.003	2,590,449.20	-0.61161786	0.5408675971
impact_area_workers	-35,897.543	25,439.15	-1.41111405	0.1583832262
impact_area_community_na_score	-27,615.487	155,924.71	-0.17710783	0.8594435510
impact_area_customers_na_score	1,395,903.366	376,900.19	3.70364193	0.0002189136
impact_area_environment_na_score	-60,422.865	61,472.75	-0.98292121	0.3257778756
impact_area_workers_na_score	154,767.860	74,244.57	2.08456817	0.0372487105
ia_community_it_civic_engagement_giving	-52,394.276	84,525.08	-0.61986661	0.5354238053
ia_community_it_diversity_equity_inclusion	-10,192.849	80,129.39	-0.12720486	0.8987924165
ia_community_it_diversity_inclusion	20,808.379	77,439.96	0.26870338	0.7881886423
ia_community_it_economic_impact	-55,664.774	66,002.66	-0.84337172	0.3991322676
ia_community_it_job_creation	84,030.796	72,931.24	1.15219203	0.2493946654
ia_community_it_local_involvement	-44,483.370	53,364.27	-0.83357968	0.4046281134
ia_community_it_suppliers_distributors_product	6,107.849	66,967.85	0.09120569	0.9273392685
ia_community_it_supply_chain_management	-22,938.346	92,950.19	-0.24678106	0.8051057192
ia_customers_it_customer_stewardship	166,872.157	128,722.10	1.29637533	0.1950118332
ia_environment_it_air_climate	-123,542.021	78,459.80	-1.57459008	0.1155262436
ia_environment_it_environmental_management	125,351.501	88,242.13	1.42054026	0.1556230720
ia_environment_it_inputs	124,163.203	87,481.40	1.41930979	0.1559812865
ia_environment_it_land_life	-29,912.846	89,861.44	-0.33287745	0.7392654267
ia_environment_it_land_office_plant	-120,926.264	74,656.54	-1.61976780	0.1054567530
ia_environment_it_outputs	-52,344.711	105,491.82	-0.49619689	0.6198158883
ia_environment_it_water	-382,854.388	193,989.99	-1.97357807	0.0485819617
ia_governance_it_corporate_accountability	-124,770.618	154,331.79	-0.80845703	0.4189340151
ia_governance_it_ethics_transparency	1,682,752.953	2,593,698.26	0.64878516	0.5165597359
ia_governance_it_mission_engagement	1,415,687.699	2,586,670.48	0.54730114	0.5842394840
ia_governance_it_mission_locked	1,620,049.209	2,588,749.28	0.62580383	0.5315226964
ia_governance_it_transparency	-69,449.202	125,215.72	-0.55463643	0.5792120456
ia_workers_it_career_development	79,978.772	163,580.54	0.48892596	0.6249534802
ia_workers_it_compensation_wages	-5,061.727	50,455.71	-0.10032020	0.9201012533
ia_workers_it_engagement_satisfaction	190,241.311	126,656.44	1.50202639	0.1332651123
ia_workers_it_financial_security	78,970.493	55,743.01	1.41668878	0.1567464030
ia_workers_it_health_wellness_safety	-31,348.451	63,725.97	-0.49192579	0.6228315896
ia_workers_it_management_worker_communication	51,602.316	88,351.69	0.58405580	0.5592557106
ia_workers_it_training_education	11,110.198	162,982.89	0.06816788	0.9456595436
ia_workers_it_worker_ownership	195,946.634	92,458.78	2.11928638	0.0342023961

Table 12 Model estimations for the analysis of the relationship between Total fundings and the subscores



--- Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residuals:

Min.	1st Qu.	Median	3rd Qu.	Max.
-4939689	-1020855	-448404	75348	115626189

- Total Sum of Squares: 5.2518e+16
- Residual Sum of Squares: 5.1089e+16
- R-Squared: 0.027213
- Adj. R-Squared: 0.0067445
- F-statistic: 1.32951 on 38 and 1806 DF, p-value: 0.087069

The aim of this study was to examine the factors influencing the total amount raised by subscores. A panel data model using the "pooling" approach was employed to analyze the data.

The study's findings revealed that the model's overall performance in explaining the total amount raised was rather weak, as evidenced by the low R-squared value of 0.0272. This implies that the model's variables explain just roughly 2.72% of the entire variation in the total amount raised by impact-oriented programs.

Examining the coefficients of the independent variables provides insights into their individual effects on the total amount raised. Notably, the coefficients of the impact area variables, such as `impact_area_community`, `impact_area_customers`, `impact_area_environment`, `impact_area_governance`, and `impact_area_workers`, indicate the expected change in the total amount raised when compared to their respective base levels.

Exploring the dimensions within the community impact area, variables such as `ia_community_it_civic_engagement_giving` and `ia_community_it_diversity_equity_inclusion` did not exhibit a significant relationship with the total amount raised. This implies that specific dimensions within the community impact area may not be strong determinants of fundraising success.

However, it was found that projects emphasizing customer stewardship, as represented by the variable `ia_customers_it_customer_stewardship`, tend to attract higher total amounts raised. Conversely, grades related to water management or conservation, as indicated by `ia_environment_it_water`, were associated with lower total amounts raised. This suggests that the specific focus of a project, particularly in terms of customer stewardship and water-related initiatives, can significantly influence the fundraising outcomes of SMEs.

Additionally, the presence of worker ownership, captured by the variable `ia_workers_it_worker_ownership`, was found to have a positive and statistically significant effect on the total amount raised. This implies that projects involving worker ownership tend to attract higher levels of funding.

In conclusion, while several specific dimensions within impact areas and project features revealed significant relationships with total amount raised, the model's overall explanatory power was very modest. This shows that, in addition to the variables considered in this study, there may be other unexplored elements or contextual impacts that contribute to the fundraising outcomes of impact-oriented programs.

## VI. INDUSTRY SECTORS AND B CORP CERTIFICATION

The total amount raised is the dependent variable in this section. The independent variables are a collection of dummy variables representing various industry sectors and also the dummy variable `B_Corporation`.

Consider the coefficient for the "`catgr_Software`" dummy variable, for example. A positive coefficient shows that working in the software industry is related with a higher total amount raised as compared to the reference group (usually the excluded sector). A negative coefficient, on the other hand, indicates that working in the software industry is related with a lower total amount raised.

Here are the results of the model:

Coefficients:

**Table 13 Model estimations for the analysis of the relationship between Total funding amount and the different sectors and B\_Corporation**

	Estimate	Std. Error	t-value	Pr(> t )
(Intercept)	-63,864.8046	22,764.46	-2.805460849	0.005025
<code>catgr_Professional.Services</code>	-75,635.8553	24,514.01	-3.085413955	0.002033
<code>catgr_Commerce.and.Shopping</code>	-8,764.5170	29,982.77	-0.292318477	0.770044
<code>catgr_Other</code>	-28,250.1232	26,313.95	-1.073579602	0.283014
<code>catgr_Sales.and.Marketing</code>	-21,145.3131	39,092.44	-0.540905373	0.588574
<code>catgr_Software</code>	58,897.9162	31,125.54	1.892269710	0.058458
<code>catgr_Food.and.Beverage</code>	144,127.8797	34,664.64	4.157778028	0.000032
<code>catgr_Financial.Services</code>	209,974.2277	35,766.85	5.870638131	0.000000
<code>catgr_Sustainability</code>	278,242.8458	40,912.15	6.800982817	0.000000
<code>catgr_Design</code>	-40,600.4960	34,992.76	-1.160254315	0.245948
<code>catgr_Media.and.Entertainment</code>	-37,198.1052	42,073.29	-0.884126437	0.376630
<code>catgr_Community.and.Lifestyle</code>	222.4902	37,568.88	0.005922195	0.995275
<code>catgr_Internet.Services</code>	96,519.8237	33,814.94	2.854354289	0.004313
<code>catgr_Health.Care</code>	110,496.1713	32,571.35	3.392434638	0.000693
<code>catgr_Information.Technology</code>	36,513.8369	32,341.31	1.129015416	0.258894
<code>catgr_Advertising</code>	-12,553.5616	49,854.30	-0.251805014	0.801192
<code>catgr_Consumer.Goods</code>	28,745.5350	41,421.17	0.693981755	0.487695
<code>catgr_Real.Estate</code>	37,106.5829	32,651.93	1.136428521	0.255780
<code>catgr_Manufacturing</code>	-3,185.0004	33,650.72	-0.094648812	0.924594

catgr_Education	12,180.0913	38,353.24	0.317576597	0.750807
catgr_Lending.and.Investments	-147,598.7018	64,738.86	-2.279908924	0.022615
catgr_Administrative.Services	102,748.5471	42,534.27	2.415665126	0.015708
catgr_Clothing.and.Apparel	80,627.6675	63,475.72	1.270212709	0.204012
catgr_Energy	214,878.4045	65,218.75	3.294733772	0.000985
catgr_Science.and.Engineering	155,200.4530	49,488.65	3.136081873	0.001713
catgr_Hardware	-11,443.5561	49,846.50	-0.229575918	0.818422
catgr_Data.and.Analytics	73,506.1370	54,614.12	1.345918160	0.178332
catgr_Transportation	111,915.0899	44,609.46	2.508774915	0.012117
catgr_Agriculture.and.Farming	519,556.7037	68,495.90	7.585223897	0.000000
catgr_Sports	25,500.1878	59,896.32	0.425738828	0.670299
catgr_Apps	10,100.0856	59,892.40	0.168637170	0.866082
catgr_Content.and.Publishing	51,719.2701	62,835.68	0.823087669	0.410460
catgr_Travel.and.Tourism	127,499.3335	64,932.78	1.963558688	0.049584
catgr_Natural.Resources	50,026.2436	78,155.62	0.640085013	0.522119
catgr_Consumer.Electronics	62,672.9406	74,253.53	0.844039927	0.398649
catgr_Events	2,681.2217	75,750.79	0.035395299	0.971765
catgr_Video	156,367.1773	79,424.77	1.968745739	0.048985
catgr_Biotechnology	867,263.3369	101,183.68	8.571178008	0.000000
catgr_Artificial.Intelligence	-22,510.1190	106,411.07	-0.211539270	0.832467
catgr_Government.and.Military	4,209.3304	89,638.06	0.046959185	0.962546
catgr_Privacy.and.Security	-874.5270	73,615.08	-0.011879727	0.990522
catgr_Payments	401,881.4526	109,525.82	3.669284988	0.000243
catgr_Messaging.and.Telecommunications	218,012.0801	126,397.91	1.724807641	0.084565
catgr_Music.and.Audio	8,290.3182	101,862.10	0.081387666	0.935134
catgr_Gaming	78,574.0482	112,186.72	0.700386360	0.483688
catgr_Navigation.and.Mapping	-102,387.7517	157,368.45	-0.650624378	0.515290
catgr_Platforms	-81,129.6408	131,924.85	-0.614968597	0.538577
B_Corporation	436,811.7684	24,812.70	17.604364233	0.00000001

--- Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residuals:

Min.	1st Qu.	Median	3rd Qu.	Max.
-2193210	-228342	-46631	47251	278931890

- Total Sum of Squares: 9.2111e+17
- Residual Sum of Squares: 9.1388e+17
- R-Squared: 0.0078502
- Adj. R-Squared: 0.0074044
- F-statistic: 17.6109 on 47 and 104611 DF, p-value: < 2.22e-16

In this study, a pooling model was employed to examine the factors influencing the total amount raised by impact-oriented projects. The results of the pooling model reveal several significant findings. Firstly, the coefficients of the categorical variables representing different industry categories indicate their impact on the total amount raised. Notably, the categories of "Professional Services," "Food and Beverage," "Financial Services," "Sustainability," "Healthcare," "Internet Services," "Energy," "Science and Engineering," "Transportation," "Agriculture and Farming," "Biotechnology," and "Payments" were found to have statistically significant effects on the total amount raised. These categories

exhibited positive coefficients, suggesting that projects falling within these industries tend to attract higher levels of funding.

