THE ‘GREEN’ START-UP: ENVIRONMENTAL COMMITMENT AND ITS IMPACT ON START-UP SUCCESS

by

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Abstract

This thesis analyzes the impact of environmental commitment and industry greenhouse gas (GHG) emission of start-ups on start-up success. I study environmental commitment along with GHG emission and funding data for 911 start-ups based in the United States. The results show that start-ups' greenness, measured by greenhouse gas emissions of the main industry in which the start-up operates in and by start-ups' environmental responsibility, has a significant effect on the amount of Venture Capital funds invested in the start-up. The results of my study provide important implications for entrepreneurs, investors, and regulators, highlighting the impact of environmental commitment of start-ups on the venture capital funding they receive.

Keywords: **Start-up, Venture capital, Greenness, Greenhouse Gas emission.**

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Chapter 1. Introduction

In recent years, compliance with 'environmental, social and governance' principles, in short 'ESG', has become more and more important in capital markets, both for firms and for investors (Geczy et al., 2021; Gillan et al., 2021; Amesheva, 2022). Given the current and pressing challenges related to climate change mitigation, the 'E' part has been receiving special attention. More and more pressure is being put on businesses to go green by stakeholder activism in order to improve their ESG and financial performance. This can explain the heightened interest in environmental matters by businesses. Equally important, stakeholders have high expectations regarding the credibility of a company's ESG performance and conduct in relation to financial performance (Lee and Raschke, 2022).

The heightened importance of and attention to the 'Environment' is shown by a variety of different capital market participants. Both public and private firms have been emphasizing the implementation of changes in their business model and operations to signal their commitment to reducing their carbon footprint.

Some firms are going as far as changing their overall business strategy to avoid exposure to climate change risks and support climate change mitigation effort (Pàstor et al, 2021). Sustainability is now a CEO-level matter that is fundamental to the core business and is no longer confined to departments of corporate social responsibility. (Edmans and Kacperczyk, 2022) For example, Hasbro has created a new job position for 'Chief Purpose Officers' and has phased out all plastic packaging for toys. BP declared in August of 2020 that it is cutting all CAPEX spending on their fossil fuel businesses, and is only investing in renewable energies. Rating agencies, such as KLD/MSCI Stats, Sustainalytics, Vigeo Eiris/Moody's, RobecoSAM/S&P Global, and Asset4/Refinitiv have started to compile ESG 'rankings' – much like traditional credit ratings – for corporations (PRI, 2020). Banks have also started to include the risk associated with certain lines of business or certain activities that present a threat to the environment in their assessment of a borrower's credit quality.

Even through, purchasing corporate insurance is not free from compliance with environmentally friendly business principles. Allianz declared in 2020 that starting from the beginning of January 1st, 2023, mining businesses that develop new coal mines, derive

more than 25% of their revenue from coal mining, or produce more than 10 million tons of coal on a yearly basis, would no longer be eligible for property and liability insurance or financing. Institutional investors drive a substantial part of this change. They have been paying more attention to the environmental impact of the companies they invest in, demanding change when necessary (e.g., Hartzmark and Sussman, 2019; Bolton and Kacperczyk, 2021). In the same context, Nguyen et al state that mortgage spreads at financial institutions are higher for properties that are more susceptible to sea level rise risk. This impact is strong to a large number of controls, including area and property qualities, borrower financial soundness, and flood protection. The sea level rise premium is primarily driven by long-term mortgages and not by short-term flooding or the creditworthiness of the borrower at loan origination. This suggests that lenders consider sea level rise risk to be a climate change risk in the long run. (Nguyen et al, 2022)

However, most attention in that matter, including that of scientific research, has been limited to financial public markets and/or mature companies. Although Venture Capital (VC) markets have grown drastically in recent years, little research has examined the effects of 'ESG' compliance and the 'green-ness' of start-ups and Venture Capital (VC) markets. According to IMARC Group, in 2021, the worldwide VC market investment was valued at US$ 211.3 billion, and it would reach US$ 584.4 billion by 2027.