Conversely, several industry categories, such as "Commerce and Shopping," "Other," "Sales and Marketing," "Design," "Media and Entertainment," "Consumer Goods," "Real Estate," "Manufacturing," "Education," "Lending and Investments," "Clothing and Apparel," "Information Technology," "Advertising," "Hardware," "Data and Analytics," "Content and Publishing," "Natural Resources," "Consumer Electronics," "Events," "Video," "Artificial Intelligence," "Government and Military," "Privacy and Security," "Messaging and Telecommunications," "Music and Audio," "Gaming," "Navigation and Mapping," and "Platforms," did not demonstrate statistically significant effects on the total amount raised.

Furthermore, the coefficient for the dummy variable "B\_Corporation" was determined to be highly significant. A positive coefficient indicates that being a B Corp certified company has a positive impact on the overall amount raised by firms.

The overall performance of the model in explaining the variation in the total amount raised was relatively weak, as indicated by the low R-squared value of 0.0079. This implies that the variables included in the model collectively explain only around 0.79% of the total variation in the total amount raised by firms.

It should be noted that the coefficient estimates should be viewed with caution because several variables had no statistically significant effects on the overall amount raised. Furthermore, the low R-squared value shows the inclusion of unknown elements or contextual impacts that contribute to the fundraising outcomes of impact-oriented programs in addition to the variables considered in this study.

These findings are useful for practitioners and policymakers working on impact-oriented programs. Professional Services, Food and Beverage, Financial Services, Sustainability, Healthcare, Internet Services, Energy, Science and Engineering, Transportation, Agriculture and Farming, Biotechnology, and Payments have a better chance of attracting more funding for their impact-oriented projects. Obtaining B Corp certification can also considerably increase the overall amount raised.

## VII. THE IMPACT OF B CORP CERTIFICATION, FIRM SIZE, AND FIRM AGE ON FUNDING SUCCESS FOR SMES:

The outcomes of the logistic regression analysis investigating the influence of B Corp certification, company size, and firm age on the likelihood of funding success for SMEs are presented in this section.

The dependent variable, *funding\_success*, is a binary variable indicating whether an SME obtained funding (1) or not (0). The independent variables of interest include B Corp certification, firm size, and age of the firm.

**Table 14 Model estimations for the analysis of the relationship between the probability of funding success and dependent variables**

	Estimate	Std. Error	t-value	Pr(> t )
<b>(Intercept)</b>	-4.422848440	0.1311963068	-33.71168	3.897575e-249
<b>B_Corporation</b>	0.677292744	0.0521477665	12.98795	1.432061e-38
<b>size 1-9</b>	0.627866713	0.1360399326	4.615312	3.925055e-06
<b>size 10-49</b>	0.775708312	0.1340192985	5.788034	7.121482e-09
<b>size 50-249</b>	1.037949044	0.1412303471	7.349334	1.991963e-13
<b>Age</b>	-0.002895802	0.0008885087	-3.259172	1.117380e-03

The results show that B Corp certification has a statistically significant positive effect on the odds of funding success for SMEs ( $\beta = 0.6773$ ,  $p < 0.001$ ). This means that, even after controlling for other variables, SMEs with B Corp accreditation are more likely to get funding than those without certification. This research implies that B Corp certification serves as a signal of social and environmental responsibility, which may attract investors and enhance funding opportunities.

Furthermore, firm size has a substantial association with funding performance. The coefficient estimates for firm sizes 1-9, 10-49, and 50-249 are all positive and statistically significant. This suggests that larger SMEs, in terms of employee numbers, have a better chance of securing funding than smaller SMEs. This finding is consistent with earlier research emphasizing the benefits of scale and resources that larger organizations have in attracting investors and accessing funding options.

Interestingly, the age of the firm exhibits a negative and statistically significant effect on funding success ( $\beta = -0.0029$ ,  $p < 0.01$ ). This implies that as the firm's age increases, the chances of obtaining capital diminish slightly. One possible explanation is that older organizations may suffer hurdles in terms of flexibility, creativity, or reputation, which may limit their capacity to acquire capital when compared to younger and more dynamic firms.

Overall, the findings emphasize the importance of B Corp certification and firm size in impacting the likelihood of SME funding success. B Corp certification is a distinguishing element that makes SMEs more appealing to potential investors. Furthermore, the positive association between firm size and funding success highlights the advantages that larger firms have in gaining access to financial resources. However, the negative effect of business age shows that older enterprises may face specific funding constraints that need more examination.

## CONCLUSION

In this master's dissertation, we aimed to explore the relationship between B Corp certification and the ability of certified SMEs to attract new investments. Our findings reveal that the B Corp certification has a positive relationship with firms' funding rounds. We aimed to analyse the economic benefits that B Corp certification may provide to SMEs through a review of the current literature and a theoretical framework, as well as the role of social and environmental sustainability in the impact of the ensuing economic interest and with an exhaustive empirical study with the R program.

The first hypothesis (H1) proposed that B Corp certification has a positive effect on the ability of certified SMEs to attract new investments. According to Appendix 2, only 27.5% of the companies were certified prior to their initial funding round. This observation underscores the prevalent trend among firms to achieve B Corp Certification later in their development. Frequently after getting certificated, they receive their first round of funding. Furthermore, as shown in Appendix 3, the number of firms getting at least one investment round has increased significantly over time. The findings presented in Table 13 reveal that obtaining a B Corp Certification, because of the positive coefficient has a positive impact on the overall amount raised by firms. However, it is important to note that the model used in table 13 exhibited relatively weak predictive power, as indicated by the low R-squared value of 0.0079. This implies that the variables included in the model collectively explain only around 0.79% of the total variation in the total amount raised by firms. Despite the model's weak explanatory power, the results show that B Corp Certification has a significant beneficial impact on the amount of finance secured by enterprises. While the model may not capture all the factors driving fundraising outcomes, the data suggest that B Corp Certification plays an important role in encouraging higher finance for firms. The findings in Table 15 demonstrate that B Corp certification has a statistically significant positive effect on SMEs' probability of funding success. This implies that SMEs with B Corp certification are more likely to secure funding to those without certification. Other results of that model are that firm size influences funding performance, with larger SMEs having higher odds of obtaining funding. Finally, firm age shows a negative and statistically significant effect on funding success. As the firm's age increases, the chances of obtaining capital slightly diminish. This suggests that older organization may face specific constrains related to flexibility, creativity, and reputation.

The second hypothesis (H2) proposed that the strength of the influence of B Corp certification on investment attractiveness is depending on the BIA ratings of the SMEs. In terms of soliciting new investments, we believed that SMEs with better BIA ratings would benefit more from B Corp accreditation. This hypothesis has been rejected because of the results of table 6. The field "overall\_score" has a coefficient of -4771.8. In this case, a negative coefficient implies that an increase

in overall score is associated with a decrease in total amount raised, but the coefficient is not statistically significant ( $p\text{-value} > 0.05$ ). Based on the findings, there is insufficient evidence to support the notion that the overall score of BCorp certification has a significant impact on the total amount generated by SMEs. The low R-squared and modified R-squared values show that additional factors not accounted for in the model may have a higher impact on the funding levels of SMEs. The findings produced by the model, table 12, that analyzed the relationship between total funding raised and the set of subscores, on the other hand, revealed an existing relationship between certain dimensions within impact areas and project aspects, and total financing raised by SMEs. Firms that promote customer stewardship receive more financing, whereas grades relating to water management or conservation receive less cash. Furthermore, projects featuring worker ownership tend to receive more funding. However, the model's overall explanatory ability is limited.

The third hypothesis (H3) investigated how the impact of B Corp certification differed across industry sectors in terms of investment attractiveness. We hypothesized that certain industries would be more positively impacted than others. This hypothesis acknowledges that contextual factors and industry-specific dynamics may influence the perceived value and desirability of B Corp certification across industries. To demonstrate this hypothesis, a pooling model was employed, as it can be seen in Table 13. The results of the pooling model yield significant findings. Particularly, the coefficients of categorical variables representing different industry categories indicate their impact on the total funding raised. Noteworthy industry categories such as "Professional Services," "Food and Beverage," "Financial Services," "Sustainability," "Healthcare," "Internet Services," "Energy," "Science and Engineering," "Transportation," "Agriculture and Farming," "Biotechnology," and "Payments" exhibit statistically significant effects on the total funding raised. These industry categories demonstrate positive coefficients, implying that projects within these sectors tend to attract higher levels of funding.

It is also relevant to note that this study has limitations, keeping avenues open for further research. Firstly, even though our study is cross-sectional, and the scope involves multiple countries, the sample used is relatively small. Secondly, the matching used for merging both databases, B Corporation and Crunchbase, can be improved. We found 61.79% matching results despite of the lack of common foreign keys to join both datasets. Finally, our study could be more exhaustive by regressing more types of funding rounds and including more dependent variables in the models. By addressing these limitations and further exploring these aspects, future research can contribute to a more robust understanding of B Corp certification on SME funding outcomes.