It is unclear, for example, to what extent start-ups are 'ESG' compliant or whether VC firms invest in ESG start-ups, in particular. VC funding is crucial for such start-ups as they can build technologies that solve the environmental issues, which they may not be able to develop if this funding is not available. Furthermore, the entire involvement of the VC business in the 'ESG' scope has yet to be determined. It is therefore the contribution of this thesis: to shed light on the effect of being part of a less polluting industry on the amount of funding a start-up receives. Impact investors, in contrast to conventional venture capitalists, are instrumental in providing consumers with environmentally friendly alternatives. Being involved in almost most of the industries, venture capital funds have a growing impact on the different areas. They fund innovations that meet unmet demand by anticipating future consumer demand for sustainable goods and services. (Holtslag et al,2021).

My thesis presents a novel method to define 'green' and 'non green' start-ups. This

new measure of start-up ‘greenness’ is basically an observation of whether there is a use of greenness-related words in the start-up website and to which degree the start-up industries emit greenhouse gas. I use a sample of 911 U.S. start-ups that were founded between 2001 and 2020. This study is cross-sectional covering the years 2016, 2018, and 2020. I work the years 2016, 2018 and 2020 as years of series A funding to be able to compare different start-ups based on their year of series A funding. The data is cross-sectional, and it presents observations in a specific year for different start-ups.

The findings seek to deepen my understanding of the effects of start-ups’ involvement in environmentally responsible industries on the amount of funding received from venture capital funds. This thesis brings together many studies that investigate the importance and emergence of greenness in businesses and capital markets as well as the impact of greenwashing on investors. My empirical analysis aligns with some of the literature, suggesting that investors are more interested in green businesses. In addition, my analysis presents evidence about the impact of greenness on IPO and suggests a comparison between the effect of greenwashing on IPOs and the total amount of funding received from venture capital funds.

The remainder of this thesis proceeds as follows. In Section II, I discuss theoretical background for My hypotheses. In Section III, I detail the sample and variables definitions. Section IV provides the empirical results and discussion. Finally, Section V outlines my conclusions.

Chapter 2. Literature Review

2.1 Different Definitions of Green and Sustainable Finance & ESG Frameworks

Different definitions of several terms related to "green" in corporations can be found in the literature. The International Finance Corporation (IFC), for instance, defines green finance as follows “If we are to transition to a sustainable global economy, we need to scale up the financing of investments that provide environmental benefits, known as ‘green finance’” (IFC, 2017). The European Commission defines Sustainable Finance as “the process of taking due account of environmental, social and governance (ESG) considerations when making investment decisions in the financial sector, leading to increased longer-term investments into sustainable economic activities and projects" (European Commission, 2021). PriceWaterhouseCoopers, the audit and consulting firm, describes green finance in the banking sector as follows: "For the banking sector, green finance is defined as financial products and services, under the consideration of environmental factors throughout the lending decision making, ex-post monitoring and risk management processes, provided to promote environmentally responsible investments and stimulate low-carbon technologies, projects, industries and businesses.” (PWC, 2013). In this context, a lot of ESG frameworks were developed by rating agencies, authors and different other institutions.

In Table A, I list the following 6 ESG frameworks: Asset 4 Data, Sustainability Accounting Standards Board framework, MSCI ESG, Allianz Global Investors framework: EM sovereign bonds ESG rating, Framework: ESG related AI impacts based on the United Nation’s Sustainable development goals (SDGs) and Mansouri and Momtaz (2021)’s Machine learning and start-up ESG related dictionary tool. These 6 frameworks observe the environmental, the social, and the governance pillars. The Sustainability Accounting Standards Board framework includes additional pillars such as Human Capital, Business model and innovation and leadership. The scoring methodology and metrics used by these 5 frameworks differ. Certain frameworks use numbers, others use macro and micro measurements etc. This divergence in the measurement methods is the major driver for the existing division in ESG ratings generated by different rating agencies. On top of this, after

analyzing some of the causes of the divergences that occur in measurement, there is evidence that there is a rater effect, in which a rater's overall perception of a company influences the measurement of particular categories. Companies' ESG disclosures should be standardized by governments so that all ESG ratings can be built on a foundation of trustworthy and freely available data. (Berg et al.,2022). In this thesis, I focus mainly on the Environmental 'E' part of these frameworks

2.2 Investors' Preferences and Firm Performance

Literature indicates investors being institutional investors or personal investors have different preferences and behaviors when it comes to investing in assets that are linked to environmentally committed activities. Anderson and Robinson surveyed a sample of 4,000 households from Sweden aged between 18 and 65 in 2018. Based on this survey they find that green financial decisions are generally not made by households with environmental preferences. This result is driven by two main factors. Financial disengagement is the first. Financially disengaged and generally uninterested, households with strong pro-environmental behaviors and beliefs are financially disengaged. They are less likely than others to check their retirement balance and to make an active allocation decision in a mandatory-participation national retirement plan. (Anderson and Robinson,2021).

According to elementary portfolio theory, environmentalists should hold more shares of polluting businesses than non-environmentalists do (Baker et al,2022). This can be explained by the fact that polluting businesses are more likely to attract investment capital through a hedging channel than otherwise identical non-polluting businesses. That is to say, investors who claim taking into consideration the environmental implications of their assets while making investment decisions hold more polluting businesses shares in comparison to the shares of polluting businesses that non environmentalists hold. In other words, for environmentalists owning shares in polluting businesses is considered as a hedging channel against the risk of underperformance of holding shares of non-polluting firms (Baker et al,2022).

In addition, a considerable number of the institutional investors, particularly, the large-scale, ESG-aligned ones that have portfolios that include ESG issues, believe that risk management and involvement, rather than divestment, is a superior way to address

climate issues. Equally important, the investors that were surveyed assume that even though certain equity valuations do not entirely mirror the risks that emanate from climate changes, these overvaluations are not considerable.

These policies shape investors' preferences in different countries. Investors in wealthy nations with strong environmental protection or strong governance condemn business acquirers that promote CSR while also acquiring a portfolio of companies that emits a high amount of carbon dioxide, resulting in lower abnormal returns. Investors preferences are impacted by the overall environmental and governance ecosystem of their country. In other words, carbon risk matters and impacts corporate acquisition decision (Bose et al, 2021).

Bolton and Kacperczyk (2021) argue that despite the higher returns on the stocks of companies that have more elevated total carbon dioxide emissions, investors have so far requested an indemnity for the risk they are exposed to because of carbon emission. Meaning that, for some conspicuous spaces, institutional investors enact restrictive screening derived from the intensity of direct emission. This change is driven by institutional investors, who have been taking into account the environmental impact of the firms they invest in.

In this thesis, the findings are consistent with Krueger et al. (2020)'s survey results stating that investors consider the risks emanating from climate change in their investment decision-making process. This is for various financial and non-financial reasons, including reputation protection, legal and ethical considerations and portfolio returns. In a nutshell, they suggest that climate risks have significant impact on investment decisions. While investors have already begun to incorporate climate risks into their investment strategies, the investment industry as a whole is still in the early stages of incorporating climate risks. For instance, many investors continue to overlook the fundamental methods for identifying and managing risks related to carbon and stranded assets[1]. In general, long-term and larger investors appear to influence the shift to a low-carbon economy (Krueger et al., 2020).

[1] "Stranded assets are defined as assets that have suffered from unanticipated or premature write-downs, devaluation or conversion to liabilities. In recent years, the issue of stranded assets caused by environmental factors, such as climate change and society's attitudes towards it, has become increasingly high profile.Changes to the physical environment driven by climate change, and society's response to these changes, could potentially strand entire regions and global industries within a short timeframe, leading to direct and indirect impacts on investment strategies and liabilities." (Lloyd's, 2017)

Sustainability used to be the exclusive domain of "socially responsible investors" with social and financial goals in the investment industry; however, it is now popular and includes investors with only financial goals. To explain more, investors that are driven solely by financial goals are now interested in the sustainability space when it comes to investing in businesses. In a broader sense, a company's social license to operate is significantly impacted by its sustainability, as is how policymakers and citizens perceive it. In this context, since the image of the company is impacted by its societal and environmental impact, the performance of companies is also impacted by this image. Investors now look at sustainable businesses as attractive investments given its attractiveness to consumers (Edmans and Kacperczyk, 2022).