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# APPENDIX 1: FIGURES

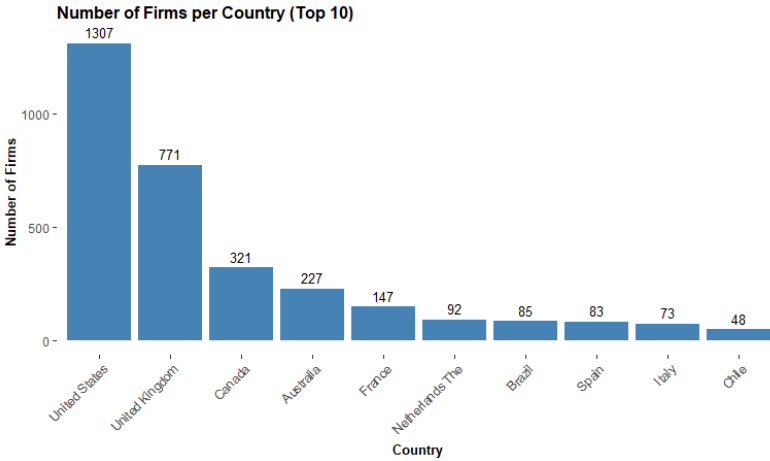


Figure 2 Certified BCorps SME by country

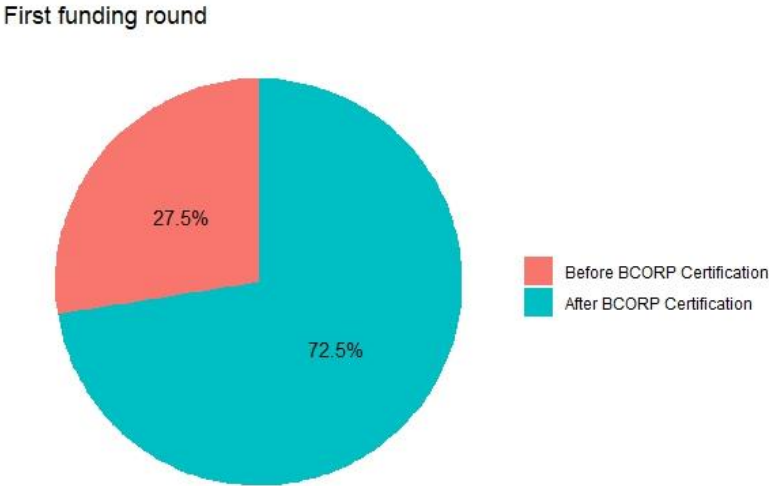
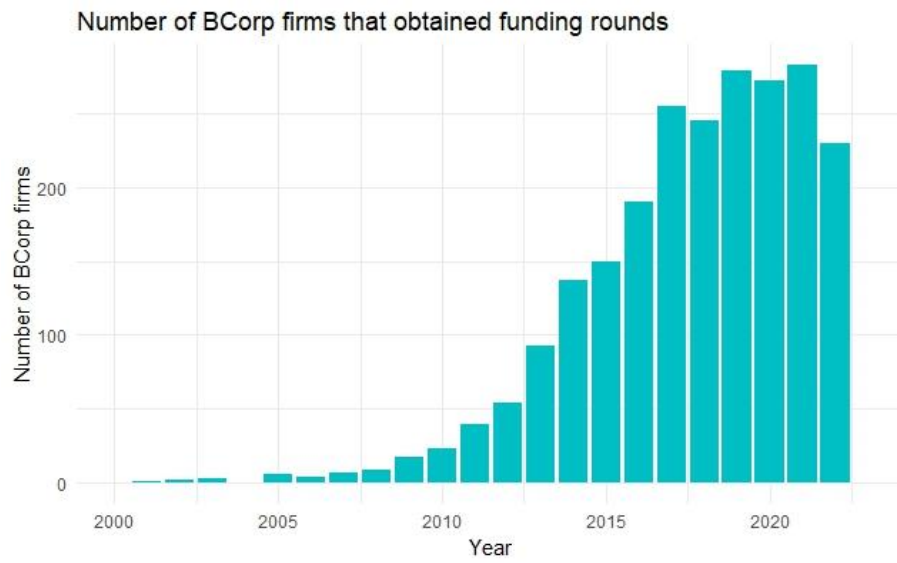


Figure 3 SMEs and first funding round



**Figure 4 Number of B Corp's that had at least one funding round per year**



## APPENDICE 2 : CODE

```
# set the working directory
.libPaths("C:\\Mesprogrammes\\R\\RLibraries")
setwd("C:\\Users\\mikel.escribano\\Documents\\Master\\Master Thesis")

library(dplyr)
library(tidyverse)
library(sqldf)
library(lubridate)

# read the csv file
setwd("C:\\Users\\mikel.escribano\\Documents\\Master\\Master Thesis\\Crunchbase")
CR_org <- read.csv("organizations.csv")
CR_org_desc <- read.csv("organization_descriptions.csv")
colnames(CR_org)

setwd("C:\\Users\\mikel.escribano\\Documents\\Master\\Master Thesis")

# read the csv file
BCORP <- read.csv("B Corp Impact Data.csv")

orga_filtered <- subset(CR_org, !is.na(name))
orga_filtered <- subset(orga_filtered, domain != "")
orga_filtered <- subset(orga_filtered, status == "operating")
orga_filtered <- subset(orga_filtered, primary_role == "company")
orga_filtered <- sqldf('SELECT *
                        FROM orga_filtered
                        WHERE employee_count IN ("1-10", "11-50", "101-250", "51-
100")')

orga_filtered <- sqldf('SELECT *
                        FROM orga_filtered
                        WHERE uuid NOT IN (select distinct(uuid) from
Panel_data_v2)')

#orga_filtered
# +-3000 in our panel data

orga_rand <- orga_filtered[sample(nrow(orga_filtered), 3000, replace =
FALSE), ]
orga_BCorp <- sqldf('SELECT *
                    FROM orga_filtered
                    WHERE uuid IN (select distinct(uuid) from
Panel_data_v2)')

orga_rand$B_Corporation <- 0
orga_BCorp$B_Corporation <- 1
orga_fi <- rbind(orga_rand, orga_BCorp)

#try to modify website in order to do a join with domain
BCORP$test <- gsub("(www\\.|https?:/|/)", "", BCORP$website)
BCORP$test <- tolower(BCORP$test)

# InnerJoin between both databases by website and company name
prueba <- sqldf('SELECT *
```

```

        FROM orga_fi
        LEFT JOIN BCORP
        ON BCORP.company_name = orga_fi.name
        OR BCORP.test = orga_fi.domain'
)

# Company_id is repeated
colnames(prueba3)
names(prueba3)[16] <- "city_org"

prueba$date_certified <- as.Date(prueba$date_certified)
colnames(prueba)
columns_to_delete <- c("state",
"b_corp_profile", "website", "ia_customers_it_marketing_recruiting_and_transp
arency",
"ia_customers_it_student_experience",
"ia_environment_it_environmentally_innovative_agricultural_process",
"ia_customers_it_mission_aligned_exit",
"ia_customers_it_student_outcomes_special_interest_students_",
"ia_customers_it_infrastructure_market_access",
"ia_environment_it_designed_to_conserve_wholesale_process",
"ia_environment_it_environmentally_innovative_manufacturing_process",
"ia_community_it_national_economic_development",
"ia_customers_it_educational_models_and_engagement",
"ia_customers_it_infrastructure_market_access_building",
"ia_community_it_microfranchise_poverty_alleviation",
"ia_environment_it_green_investing",
"ia_community_it_producer_cooperative",
"ia_customers_it_student_outcomes_traditional_students_",
"ia_customers_it_student_outcomes",
"ia_environment_it_construction_practices",
"ia_community_it_microdistribution_poverty_alleviation",
"ia_environment_it_safety",
"ia_environment_it_designed_to_conserve_agriculture_process",
"ia_customers_it_basic_services_for_the_underserved",
"ia_customers_it_business_model_and_engagement",
"ia_customers_it_educational_outcomes",
"ia_customers_it_privacy_and_consumer_protection",
"ia_customers_it_quality_and_continuous_improvement",
"ia_environment_it_environmentally_innovative_wholesale_process",
"ia_environment_it_energy_water_efficiency",
"ia_customers_it_serving_underserved_populations_direct_",
"ia_community_it_designed_for_charitable_giving",
"ia_environment_it_green_lending",
"ia_environment_it_material_energy_use",
"ia_environment_it_designed_to_conserve_manufacturing_process",
"ia_customers_it_health",

```

"ia\_environment\_it\_materials\_codes",  
"ia\_workers\_it\_worker\_owned",  
"ia\_customers\_it\_arts\_media\_culture",  
"ia\_customers\_it\_economic\_empowerment\_for\_the\_underserved",  
"num\_exits",  
"ia\_customers\_it\_mission\_lock",  
"ia\_customers\_it\_fund\_governance",  
"ia\_environment\_it\_certification",  
"ia\_customers\_it\_capacity\_building",  
"ia\_customers\_it\_current\_fund",  
"ia\_customers\_it\_past\_performance",  
"ia\_customers\_it\_positive\_impact",  
"ia\_environment\_it\_training\_collaboration",  
"ia\_environment\_it\_community",  
"ia\_environment\_it\_renewable\_or\_cleaner\_burning\_energy",  
"ia\_workers\_it\_workforce\_development",  
"ia\_workers\_it\_human\_rights\_labor\_policy",  
"ia\_customers\_it\_health\_wellness\_improvement",  
"ia\_customers\_it\_portfolio\_management",  
"ia\_customers\_it\_leadership\_outreach",  
"ia\_environment\_it\_environmental\_education\_information",  
"ia\_customers\_it\_investment\_criteria",  
"ia\_customers\_it\_targeted\_for\_investment",  
"ia\_environment\_it\_land\_wildlife\_conservation",  
"ia\_customers\_it\_education",  
"ia\_customers\_it\_portfolio\_reporting",  
"ia\_customers\_it\_improved\_impact",  
"ia\_community\_it\_supply\_chain\_poverty\_alleviation",  
"ia\_customers\_it\_impact\_improvement",  
"ia\_community\_it\_local\_economic\_development",  
"ia\_community\_it\_designed\_to\_give",  
"ia\_community\_it\_suppliers\_distributors",  
"ia\_environment\_it\_environment\_products\_services\_introduction",  
"ia\_environment\_it\_resource\_conservation",  
"ia\_workers\_it\_occupational\_health\_safety",  
"ia\_environment\_it\_transportation\_distribution\_suppliers",  
"ia\_environment\_it\_toxin\_reduction\_remediation",  
"ia\_governance\_it\_governance",  
"ia\_customers\_it\_support\_for\_underserved\_purpose\_driven\_enterprises",  
"ia\_workers\_it\_worker\_benefits",  
"ia\_governance\_it\_ethics",  
"ia\_workers\_it\_job\_flexibility\_corporate\_culture",  
"ia\_workers\_it\_benefits",  
"ia\_customers\_it\_serving\_in\_need\_populations",  
"test",  
"type",  
"permalink",  
"cb\_url",  
"legal\_name",  
"roles",  
"domain",  
"homepage\_url",  
"address",  
"postal\_code",  
"short\_description",

```

        "email",
        "phone",
        "facebook_url",
        "linkedin_url",
        "twitter_url",
        "logo_url",
        "alias1",
        "alias2",
        "alias3",
        "total_funding",
        "total_funding_currency_code",
        "rank",
        "country_code",
        "state_code",
        "region",
        "city_org",
        "status" )

# Delete the specified columns from the dataset
Dataset10 <- prueba[, -which(names(prueba) %in% columns_to_delete)]
colnames(Dataset10)

Dataset10$description <- gsub("\n", " ", Dataset10$description)
Dataset10$description <- gsub("[^[:alnum:]]", " ", Dataset10$description)
Dataset10$products_and_services <- gsub("\n", " ", Dataset10$products_and_services)
Dataset10$products_and_services <- gsub("[^[:alnum:]]", " ", Dataset10$products_and_services)
write.csv(Dataset10, "C:\\Users\\mikel.escribano\\Documents\\Master\\Master Thesis/IJ_BCORP-0-1.csv", row.names = FALSE)

colnames(Dataset10)
#We did a groupby count further in the code and we realise that there are some company_id that doesn't match properly. Since we have selected random firms, careful with the next line of the code because I might be diferent
borrado <- sqldf('select * from Dataset10 where company_id in("0013b00001s7i4wAAA", "001C000001QzVAgIAN", "001C000000z18noIAA", "001C0000011M5KKIA0", "0013b00001tBGnQAAW", "001C000001QzgRJIAZ", "0013b00001qEcsnAAC", "0013b00001srTp5AAE", "0013b00001vAIxWAAW") ')

Dataset10 <- Dataset10 %>%
  filter(!company_id %in% borrado$company_id)
#Can you convert the items in "category_list" and "category_groups_list" into separate dummy variables? All items listed with the commas, such as "Brand Marketing,Consulting,Graphic Design" should become new variables with a value of 1 if the item is mentioned and "0" otherwise. In this example, value of 1 for "Brank Marketing" variable, but 0 for "Architecture", etc.

# Split the items in the "category_list" column into dummy variables
categories <- strsplit(as.character(Dataset10$category_list), ",")
category_names <- unique(unlist(categories))
category_names <- as.character(category_names) # Convertir a caracteres

# Create an empty dataframe for the dummy variables
dummy_vars <- data.frame(matrix(0, nrow = nrow(Dataset10), ncol = length(category_names)))
colnames(dummy_vars) <- paste("cat_", category_names, sep = "")

# Set the values of dummy variables to 1 where appropriate
for (i in 1:length(categories)) {

```

```

dummy_vars[i, paste("cat_", categories[[i]], sep = "")] <- 1
}

# Split the items in the "category_groups_list" column into dummy variables
category_groups <- strsplit(as.character(Dataset10$category_groups_list),
",")
category_groups_names <- unique(unlist(category_groups))
category_groups_names <- as.character(category_groups_names) # Convertir a
caracteres

# Create an empty dataframe for the dummy variables
dummy_vars_category_groups <- data.frame(matrix(0, nrow = nrow(Dataset10),
ncol = length(category_groups_names)))
colnames(dummy_vars_category_groups) <- paste("catgr_",
category_groups_names, sep = "")

# Set the values of dummy variables to 1 where appropriate
for (i in 1:length(category_groups)) {
  dummy_vars_category_groups[i, paste("catgr_", category_groups[[i]], sep =
"")] <- 1
}

# Combine the original data with the dummy variables
data <- cbind(Dataset10, dummy_vars, dummy_vars_category_groups)
#- Once it's done, drop the commas "," in all variables, as they will
corrupt the csv files when opened in Excel or Stata.

data$category_groups_list <- gsub(",", ";", data$category_groups_list)

data$category_list <- gsub(",", ";", data$category_list)
Dataset10 <- data

setwd("C:\\Users\\mikel.escribano\\Documents\\Master\\Master
Thesis\\Crunchbase")
Fund_rounds <- read.csv("funding_rounds.csv")

a10 <- sqldf('SELECT *
            FROM Fund_rounds
            where org_uuid IN (select uuid from Dataset10)'
)

colnames(a10)
a10$year <- year(a10$announced_on)

Pivot_fund_rounds_10 <- a10 %>%
  group_by(org_uuid, org_name, investment_type) %>%
  mutate(column_index = row_number()) %>%
  ungroup() %>%
  pivot_wider(
    id_cols = c("org_uuid", "org_name"),
    names_from = c("investment_type", "column_index"),
    values_from = c("uuid", "name", "created_at", "updated_at",
"announced_on", "raised_amount_usd", "post_money_valuation_usd", "year"),
    names_glue = "{.value}_{investment_type}_{column_index}"
  ) %>%
  select(-starts_with("investment_type_"), -starts_with("column_index_"))

```

```

dataset_fund_rounds_10 <- sqldf('SELECT *
                                FROM Dataset10
                                INNER JOIN Pivot_fund_rounds_10
                                ON dataset10."uuid" = Pivot_fund_rounds_10.org_uuid'
)

write.csv(dataset_fund_rounds_10,
"C:\\Users\\mikel.escribano\\Documents\\Master\\Master Thesis/IJ_BCORP-0-
1_founds.csv", row.names = FALSE)
colnames(dataset_fund_rounds_10)

#perform the panel data

colnames(Dataset10)

aaaa <- sqldf('SELECT *
              FROM Dataset10
              where company_id
IN("0013b00001u8kJtAAI", "001C000000zkznbIAA", "001C000001h04RNIAY") '
)

Dataset10 <- sqldf('SELECT *
                  FROM Dataset10
                  where uuid NOT IN(SELECT uuid
                  FROM aaaa) '
)

Dataset10$year <- year(Dataset10$date_certified)
Dataset10$year <- ifelse(is.na(Dataset10$year), 2024, Dataset10$year)

Dataset10 <- Dataset10 %>%
  group_by(uuid, year) %>%
  mutate(row_number = row_number()) %>%
  filter(!(row_number == 2)) %>%
  ungroup() %>%
  select(-row_number)
# Sort the dataframe by company_id and year
Dataset10 <- Dataset10 %>%
  arrange(uuid, date_certified)

# Get the minimum and maximum year values for each company_id
min_year <- Dataset10 %>%
  group_by(uuid) %>%
  summarize(first_year = min(year))

max_year <- Dataset10 %>%
  group_by(uuid) %>%
  summarize(last_year = max(year))

# Generate the dataframe with all the years for each company_id
all_years <- expand.grid(year =
min(min_year$first_year):max(max_year$last_year),
                        uuid = unique(Dataset10$uuid))

panel_data_10 <- all_years %>%

```

```

left_join(Dataset10, by = c("year", "uuid")) %>%
arrange(uuid, year) %>%
group_by(uuid)

panel_data_10 <- panel_data_10[order(panel_data_10$uuid,
panel_data_10$year), ]
colnames(panel_data_10)

panel_data_10 <- panel_data_10 %>%
group_by(uuid) %>%
fill(
  "company_name"          ,
  "date_first_certified"  ,
  "name",
  "created_at",
  "updated_at",
  "B_Corporation",
  "company_id",
  "current_status"       ,
  "description"          ,
  "industry"             ,
  "industry_category"    ,
  "products_and_services",
  "country"              ,
  "city"                 ,
  "sector"               ,
  "size"                 ,
  "uuid"                 ,
  "category_list"        ,
  "category_groups_list" ,
  "num_funding_rounds"   ,
  "total_funding_usd"    ,
  "founded_on"           ,
  "last_funding_on"      ,
  "closed_on"            ,
  "employee_count"       ,
  "primary_role"         ,
  "cat_Employment"      ,
  "cat_IT.Management"    ,
  "cat_Mobile.Apps"      ,
  "cat_Network.Security" ,
  "cat_Software"         ,
  "cat_Web.Design"       ,
  "cat_Animal.Feed"      ,
  "cat_Pet"              ,
  "cat_Building.Material" ,
  "cat_E.Commerce"       ,
  "cat_Industrial"       ,
  "cat_Analytics"        ,
  "cat_Artificial.Intelligence" ,
  "cat_Machine.Learning" ,
  "cat_Field.Support"    ,
  "cat_Service.Industry" ,
  "cat_Agriculture"      ,
  "cat_Chemical"         ,
  "cat_Consumer.Goods"   ,
  "cat_Logistics"        ,
  "cat_Manufacturing"    ,
  "cat_Communities"      ,
  "cat_Information.Services" ,
  "cat_Internet.Radio"   ,

```

"cat\_Information.Technology" ,  
"cat\_Web.Development" ,  
"cat\_Android" ,  
"cat\_Consulting" ,  
"cat\_Mobile" ,  
"cat\_Mobile.Payments" ,  
"cat\_Payments" ,  
"cat\_Transportation" ,  
"cat\_Food.and.Beverage" ,  
"cat\_Food.Delivery" ,  
"cat\_Fruit" ,  
"cat\_Sales" ,  
"cat\_Advice" ,  
"cat\_Skill.Assessment" ,  
"cat\_Apps" ,  
"cat\_Event.Management" ,  
"cat\_Task.Management" ,  
"cat\_Civil.Engineering" ,  
"cat\_Construction" ,  
"cat\_Property.Development" ,  
"cat\_Internet.of.Things" ,  
"cat\_Mechanical.Engineering" ,  
"cat\_Business.Information.Systems" ,  
"cat\_Document.Preparation" ,  
"cat\_Legal" ,  
"cat\_Financial.Services" ,  
"cat\_Insurance" ,  
"cat\_Professional.Services" ,  
"cat\_Cloud.Computing" ,  
"cat\_Hardware" ,  
"cat\_Events" ,  
"cat\_Wine.And.Spirits" ,  
"cat\_Winery" ,  
"cat\_Location.Based.Services" ,  
"cat\_Big.Data" ,  
"cat\_Gamification" ,  
"cat\_Predictive.Analytics" ,  
"cat\_Human.Resources" ,  
"cat\_Recruiting" ,  
"cat\_Staffing.Agency" ,  
"cat\_Document.Management" ,  
"cat\_E.Signature" ,  
"cat\_Health.Care" ,  
"cat\_Medical" ,  
"cat\_Non.Profit" ,  
"cat\_Asset.Management" ,  
"cat\_Commercial.Real.Estate" ,  
"cat\_Real.Estate" ,  
"cat\_Publishing" ,  
"cat\_Customer.Service" ,  
"cat\_Wholesale" ,  
"cat\_Golf" ,  
"cat\_Recreation" ,  
"cat\_Sports" ,  
"cat\_Hospital" ,  
"cat\_Nutrition" ,  
"cat\_Therapeutics" ,  
"cat\_Courier.Service" ,  
"cat\_Same.Day.Delivery" ,  
"cat\_Digital.Media" ,  
"cat\_Security" ,