In the same context, Krueger et al. (2020) state that the risks associated with climate change have important implications on firms in terms of investors' portfolios. They show that firms in certain industries, such as fossil fuel, can be adversely affected by regulations and policies put in place to mitigate climate change, such as carbon pricing or ceilings on carbon emission. Moreover, effects of climate change (e.g., the rise in sea water levels or major weather hazards) have direct costs for businesses like insurance companies, which are exposed to higher loss and damage costs. Based on a survey "the importance of climate risks for institutional investors", conducted by Krueger et al in 2019 institutional investors consider that the risks emanating from climate change have significant consequences on firms' portfolios. They also find that such regulatory risks have already been taking place and affecting firms' investment performance.

Carbon emissions pose a unique threat to every business in every sector after taking into account supply and demand. For policymakers, this question is crucial as well. Policymakers who are in the lookout to engage investors in the climate change fight. They discover that there is robust evidence that stock returns are remarkably affected by carbon emissions. The mitigation of climate change and the reduction of carbon emissions are directly linked. Firms are distinctively impacted by the increasing scrutiny over their carbon emission and their use of renewable energy technologies in their goods and services production. (Bolton and Kacperczyk, 2021).

2.3 Green Start-ups and Environmental Commitments

While there are several unanswered questions regarding the behavior and performance of green start-ups, the number of such businesses has steadily increased worldwide in response to environmental issues requiring immediate solutions (Demirel et al, 2017).

While some argue that investors have lower expectations of a startup's financial returns, especially when evaluating attractive startups (Zhang,2021). Others say that in many instances, sustainability-minded investors can have a significant effect on a company's cost of capital. Exclusionary screening and ESG integration can therefore be useful tools for contributing to the ecological transition without going against shareholder engagement policies (Zerbib,2022). Equally important, companies that have a high proportion of investors who are conscious about the environmental and social (E&S) impact improve their E&S policies, especially if the compensation of their managers is tied to the stock price (Cantchev and Giannetti, 2022).

While Brandon et al. (2022) observe a significant gap between what institutional investors who signed the Principles for Responsible Investment (PRI)[2] claim to do regarding ESG and what they actually do in the United States. In other words, institutional investors who are PRI signatories are found to have portfolios that are not ESG compliant. Managers facing reputational risk may rely on environmentally friendly policies to build trust with financial stakeholders like banks, investment funds, and private investors who are interested in environmentally friendly business models. A more in-depth engagement with the environment has the potential to enhance important strategic resources associated with Corporate Responsibility, such as social capital and human capital, which can be expressed as improved relationships with customers and external stakeholders. (Gangi et Al., 2020)

Bergset et al. (2017) state that it is impossible to affirm that green start-ups face more challenges in access to finance. However, these green start-ups are likely to face more challenges in having access to funding due to the deficiency in business education and the elevated level of innovativeness in comparison with other start-ups. Bocken (2015) argues

[2] "Principles for Responsible Investment (PRI), a commitment to responsible investing, exhibit better portfolio-level environmental, social, and governance (ESG) scores." (Brandon et Al, 2022)

that while venture capitalists with a sustainability focus can assist in demonstrating the viability of sustainable business models through start-ups, they will also need to exercise patience in their expectations. They state that by evaluating the characteristics of a company's environmental activities, the US public market takes them seriously. In addition, in the context of an IPO, the market is more sensitive to negative environmental content information than to positive environmental content information (Bui and Frongillo, 2020). In the same context, Labbé, (2016) and Kao and Chen (2020) among others highlight the importance of transparency in start-up communication pre-IPO in reducing information asymmetry that leads to IPO issues. They state that companies must provide investors and underwriters with a comprehensive risk profile, explain their sustainability concerns, establishing an independent audit committee and run an autonomous ESG report to increase the transparency pre-listing. To explain more, issues related to IPOs under information asymmetry (e.g., underpricing) have to be reduced and mitigated by enhancing the quality of reporting of the companies pre-IPO.

Even though there is a growing body of evidence that Corporate Social Responsibility (CSR) as well as Environmental, Social, and Governance (ESG) activities can reduce risk and possibly increase firm value, this central issue is still up for debate in the literature (Gillan et al, 2021).

Different investors' preferences as well as the different environmental commitments and the literature regarding investing in green assets leads to constructing the following hypothesis that this thesis tests:

Hypothesis 1: Less polluting and environmentally committed start-ups should raise more venture capital funding than more polluting and less environmentally committed start-ups

Hypothesis 2: 'Green' startups should be more successful (in terms of IPOs versus non-IPOs) than 'non-green' startups.

2.4 Greenwashing

Greenwashing includes a variety of communications that lead people to believe falsely in the companies' ESG practices, goods, and services (Lyon and Montgomery, 2015). In the same context, Roulet and Toubou (2015) define the act of greenwashing as

“engage in mostly symbolic rather than substantive social and environmental actions”. They state that greenwashing may still be used by businesses with a competitive mindset to gain an advantage. Thus, greenwashing is used as a mean to have a competitive tool to portray a better image of the business.

ESG performance and financial performance are two spaces that have been getting a lot of attention lately. Lee and Raschke (2022) find that ESG performance and financial performance are both influenced by stakeholder legitimacy. Even though greenwashing has no effect on financial performance, businesses with low ESG performance are more likely to greenwash than those with high ESG performance. In a broader scope, given the pressure and high expectation from the stakeholders for businesses to go green, businesses with low ESG performance get to engage in greenwashing activities. While greenwashing is used to portray a polished image of the company (Roulet and Toubou, 2015), it (greenwashing) does not appear to affect a company's financial performance in today's highly interconnected business environment. When the business environment increases the. financial risk of emission for companies especially due to strong governance and environmental protection policies, business acquirers move their carbon emissions offshore to other countries. These countries are less likely to have sanctions that can be imposed. Lowering the financial risk of emissions to avoid the disapproval, pressure and criticism of the investors coming from countries that have developed governance and environmental protection measures can be viewed as a form of greenwashing especially if it portrays the company in a certain way that is different than reality (Bose et al, 2021; Roulet and Toubou, 2015; Lyon and Montgomery, 2015). Despite providing significant benefits to existing stakeholders, greenwashing will harm consumers' interests as well as society as a whole. In this instance, the primary function of the authorities or government is to put into place the right policies and laws to protect consumers' rights (Yang et al, 2020).

Greenwashing being the gap between what businesses say and communicate and what they actually do and offer to their customers (Lyon and Montgomery, 2015; Roulet and Toubou, 2015) can be linked to the importance and obligation of a transparent communication by start-ups pre-IPO to avoid information asymmetry as a main information generator for the IPO due-diligence (Bui and Frongillo, 2020; Labbé, 2016; Kao and Chen, 2020) leads us to build a Hypothesis 3.:

Hypothesis 3: Greenwashing has an impact on start-up success (Total amount of funding and IPO)

To sum up, the three-hypothesis built based on the literature review of this thesis will be the following:

Hypothesis 1: Less polluting and environmentally committed start-ups should raise more venture capital funding than more polluting and less environmentally committed start-ups

Hypothesis 2: ‘Green’ startups should be more successful (in terms of IPOs versus non-IPOs) than ‘non-green’ startups.

Hypothesis 3: Greenwashing has an impact on start-up success (Total amount of funding and IPO).

Chapter 3. Data

3.1 Data Collection and Composition

The U.S. Venture Capital and startup data obtained from Crunchbase is used in this study. Crunchbase is one of the leading VC and startup databases in the world. The database provides data on thousands of startups, such as their founding date, first round of funding, the total amount of funding, and the number of funding rounds.