"cat\_Smart.Home" ,  
"cat\_Embedded.Systems" ,  
"cat\_Robotics" ,  
"cat\_STEM.Education" ,  
"cat\_Content" ,  
"cat\_Marketing" ,  
"cat\_Video.Advertising" ,  
"cat\_Management.Consulting" ,  
"cat\_Fashion" ,  
"cat\_Product.Design" ,  
"cat\_Textiles" ,  
"cat\_Project.Management" ,  
"cat\_Software.Engineering" ,  
"cat\_UX.Design" ,  
"cat\_Furniture" ,  
"cat\_Dietary.Supplements" ,  
"cat\_Health.Insurance" ,  
"cat\_Life.Insurance" ,  
"cat\_Market.Research" ,  
"cat\_Training" ,  
"cat\_Advertising" ,  
"cat\_Digital.Marketing" ,  
"cat\_Graphic.Design" ,  
"cat\_Database" ,  
"cat\_Public.Safety" ,  
"cat\_Real.Estate.Investment" ,  
"cat\_Taxi.Service" ,  
"cat\_Advertising.Platforms" ,  
"cat\_Finance" ,  
"cat\_FinTech" ,  
"cat\_Internet" ,  
"cat\_CRM" ,  
"cat\_Retail" ,  
"cat\_Electronics" ,  
"cat\_Mobile.Advertising" ,  
"cat\_Web.Hosting" ,  
"cat\_Accounting" ,  
"cat\_Risk.Management" ,  
"cat\_Cryptocurrency" ,  
"cat\_Lending" ,  
"cat\_Wealth.Management" ,  
"cat\_CleanTech" ,  
"cat\_Industrial.Manufacturing" ,  
"cat\_E.Commerce.Platforms" ,  
"cat\_Interior.Design" ,  
"cat\_Industrial.Engineering" ,  
"cat\_Local.Business" ,  
"cat\_Machinery.Manufacturing" ,  
"cat\_Coffee" ,  
"cat\_Supply.Chain.Management" ,  
"cat\_Home.Decor" ,  
"cat\_Home.Improvement" ,  
"cat\_Dental" ,  
"cat\_Media.and.Entertainment" ,  
"cat\_Medical.Device" ,  
"cat\_Personal.Health" ,  
"cat\_Printing" ,  
"cat\_Banking" ,  
"cat\_Property.Management" ,  
"cat\_Brand.Marketing" ,  
"cat\_Warehousing" ,

"cat\_Soccer" ,  
"cat\_Shopping" ,  
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"cat\_Education" ,  
"cat\_Primary.Education" ,  
"cat\_Travel" ,  
"cat\_Wellness" ,  
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"cat\_Cyber.Security" ,  
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"cat\_Search.Engine" ,  
"cat\_Funding.Platform" ,  
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"cat\_Residential" ,  
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"cat\_Energy" ,  
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"cat\_Data.Visualization" ,  
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"cat\_Open.Source" ,  
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"cat\_Email" ,  
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"cat\_Office.Administration" ,  
"cat\_Social.Media" ,  
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"cat\_Small.and.Medium.Businesses" ,  
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"cat\_Technical.Support" ,  
"cat\_Adult" ,  
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"cat\_Art" ,  
"cat\_Flowers" ,  
"cat\_Jewelry" ,  
"cat\_Solar" ,  
"cat\_Snack.Food" ,  
"cat\_Home.Renovation" ,  
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"cat\_Oil.and.Gas" ,  
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"cat\_Subscription.Service" ,  
"cat\_Gift" ,  
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"cat\_Computer" ,  
"cat\_News" ,  
"cat\_Product.Research" ,  
"cat\_Retirement" ,  
"cat\_Food.Processing" ,  
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"cat\_Delivery.Service" ,

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"cat\_Charity" ,  
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"cat\_Social.Media.Management" ,  
"cat\_EdTech" ,  
"cat\_Communication.Hardware" ,  
"cat\_Wired.Telecommunications" ,  
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"cat\_VoIP" ,  
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"cat\_Home.Health.Care" ,  
"cat\_Management.Information.Systems" ,  
"cat\_Intellectual.Property" ,  
"cat\_Legal.Tech" ,  
"cat\_Video.Games" ,  
"cat\_Privacy" ,  
"cat\_Seafood" ,  
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"cat\_Laundry.and.Dry.cleaning" ,  
"cat\_Employee.Benefits" ,  
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"cat\_Government" ,  
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"cat\_Dating" ,  
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"cat\_Online.Portals" ,  
"cat\_Tobacco" ,  
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"cat\_Semiconductor" ,  
"cat\_Health.Diagnostics" ,  
"cat\_Reservations" ,  
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"cat\_Operating.Systems" ,  
"cat\_Transaction.Processing" ,  
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"cat\_Diving" ,  
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"cat\_Film.Distribution" ,  
"cat\_Cosmetics" ,  
"cat\_SEM" ,  
"cat\_InsurTech" ,  
"cat\_Aquaculture" ,  
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"cat\_Performing.Arts" ,  
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"cat\_Clinical.Trials" ,  
"cat\_Emergency.Medicine" ,  
"cat\_Classifieds" ,  
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"cat\_Compliance" ,  
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"cat\_Museums.and.Historical.Sites" ,  
"cat\_Tour.Operator" ,  
"cat\_Trading.Platform" ,  
"cat\_TV.Production" ,  
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"cat\_Augmented.Reality" ,  
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"cat\_Air.Transportation" ,  
"cat\_Green.Building" ,  
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"cat\_Universities" ,  
"cat\_Broadcasting" ,  
"cat\_Infrastructure" ,  
"cat\_Bakery" ,  
"cat\_Coworking" ,  
"cat\_Digital.Entertainment" ,  
"cat\_Assisted.Living" ,  
"cat\_Consumer.Software" ,  
"cat\_Alternative.Medicine" ,  
"cat\_Language.Learning" ,  
"cat\_Wood.Processing" ,  
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"cat\_Cycling" ,  
"cat\_Recipes" ,  
"cat\_Fertility" ,  
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"cat\_Virtual.Reality" ,  
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"cat\_Information.and.Communications.Technology..ICT." ,  
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"cat\_Developer.Tools" ,  
"cat\_Music.Streaming" ,  
"cat\_Basketball" ,  
"cat\_Computer.Vision" ,  
"cat\_Point.of.Sale" ,  
"cat\_Industrial.Design" ,  
"cat\_Retail.Technology" ,  
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"cat\_Shoes" ,  
"cat\_Ports.and.Harbors" ,  
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"cat\_Secondary.Education" ,  
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"cat\_Fast.Moving.Consumer.Goods" ,  
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"cat\_Consumer.Reviews" ,  
"cat\_Musical.Instruments" ,  
"cat\_Grocery" ,  
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"cat\_Craft.Beer" ,  
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"cat\_Social.News" ,  
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"cat\_Ride.Sharing" ,  
"cat\_Desktop.Apps" ,  
"cat\_Precious.Metals" ,  
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"cat\_Biometrics" ,  
"cat\_Veterinary" ,  
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"cat\_Travel.Accommodations" ,  
"cat\_Vacation.Rental" ,  
"cat\_Consumer.Research" ,

"cat\_Ferry.Service" ,  
"cat\_B2C" ,  
"cat\_Distillery" ,  
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"cat\_Politics" ,  
"cat\_Paper.Manufacturing" ,  
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"cat\_Enterprise" ,  
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"cat\_Laser" ,  
"cat\_RFID" ,  
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"cat\_Debit.Cards" ,  
"cat\_Edutainment" ,  
"cat\_Mobile.Devices" ,  
"cat\_Music.Venues" ,  
"cat\_Flash.Storage" ,  
"cat\_Natural.Resources" ,  
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"cat\_Knowledge.Management" ,  
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"cat\_Cause.Marketing" ,  
"cat\_Photo.Editing" ,  
"cat\_Video.Editing" ,  
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"cat\_Genetics" ,  
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"cat\_Windows" ,  
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"cat\_Franchise" ,  
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"cat\_GovTech" ,  
"cat\_Brewing" ,  
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"cat\_Personalization" ,  
"cat\_Pollution.Control" ,  
"cat\_Social.Shopping" ,  
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"cat\_Parking" ,  
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"cat\_Independent.Music" ,  
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"cat\_Human.Computer.Interaction" ,  
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"cat\_Social.Recruiting" ,  
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"cat\_IaaS" ,  
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"cat\_Self.Storage" ,  
"cat\_Energy.Storage" ,  
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"cat\_Gift.Exchange" ,  
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"cat\_Natural.Language.Processing" ,  
"cat\_PaaS" ,  
"cat\_Last.Mile.Transportation" ,  
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"cat\_Vending.and.Concessions" ,  
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"cat\_Image.Recognition" ,  
"cat\_Simulation" ,  
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"cat\_GPU" ,  
"cat\_Content.Discovery" ,  
"cat\_Made.to.Order" ,  
"cat\_CMS" ,  
"cat\_Photo.Sharing" ,  
"cat\_Nightclubs" ,  
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"cat\_" ,  
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"catgr\_Information.Technology" ,  
"catgr\_Mobile" ,  
"catgr\_Privacy.and.Security" ,

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"catgr_Software" ,
"catgr_Agriculture.and.Farming" ,
"catgr_Community.and.Lifestyle" ,
"catgr_Commerce.and.Shopping" ,
"catgr_Manufacturing" ,
"catgr_Real.Estate" ,
"catgr_Artificial.Intelligence" ,
"catgr_Data.and.Analytics" ,
"catgr_Science.and.Engineering" ,
"catgr_Other" ,
"catgr_Consumer.Goods" ,
"catgr_Transportation" ,
"catgr_Media.and.Entertainment" ,
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"catgr_Platforms" ,
"catgr_Financial.Services" ,
"catgr_Payments" ,
"catgr_Food.and.Beverage" ,
"catgr_Sales.and.Marketing" ,
"catgr_Education" ,
"catgr_Events" ,
"catgr_Internet.Services" ,
"catgr_Administrative.Services" ,
"catgr_Hardware" ,
"catgr_Navigation.and.Mapping" ,
"catgr_Gaming" ,
"catgr_Health.Care" ,
"catgr_Content.and.Publishing" ,
"catgr_Sports" ,
"catgr_Consumer.Electronics" ,
"catgr_Advertising" ,
"catgr_Clothing.and.Apparel" ,
"catgr_Government.and.Military" ,
"catgr_Sustainability" ,
"catgr_Lending.and.Investments" ,
"catgr_Travel.and.Tourism" ,
"catgr_Energy" ,
"catgr_Natural.Resources" ,
"catgr_Video" ,
"catgr_Messaging.and.Telecommunications" ,
"catgr_Biotechnology" ,
"catgr_" ,
.direction = "downup") %>%
ungroup()

panel_data_10 <- panel_data_10 %>%
group_by(uuid) %>%
fill("date_certified" ,
"assessment_year" ,
"overall_score" ,
"impact_area_community" ,
"impact_area_customers" ,
"impact_area_environment" ,
"impact_area_governance" ,
"impact_area_workers" ,
"impact_area_community_na_score" ,
"impact_area_customers_na_score" ,
"impact_area_environment_na_score" ,
"impact_area_governance_na_score" ,
"impact_area_workers_na_score" ,
"ia_community_it_civic_engagement_giving" ,

```