The database provides detailed information on the institutional features of start-ups (e.g., founding date, location, industry) as well as their financial information. For My research design, I obtain all VC investors for each start-up, along with the amount of provided funding, both per funding round and in total. I also have the exit of each respective start-up which, in typical VC-based research, serves as a leading 'success' indicator: Start-ups that are exited via Initial Public Offering (IPO) are deemed to be most successful, while inactive and/or insolvent start-ups are naturally considered as the least successful. Those financial indicators, particularly the funding amounts and exit scenarios will serve as my 'success' indicators. The exist status in the dataset is presented as follows: IPO, Seed, M&A, Early-stage venture, Late-stage venture and Private Equity.

First, I manually extract the websites of each startup from the Crunchbase links that the first set of data had. The links were mentioned on the Crunchbase URLs. Then, I randomly choose 1,500 start-ups across different industries. To ensure that the start-ups are randomly chosen, I sort each group of start-ups alphabetically, then I assign a number for each start-up and I only keep the start-ups that were assigned an even number. Each 500 of which raised their series A in 2016, 2018 and 2020, respectively. Given the limited amount of time and the necessity to collect the start-ups' website links data manually, I work on a randomized sample rather than the entire dataset.

I use three different measures as a proxy for the start-ups 'greenness': (i) whether the start-up has environmentally friendly projects or initiatives, (ii) occurrence of 'greenness' related words on their website, and (iii) total industry carbon gas emission.

First, I indicate whether the start-up has a section of the website that explicitly mentions the start-up's work on environmentally friendly projects and initiatives. The start-ups that have a separate section for environmentally friendly projects receives 1 and 0 otherwise.

Second, I count the occurrence of environment related words on their website. The words I consider are: 'sustainability,' 'green,' 'greenness,' 'net-zero,' 'carbon emission,' 'environmental,' 'environment.'etc. I use a python script to automate the task.

Third, The dataset provides the industries that each start-up operates in. I pick the first 2 industries mentioned for each start-up and extract the 2-digit SIC (Standardized Industrial Classification) code that each industry falls under. I use S&P Global Market intelligence database, which provides greenhouse emission indicators for different industries. The dataset has the numbers related to the industries publicly listed companies operate in. I compute the average of the greenhouse emissions per industry. This is by summing the GHG scope1, GHG scope2 and GHG scope3[3] of each industry. After, I group the industries under 2-digit SIC code industries and calculate the average again to obtain the different average emissions of each 2-digit SIC code. The idea behind using 2-digit SIC codes in both datasets (the start-up and the emissions datasets) was mainly used to match the two databases. On excel I match each start-up 2-digit industry by the emission amount of that 2-digit industry.

Industry 1 is the main industry of the start-up and industry 2 is the sub industry of the start-up. Example: the start-up automobile that provides GPS fleet tracking solutions falls under a main industry 50: Transportation equipment and has 78: Motion Pictures as a 2nd industry. Motion pictures and Transportation equipment are two completely different industries.

No corrections were needed for the data sample as the number is comparatively small (911 observations). There was some missing observations that I eliminated and that is why the final sample had 911 start-ups There are no outliers as the data is aligned with similar data used in the literature (Bolton and Kacperczyk,2021).

[3] GHG scope1: direct emissions from production, GHG scope2: indirect emissions from consumption of purchased electricity, heat, or steam and GHG scope3: other indirect emissions from the production of purchased materials, product use, waste disposal, outsourced activities, etc. Two industries per startup are being used (industry 1 and industry 2), as they capture the two dimension of a startups possible carbon footprint – the same way different ESG scopes do.

3.2 Sample Overview and Summary Statistics

Before analyzing the different regressions presented in Tables 8, 9 and 10, it is important to mention that the descriptive statistics Tables showcase certain aspects of the different industries and commitment of the start-ups to greenness that go along with the literature.