```

"ia_community_it_diversity_equity_inclusion" ,
"ia_community_it_diversity_inclusion" ,
"ia_community_it_economic_impact" ,
"ia_community_it_job_creation" ,
"ia_community_it_local_involvement" ,
"ia_community_it_suppliers_distributors_product" ,
"ia_community_it_supply_chain_management" ,
"ia_customers_it_customer_stewardship" ,
"ia_environment_it_air_climate" ,
"ia_environment_it_environmental_management" ,
"ia_environment_it_inputs" ,
"ia_environment_it_land_life" ,
"ia_environment_it_land_office_plant" ,
"ia_environment_it_outputs" ,
"ia_environment_it_water" ,
"ia_governance_it_corporate_accountability" ,
"ia_governance_it_ethics_transparency" ,
"ia_governance_it_mission_engagement" ,
"ia_governance_it_mission_locked" ,
"ia_governance_it_transparency" ,
"ia_workers_it_career_development" ,
"ia_workers_it_compensation_wages" ,
"ia_workers_it_engagement_satisfaction" ,
"ia_workers_it_financial_security" ,
"ia_workers_it_health_wellness_safety" ,
"ia_workers_it_management_worker_communication" ,
"ia_workers_it_training_education" ,
"ia_workers_it_worker_ownership" ,
"certification_cycle" , .direction = "down") %>%
ungroup()

# read the csv file
setwd("C:\\Users\\mikel.escribano\\Documents\\Master\\Master
Thesis\\Crunchbase")
Fund_rounds_eco_10 <- read.csv("funding_rounds.csv")

Fund_rounds_eco_10$year <- year(Fund_rounds_eco_10$announced_on)

# DELETE SOME COLUMNS

Fund_rounds_eco_10 <- subset(Fund_rounds_eco_10, select = -
c(announced_on,uuid,name, type, permalink, cb_url, rank, created_at,
updated_at, country_code, state_code, region, city, raised_amount,
raised_amount_currency_code, post_money_valuation,
post_money_valuation_currency_code, investor_count, lead_investor_uuids))
Fund_rounds_eco_10 <- Fund_rounds_eco_10 %>%
  mutate(
    raised_amount_usd = as.numeric(raised_amount_usd) )
colnames(Fund_rounds_eco_10)
Fund_rounds_eco_10 <-
Fund_rounds_eco_10[!(is.na(Fund_rounds_eco_10$raised_amount_usd) &
is.na(Fund_rounds_eco_10$post_money_valuation_usd)), ]

pivot_data_eco_10 <- Fund_rounds_eco_10 %>%
  group_by(org_uuid, org_name, year, investment_type) %>%
  summarise(
    raised_amount_usd = sum(raised_amount_usd, na.rm = TRUE),
    post_money_valuation_usd = sum(post_money_valuation_usd, na.rm = TRUE)
  ) %>%
  pivot_wider(

```

```

id_cols = c(org_uuid, org_name, year),
names_from = investment_type,
values_from = c(raised_amount_usd, post_money_valuation_usd),
names_glue = "{investment_type}_{.value}",
names_sep = "-",
values_fill = 0
)

fund_rounds_panel_data_10 <- sqldf('SELECT *
FROM panel_data_10
LEFT JOIN pivot_data_eco_10
ON panel_data_10."uuid" = pivot_data_eco_10.org_uuid
and panel_data_10."year" =
pivot_data_eco_10.year'
)

fund_rounds_panel_data_10$company_name <- gsub("\n", "
", fund_rounds_panel_data_10$company_name)
fund_rounds_panel_data_10$company_name <- gsub("[^[:alnum:]]", "
", fund_rounds_panel_data_10$company_name)
write.csv(fund_rounds_panel_data_10,
"C:\\Users\\mikel.escribano\\Documents\\Master\\Master
Thesis\\PanelData10.csv", row.names = FALSE)

paneldatafinal_10<-fund_rounds_panel_data_10
colnames(paneldatafinal_10)
# Get column number for a specific field
campo <- "year"
numero_columna <- which(colnames(paneldatafinal_10) == campo)

# Company_id is repeated
names(paneldatafinal_10)[749] <- "year_rounds"

colnames(paneldatafinal_10)
# sum the fields x_raised_money por uuid y year
paneldatafinal_10 <- paneldatafinal_10 %>%
  group_by(uuid, year) %>%
  mutate(total_raised_amount = sum(angel_raised_amount_usd,
series_a_raised_amount_usd,
series_b_raised_amount_usd,
seed_raised_amount_usd,
series_c_raised_amount_usd,
series_d_raised_amount_usd,
series_unknown_raised_amount_usd,
debt_financing_raised_amount_usd,
series_e_raised_amount_usd,
private_equity_raised_amount_usd,
series_f_raised_amount_usd,
pre_seed_raised_amount_usd,
grant_raised_amount_usd,
post_ipo_equity_raised_amount_usd,
convertible_note_raised_amount_usd,
undisclosed_raised_amount_usd,
post_ipo_debt_raised_amount_usd,
corporate_round_raised_amount_usd,
series_i_raised_amount_usd,

```

```

series_g_raised_amount_usd,
secondary_market_raised_amount_usd,
post_ipo_secondary_raised_amount_usd,
initial_coin_offering_raised_amount_usd,
non_equity_assistance_raised_amount_usd,
series_h_raised_amount_usd,
product_crowdfunding_raised_amount_usd,
equity_crowdfunding_raised_amount_usd,
series_j_raised_amount_usd,
na.rm = TRUE))

#DESCRIPTIVE_STATISTICS
paneldatafinal_10 <- subset(paneldatafinal_10, !(size %in% c(" 250-999", "
1000+" , " 250+")))
empresaunica <- unique(paneldatafinal_10$uuid)
print(length(empresaunica))

paneldatafinal_10$B_Corporation <-
ifelse(is.na(paneldatafinal_10$overall_score), 0, 1)
campo <- "B_Corporation"
numero_columna <- which(colnames(paneldatafinal_10) == campo)

library(ggplot2) # for creating plots
library(dplyr) # for data manipulation
colnames(Dataset10)

# Get the columns that start with "cat_"
columnas_cat <- names(Dataset10)[grepl("^cat_", names(Dataset10))]

# Get the category names without the "cat_" prefix
categorias <- gsub("^cat_", "", columnas_cat)

# Calculate the frequencies of occurrence of one in each field, considering
only a unique uuid
frecuencias <- sapply(columnas_cat, function(columnas_cat) {
  unique_uuids <- unique(Dataset10$uuid)
  sum(data[Dataset10$uuid %in% unique_uuids, columnas_cat] == 1)
})
# Create the data frame with the "Category" and "Frequency" columns
tabla <- data.frame("Category" = categorias, "Frequency" = frecuencias)

# Sort the table by the "Frequency" column from highest to lowest
tabla <- tabla[order(-tabla$Frequency), ]

# Limit the table to the 10 most frequent categories
tabla <- head(tabla, 10)

# Change row names
tabla <- rownames_to_column(tabla, "Row")

# remove the first column
tabla <- select(tabla, -1)

write.csv(tabla, "C:\\Users\\mikel.escribano\\Documents\\Master\\Master
Thesis/Category_list.csv", row.names = FALSE)

```

```

# Install the flextable package if it is not installed
#install.packages("flextable")

# Load the flextable library
library(flextable)

# Create a flextable object with the data table
wordprueba <- flextable(tabla)

# Save the table to a Word file
save_as_docx(wordprueba, path =
"C:/Users/mikel.escribano/Documents/Master/Master
Thesis/Category_list.docx")

prova <- sqldf('select uuid,B_Corporation, count(1) from Dataset10 group by
uuid,B_Corporation')
resultado <- table(prova$B_Corporation)
print(resultado)

# Imprimir los resultados
print(paste("Registros con valor 1:", total_1))
print(paste("Registros con valor 0:", total_0))
#How many unique firms we have
empresaunica <- unique(paneldatafinal_10$uuid)
print(length(empresaunica))

result <- paneldatafinal_10 %>%
  group_by(uuid) %>%
  summarise(count = n())
print(result)
#graph firms vs countries
country_counts <- Dataset10 %>%
  group_by(country) %>%
  summarise(count = n()) %>%
  top_n(11, count) %>%
  arrange(desc(count)) %>%
  mutate(country = factor(country, levels = country))

ggplot(country_counts, aes(x = country, y = count)) +
  geom_bar(stat = "identity", fill = "steelblue") +
  geom_text(aes(label = count), vjust = -0.5, hjust = 0.5, size = 3.5) + #
Add labels on bars
  xlab("Country") +
  ylab("Number of Firms") +
  ggtitle("Number of Firms per Country (Top 10)") +
  theme(axis.text.x = element_text(size = 9, angle = 45, hjust = 1), #
Adjust label size, rotation, and position
  plot.title = element_text(size = 12, face = "bold"), # Adjust
title appearance
  axis.title = element_text(size = 10, face = "bold"), # Adjust axis
label appearance
  panel.background = element_blank()) # Remove plot background
print(plot)

#Descriptive statistics related to founding_rounds. To load the data first
run Founding_rounds_20230605
colnames(dataset_fund_rounds_10)
dfr1 <- subset(dataset_fund_rounds_10, B_Corporation == 1)

```

```

dfr0 <- subset(dataset_fund_rounds_10, B_Corporation == 0)

summary_stats_fund <- c(
  "Minimum" = min(dataset_fund_rounds_10$total_funding_usd),
  "1st Quartile" = quantile(dataset_fund_rounds_10$total_funding_usd,
0.25),
  "Median" = median(dataset_fund_rounds_10$total_funding_usd),
  "Mean" = mean(dataset_fund_rounds_10$total_funding_usd),
  "3rd Quartile" = quantile(dataset_fund_rounds_10$total_funding_usd,
0.75),
  "Maximum" = max(dataset_fund_rounds_10$total_funding_usd)
)

# Format values to two decimal places
summary_stats_fund <- format(round(summary_stats_fund, 2), nsmall = 2)

# Create the summary table as a data frame
summary_table_fund <- data.frame(
  Statistic = names(summary_stats_fund),
  Value = summary_stats_fund,
  stringsAsFactors = FALSE
)

# Remove row names
row.names(summary_table_fund) <- NULL

# Add the sign "$" to the values in the Value column
summary_table_fund$Value <- paste0(summary_table_fund$Value, "$")

# Create the summary table with kableExtra
summary_table_fund_kable <- kable(summary_table_fund, "html") %>%
  kable_styling(bootstrap_options = "striped", full_width = FALSE) %>%
  kable_paper(full_width = TRUE) %>%
  add_header_above(c("Total Funding" = 2))

# Print the table
summary_table_fund_kable

#investors
setwd("C:\\Users\\mikel.escribano\\Documents\\Master\\Master Thesis")

dataset_investments <- read.csv("IJ_investments.csv")

# Calculate the average number of investors by company_id
media_inversores <- dataset_investments %>%
  group_by(company_id) %>%
  summarize(media_inversores = mean(investment_count, na.rm = TRUE))

print(media_inversores)

colnames(dataset_investments)

# Create the table of the amount invested by type of investor
investment_table <- dataset_investments %>%
  filter(!is.na(total_funding_usd.1) & investor_types != "") %>%
  group_by(investor_types) %>%
  summarise(
    total_amount_invested = sum(total_funding_usd.1, na.rm = TRUE),

```

```

    investment_count = n()
  ) %>%
  arrange(desc(total_amount_invested))

# Change the names of the column headers
colnames(investment_table) <- c("Investor Type", "Invested Amount ($)",
"Number of Investments")
colnames(investment_table)

investment_table_kable <- kable(investment_table, "html") %>%
  kable_styling(bootstrap_options = "striped", full_width = FALSE) %>%
  column_spec(1, bold = TRUE) %>%
  column_spec(2:3, width = "100px") %>%
  add_header_above() # Eliminar el título grande reemplazándolo con un
vector vacío

investment_table_kable
paneldatafinal_10 <- paneldatafinal_10[paneldatafinal_10$current_status !=
"de-certified", ]

# Load the 'plm' package
library(plm)
count_by_year <- paneldatafinal_10 %>%
  group_by(year, uuid) %>%
  summarize(uuid_count = n()) %>%
  filter(uuid_count > 1)

# View the resulting count by year for combinations with count > 1
print(count_by_year)

borrar <- sqldf('select * from paneldatafinal_10 where uuid in (select uuid
from count_by_year
)')
paneldatafinal_10 <- subset(paneldatafinal_10, year != 2024)
paneldatafinal_10$B_Corporation <-
as.numeric(paneldatafinal_10$B_Corporation)
paneldatafinal_10$B_Corporation <-
as.integer(paneldatafinal_10$B_Corporation)

class(paneldatafinal_10$cat_Mobile.Apps)
class(paneldatafinal_10$cat_Mobile.Apps)

# Get the columns that start with "cat_"
columnas_catgr <- names(paneldatafinal_10)[grepl("^catgr_",
names(paneldatafinal_10))]

# Define the grouping variable
group_var <- paneldatafinal_10$uuid

# Calculate the frequencies of occurrence of one in each column grouped by
uuid
frecuencias <- aggregate(paneldatafinal_10[columnas_catgr], by =
list(group_var), FUN = function(x) sum(x == 1))
# Rename the grouping variable column
names(frecuencias)[1] <- "uuid"

# Get the category names without the "cat_" prefix
categorias <- gsub("^catgr_", "", columnas_catgr)

```



```

# Create the data frame with the "Category" and "Frequency" columns
tabla <- data.frame("Category" = categorias, "Frequency" =
colSums(frecuencias[, -1])/17)

# Sort the table by the "Frequency" column from highest to lowest
tabla <- tabla[order(-tabla$Frequency), ]

# Limit the table to the top 10 most frequent categories
tabla <- head(tabla, 11)

# Print the resulting
# Change row names
tabla <- rownames_to_column(tabla, "Row")

# remove the first column
tabla <- select(tabla, -1)

write.csv(tabla, "C:\\Users\\mikel.escribano\\Documents\\Master\\Master
Thesis/Category_list.csv", row.names = FALSE)

unique(paneldatafinal_10$B_Corporation)

write.csv(paneldatafinal_10,
"C:\\Users\\mikel.escribano\\Documents\\Master\\Master
Thesis/PanelData10.csv", row.names = FALSE)

# Fit the fixed effects model with firm and year fixed effects
model <- plm(total_raised_amount ~ overall_score, data =
paneldatafinal_10, model = "within", effect = "twoways")

# Print the model summary
summary(model)

summary_table <- summary(model)

write.csv(summary_table,
"C:\\Users\\mikel.escribano\\Documents\\Master\\Master
Thesis/Psummary_table.csv", row.names = FALSE)

# Estimate the regression model
model_crowd_10 <-plm(formula = equity_crowdfunding_raised_amount_usd ~
overall_score +
certification_cycle + size + year_rounds +
catgr_Professional.Services +
catgr_Apps +
catgr_Design +
catgr_Information.Technology +
catgr_Mobile +
catgr_Privacy.and.Security +
catgr_Software +
catgr_Agriculture.and.Farming +
catgr_Community.and.Lifestyle +
catgr_Commerce.and.Shopping +
catgr_Manufacturing +
catgr_Real.Estate +
catgr_Artificial.Intelligence +
catgr_Data.and.Analytics +
catgr_Science.and.Engineering +
catgr_Other +

```

```

catgr_Consumer.Goods +
catgr_Transportation +
catgr_Media.and.Entertainment +
catgr_Music.and.Audio +
catgr_Platforms +
catgr_Financial.Services +
catgr_Payments +
catgr_Food.and.Beverage +
catgr_Sales.and.Marketing +
catgr_Education +
catgr_Events +
catgr_Internet.Services +
catgr_Administrative.Services +
catgr_Hardware +
catgr_Navigation.and.Mapping +
catgr_Gaming +
catgr_Health.Care +
catgr_Content.and.Publishing +
catgr_Sports +
catgr_Consumer.Electronics +
catgr_Advertising +
catgr_Clothing.and.Apparel +
catgr_Government.and.Military +
catgr_Sustainability +
catgr_Lending.and.Investments +
catgr_Travel.and.Tourism +
catgr_Energy +
catgr_Natural.Resources +
catgr_Video +
catgr_Messaging.and.Telecommunications+
catgr_Biotechnology , data =

paneldatafinal_10,
model = "pooling")

# View model results
summary(model_crowd_10)
class(paneldatafinal_10$year_rounds)
paneldatafinal_10$year_rounds <- as.integer(paneldatafinal_10$year_rounds)

coefficients <- coef(summary(model_crowd_10))[, "Estimate"]
std_errors <- coef(summary(model_crowd_10))[, "Std. Error"]
t_values <- coef(summary(model_crowd_10))[, "t-value"]
p_values <- coef(summary(model_crowd_10))[, "Pr(>|t|)"]

# Extract variable names
variable_names <- names(coefficients)

# Create a data frame
summary_data <- data.frame(Variable = variable_names,
                           Coefficient = coefficients,
                           Std_Error = std_errors,
                           t_value = t_values,
                           p_value = p_values)

# Create a flextable object from the data frame
flex_table <- flextable(summary_data)

# Save the table to a Word file

```

```
save_as_docx(flex_table, path =  
"C:/Users/mikel.escribano/Documents/Master/Master Thesis/sum_crowf.docx")
```

```
# Estimate the regression model
```

```
model_seed <-plm(formula = seed_raised_amount_usd ~ overall_score +  
certification_cycle + size + year_rounds+  
catgr_Professional.Services +  
catgr_Apps +  
catgr_Design +  
catgr_Information.Technology +  
catgr_Mobile +  
catgr_Privacy.and.Security +  
catgr_Software +  
catgr_Agriculture.and.Farming +  
catgr_Community.and.Lifestyle +  
catgr_Commerce.and.Shopping +  
catgr_Manufacturing +  
catgr_Real.Estate +  
catgr_Artificial.Intelligence +  
catgr_Data.and.Analytics +  
catgr_Science.and.Engineering +  
catgr_Other +  
catgr_Consumer.Goods +  
catgr_Transportation +  
catgr_Media.and.Entertainment +  
catgr_Music.and.Audio +  
catgr_Platforms +  
catgr_Financial.Services +  
catgr_Payments +  
catgr_Food.and.Beverage +  
catgr_Sales.and.Marketing +  
catgr_Education +  
catgr_Events +  
catgr_Internet.Services +  
catgr_Administrative.Services +  
catgr_Hardware +  
catgr_Navigation.and.Mapping +  
catgr_Gaming +  
catgr_Health.Care +  
catgr_Content.and.Publishing +  
catgr_Sports +  
catgr_Consumer.Electronics +  
catgr_Advertising +  
catgr_Clothing.and.Apparel +  
catgr_Government.and.Military +  
catgr_Sustainability +  
catgr_Lending.and.Investments +  
catgr_Travel.and.Tourism +  
catgr_Energy +  
catgr_Natural.Resources +  
catgr_Video +  
catgr_Messaging.and.Telecommunications+  
catgr_Biotechnology , data = paneldatafinal_10,  
model = "pooling")
```

```
# View model results
```

```
summary(model_seed)
```

```

coefficients <- coef(summary(model_seed))[, "Estimate"]
std_errors <- coef(summary(model_seed))[, "Std. Error"]
t_values <- coef(summary(model_seed))[, "t-value"]
p_values <- coef(summary(model_seed))[, "Pr(>|t|)"]

# Extract variable names
variable_names <- names(coefficients)

# Create a data frame
summary_data <- data.frame(Variable = variable_names,
                           Coefficient = coefficients,
                           Std_Error = std_errors,
                           t_value = t_values,
                           p_value = p_values)

# Create a flextable object from the data frame
flex_table <- flextable(summary_data)

# Save the table to a Word file
save_as_docx(flex_table, path =
"C:/Users/mikel.escribano/Documents/Master/Master Thesis/sum_seed.docx")

```

```

#series A funding
# Estimate the regression model
model_seriea <-plm(formula = series_a_raised_amount_usd ~ overall_score +
certification_cycle + size+year_rounds +
catgr_Professional.Services
+
catgr_Apps
+
catgr_Design
+
catgr_Information.Technology
+
catgr_Mobile
+
catgr_Privacy.and.Security
+
catgr_Software
+
catgr_Agriculture.and.Farming
+
catgr_Community.and.Lifestyle
+
catgr_Commerce.and.Shopping
+
catgr_Manufacturing
+
catgr_Real.Estate
+
catgr_Artificial.Intelligence
+
catgr_Data.and.Analytics
+
catgr_Science.and.Engineering
+
catgr_Other
+
catgr_Consumer.Goods
+
catgr_Transportation
+
catgr_Media.and.Entertainment
+
catgr_Music.and.Audio
+
catgr_Platforms
+
catgr_Financial.Services
+
catgr_Payments
+
catgr_Food.and.Beverage
+
catgr_Sales.and.Marketing
+
catgr_Education
+
catgr_Events
+
catgr_Internet.Services
+
catgr_Administrative.Services
+
catgr_Hardware
+
catgr_Navigation.and.Mapping
+
catgr_Gaming
+

```

```

catgr_Health.Care +
catgr_Content.and.Publishing +
catgr_Sports +
catgr_Consumer.Electronics +
catgr_Advertising +
catgr_Clothing.and.Apparel +
catgr_Government.and.Military +
catgr_Sustainability +
catgr_Lending.and.Investments +
catgr_Travel.and.Tourism +
catgr_Energy +
catgr_Natural.Resources +
catgr_Video +
catgr_Messaging.and.Telecommunications+
catgr_Biotechnology , data = paneldatafinal_10,
model = "pooling")

# View model results
summary(model_seriea)

coefficients <- coef(summary(model_seriea))[, "Estimate"]
std_errors <- coef(summary(model_seriea))[, "Std. Error"]
t_values <- coef(summary(model_seriea))[, "t-value"]
p_values <- coef(summary(model_seriea))[, "Pr(>|t|)"]

# Extract variable names
variable_names <- names(coefficients)

# Create a data frame
summary_data <- data.frame(Variable = variable_names,
                           Coefficient = coefficients,
                           Std_Error = std_errors,
                           t_value = t_values,
                           p_value = p_values)

# Create a flextable object from the data frame
flex_table <- flextable(summary_data)

# Save the table to a Word file
save_as_docx(flex_table, path =
"C:/Users/mikel.escribano/Documents/Master/Master Thesis/sum_sseriea.docx")

#, debt financing

# Estimate the regression model
model_debt <-plm(formula = debt_financing_raised_amount_usd ~ overall_score
+
certification_cycle + size + year_rounds +
catgr_Professional.Services +
catgr_Apps +
catgr_Design +
catgr_Information.Technology +
catgr_Mobile +
catgr_Privacy.and.Security +
catgr_Software +
catgr_Agriculture.and.Farming +
catgr_Community.and.Lifestyle +

```

```

catgr_Commerce.and.Shopping      +
catgr_Manufacturing              +
catgr_Real.Estate                +
catgr_Artificial.Intelligence    +
catgr_Data.and.Analytics         +
catgr_Science.and.Engineering    +
catgr_Other                      +
catgr_Consumer.Goods             +
catgr_Transportation             +
catgr_Media.and.Entertainment    +
catgr_Music.and.Audio            +
catgr_Platforms                  +
catgr_Financial.Services         +
catgr_Payments                   +
catgr_Food.and.Beverage          +
catgr_Sales.and.Marketing        +
catgr_Education                  +
catgr_Events                     +
catgr_Internet.Services          +
catgr_Administrative.Services    +
catgr_Hardware                   +
catgr_Navigation.and.Mapping     +
catgr_Gaming                     +
catgr_Health.Care                +
catgr_Content.and.Publishing     +
catgr_Sports                     +
catgr_Consumer.Electronics       +
catgr_Advertising                +
catgr_Clothing.and.Apparel       +
catgr_Government.and.Military    +
catgr_Sustainability             +
catgr_Lending.and.Investments    +
catgr_Travel.and.Tourism         +
catgr_Energy                     +
catgr_Natural.Resources          +
catgr_Video                      +
catgr_Messaging.and.Telecommunications+
catgr_Biotechnology, data = paneldatafinal_10,
model = "pooling")

```

```
# View model results
```

```
summary(model_debt)
```

```
coefficients <- coef(summary(model_debt))[, "Estimate"]
```

```
std_errors <- coef(summary(model_debt))[, "Std. Error"]
```

```
t_values <- coef(summary(model_debt))[, "t-value"]
```

```
p_values <- coef(summary(model_debt))[, "Pr(>|t|)"]
```

```
# Extract variable names
```

```
variable_names <- names(coefficients)
```

```
# Create a data frame
```

```
summary_data <- data.frame(Variable = variable_names,
                           Coefficient = coefficients,
                           Std_Error = std_errors,
                           t_value = t_values,
                           p_value = p_values)
```

```
# Create a flextable object from the data frame
```

```

flex_table <- flextable(summary_data)

# Save the table to a Word file
save_as_docx(flex_table, path =
"C:/Users/mikel.escribano/Documents/Master/Master Thesis/sum_debt.docx")

#scores

# Estimate the regression model
model_scores <- plm(formula = overall_score ~ impact_area_community +
  impact_area_customers +
  impact_area_environment +
  impact_area_governance +
  impact_area_workers +
  impact_area_community_na_score +
  impact_area_customers_na_score +
  impact_area_environment_na_score +
  impact_area_governance_na_score +
  impact_area_workers_na_score +
  ia_community_it_civic_engagement_giving +
  ia_community_it_diversity_equity_inclusion +
  ia_community_it_diversity_inclusion +
  ia_community_it_economic_impact +
  ia_community_it_job_creation +
  ia_community_it_local_involvement +
  ia_community_it_suppliers_distributors_product +
  ia_community_it_supply_chain_management +
  ia_customers_it_customer_stewardship +
  ia_environment_it_air_climate +
  ia_environment_it_environmental_management +
  ia_environment_it_inputs +
  ia_environment_it_land_life +
  ia_environment_it_land_office_plant +
  ia_environment_it_outputs +
  ia_environment_it_water +
  ia_governance_it_corporate_accountability +
  ia_governance_it_ethics_transparency +
  ia_governance_it_mission_engagement +
  ia_governance_it_mission_locked +
  ia_governance_it_transparency +
  ia_workers_it_career_development +
  ia_workers_it_compensation_wages +
  ia_workers_it_engagement_satisfaction +
  ia_workers_it_financial_security +
  ia_workers_it_health_wellness_safety +
  ia_workers_it_management_worker_communication +
  ia_workers_it_training_education +
  ia_workers_it_worker_ownership,
  data = paneldatafinal_10,
  model = "pooling")

coefficients <- coef(summary(model_scores))[, "Estimate"]
std_errors <- coef(summary(model_scores))[, "Std. Error"]
t_values <- coef(summary(model_scores))[, "t-value"]
p_values <- coef(summary(model_scores))[, "Pr(>|t|)"]

# Extract variable names
variable_names <- names(coefficients)

```





```

        ia_workers_it_compensation_wages +
        ia_workers_it_engagement_satisfaction +
        ia_workers_it_financial_security +
        ia_workers_it_health_wellness_safety +
        ia_workers_it_management_worker_communication +
        ia_workers_it_training_education +
        ia_workers_it_worker_ownership,
    data = paneldatafinal_10,
    model = "pooling", na.action = na.omit)

coefficients <- coef(summary(model_scores_round))[, "Estimate"]
std_errors <- coef(summary(model_scores_round))[, "Std. Error"]
t_values <- coef(summary(model_scores_round))[, "t-value"]
p_values <- coef(summary(model_scores_round))[, "Pr(>|t|)"]

# Extract variable names
variable_names <- names(coefficients)

# Create a data frame
summary_data <- data.frame(Variable = variable_names,
                           Coefficient = coefficients,
                           Std_Error = std_errors,
                           t_value = t_values,
                           p_value = p_values)

# Create a flextable object from the data frame
flex_table <- flextable(summary_data)

# Save the table to a Word file
save_as_docx(flex_table, path =
"C:/Users/mikel.escribano/Documents/Master/Master Thesis/scores-
rounds.docx")

# View model results
summary(model_scores_round)

# Change values of the field based on conditions
paneldatafinal_10$B_Corporation[paneldatafinal_10$B_Corporation == 1] <-
"yes"
paneldatafinal_10$B_Corporation[paneldatafinal_10$B_Corporation == 0] <-
"no"
paneldatafinal_10 <- subset(paneldatafinal_10, select = -B_Corporation)
paneldatafinal_10$B_Corporation <-
ifelse(!is.na(paneldatafinal_10$overall_score), 1, 0)

# Estimate the regression model
model_sector <- plm(formula = total_raised_amount ~
catgr_Professional.Services +
                    catgr_Commerce.and.Shopping +
                    catgr_Other +
                    catgr_Sales.and.Marketing +
                    catgr_Software +
                    catgr_Food.and.Beverage +
                    catgr_Financial.Services +
                    catgr_Sustainability +
                    catgr_Design +
                    catgr_Media.and.Entertainment +
                    catgr_Community.and.Lifestyle +
                    catgr_Internet.Services +

```

```

catgr_Health.Care +
catgr_Information.Technology +
catgr_Advertising +
catgr_Consumer.Goods +
catgr_Real.Estate +
catgr_Manufacturing +
catgr_Education +
catgr_Lending.and.Investments +
catgr_Administrative.Services +
catgr_Clothing.and.Apparel +
catgr_Energy +
catgr_Science.and.Engineering +
catgr_Hardware +
catgr_Data.and.Analytics +
catgr_Transportation +
catgr_Agriculture.and.Farming +
catgr_Sports +
catgr_Apps +
catgr_Content.and.Publishing +
catgr_Travel.and.Tourism +
catgr_Natural.Resources +
catgr_Consumer.Electronics +
catgr_Events +
catgr_Video +
catgr_Biotechnology +
catgr_Artificial.Intelligence +
catgr_Government.and.Military +
catgr_Privacy.and.Security +
catgr_Payments +
catgr_Messaging.and.Telecommunications +
catgr_Music.and.Audio +
catgr_Gaming +
catgr_Navigation.and.Mapping +
catgr_Platforms + B_Corporation ,
data = paneldatafinal_10,
model = "pooling")

```

```

coefficients <- coef(summary(model_sector))[, "Estimate"]
std_errors <- coef(summary(model_sector))[, "Std. Error"]
t_values <- coef(summary(model_sector))[, "t-value"]
p_values <- coef(summary(model_sector))[, "Pr(>|t|)"]

# Extract variable names
variable_names <- names(coefficients)

# Create a data frame
summary_data <- data.frame(Variable = variable_names,
                           Coefficient = coefficients,
                           Std_Error = std_errors,
                           t_value = t_values,
                           p_value = round(p_values, digits = 6)
)

# Create a flextable object from the data frame
flex_table <- flextable(summary_data)

# Save the table to a Word file
save_as_docx(flex_table, path =
"C:/Users/mikel.escribano/Documents/Master/Master
Thesis/rounds_sector.docx")

```

```

# View model results
summary(model_sector)

#logit

# Load the required packages
#install.packages("bife")
library(bife)

# 'certification' is a binary variable indicating B Corp certification
status
# 'funding_success' is a binary variable indicating funding success
paneldatafinal_10$funding_success <-
ifelse(paneldatafinal_10$total_raised_amount > 0, 1, 0)

colnames(paneldatafinal_10)

paneldatafinal_10$founded_on <- as.Date(paneldatafinal_10$founded_on)
paneldatafinal_10$year_founded <- year(paneldatafinal_10$founded_on)
paneldatafinal_10$year_founded[is.na(paneldatafinal_10$year_founded)] <- 0
class(paneldatafinal_10$year)

# Convert Age of the Firm to a continuous variable (if not already done)
paneldatafinal_10$Age <- as.numeric(paneldatafinal_10$year -
paneldatafinal_10$year_founded)

# Fit the logistic regression model
logit_age_model <- glm(funding_success ~ B_Corporation + size + Age, data =
paneldatafinal_10, family = "binomial")

# View the summary of the model
summary(logit_age_model)

coefficients <- coef(summary(logit_age_model))[, "Estimate"]
std_errors <- coef(summary(logit_age_model))[, "Std. Error"]
t_values <- coef(summary(logit_age_model))[, "z value"]
p_values <- coef(summary(logit_age_model))[, "Pr(>|z|)"]

# Extract variable names
variable_names <- names(coefficients)

# Create a data frame
summary_data <- data.frame(Variable = variable_names,
                           Coefficient = coefficients,
                           Std_Error = std_errors,
                           z_value = format(t_values, scientific = TRUE),
                           p_value = format(p_values, scientific = TRUE)
)

# Create a flextable object from the data frame
flex_table <- flextable(summary_data)

# Save the table to a Word file
save_as_docx(flex_table, path =
"C:/Users/mikel.escribano/Documents/Master/Master Thesis/rlogit.docx")

```