Table 1 provides the overall descriptive statistics. The total amount of funding received by my sample of start-ups varies between a minimum amount of US$750,000 and a maximum value of US$1.8 billion. The mean of the Total VC Funding is US$ 83 million. The total greenhouse gas emission for the two industries varies between a minimum value of 27 tons and a maximum volume of 1853t. The mean of the total gas emissions is 170t for industry1 and 132.96t for industry2. The occurrence of words related to greenness and environmental responsibility range from 0 words for certain start-ups up to 76 words for other start-ups. The mean is around 0.6 words per website. The Start-up location can either take 0 or 1. I assign 1 for the start-ups that are in Silicon Valley, and 0 if the start-up is located elsewhere. For the Exit Status, it varies between 0 and 1 because it is a dummy variable. The absolute t-values for the means of the variables mentioned in this Table are all higher than 1.96, which means that the difference between 0 and these means is significant.

Table 1 reports summary statistics for the dependent variable (Total funding ‘000USD), My key variables of greenness and a set of control variables. This Table shows the mean, standard deviation minimum and maximum values in terms of number of observations of total funding ‘000USD, total emissions for industry 1 and 2, Website Word Count, start-up location and founding date as well as the total VC funding. All variables are defined in Annex A-1. The sample comprises 911 observations covering 911 unique start-ups that got their series A funding in 2016, 2018 and 2020. Total funding ‘000USD is the total amount of funding received by the start-up in thousand dollars.

Table 1 Main descriptive statistics

Variable	Obs			Mean	Std. dev	Min	Max
		Binary					
	Total	0	1				
Total Funding '000USD	911			83,973.08	16,631	750	1.89Mn
				(15.23)			
Website Word Count	911			0.63	3.26	0	76
				(5.84)			
Total emissions 1 (tons of CO2 equivalent)	911			170.29	224.83	27.22	1,835.71
				(22.86)			
Total emissions 2 (tons of CO2 equivalent)	911			132.96	137.79	27.22	1,835.71
				(29.12)			
Start-up location	911	788	123	-	0.34	0	1
				(12.08)			
Start-up founding date	911			2014.6	2.90	2001	2020
				(2000)			
Total VC funding	911			115Bn	31Mn	23Bn	165Bn
				(110,755)			
Exit status	911	876	35	-	0.19	0	1
				(6.11)			
Number of fuding rounds	911			4.39	2.34	1	19

In Table 2, mean values of Exit status, Total emissions, Total emissions for industry 1, Total emissions for industry 2 and Website Word Count by year are provided. Table 2 shows that the mean of the total amount of funding increased by around US$ 1 million between start-ups which received their series A funding in 2016 and those that received their series A in 2018. This difference is negligible when I compare it to the increase of US$ 50 million that I notice from Table 2 between start-ups which received their series A funding in 2018 and those that received their series A in 2020. The total amount of funding received by the start-ups of the sample in 2020 is the lowest. It represents half the amount of the funding received by start-ups who received their series A funding in 2018 and 2016. The t-values for the total amount of funding for the 3 years is higher than the absolute value of 1.96 which means the difference in mean is significant for this variable. For the remaining means for the remaining variables in the 3 years (total emissions industry 1, total

emissions industry 2 and website word count) is insignificant.

Table 2 shows the means of my dependent variable (total emissions) and my key independent variables of greenness (total emissions for industry 1 and 2 and Website Word Count) classified by the year when the start-up raised its series A. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020.

Table 2. Descriptive statistics by year

Year	Exit status		Total Funding '000USD	Total emissions industry1	Total emissions industry2	Website Word Count
	0	1				
2016	230	22	103,274.31	163.97	132.51	0.71
			(-7.00)	(-0.95)	(-0.95)	(-0.45)
2018	292	9	104,269.66	180.07	142.44	0.72
			(-3.04)	(-0.11)	(0.24)	(0.69)
2020	354	4	53,321.741	166.52	125.31	0.50
			(-7.85)	(0.14)	(-0.28)	(0.27)
Total	876	35	83,973.082	170.29	132.96	0.63

Table 3 provides mean values of Total emissions, Total emissions for industry 1 & Website Word Count per main industry (i.e., industry 1) my sample start-ups operate in. It shows that industries receive different amounts of VC funding. VCs are more interested in certain industries. For example, the communication industry receives the highest amount of venture capital funding. Activities that fall under the communications industry are services related to data, voice and sound transmission, and video. My findings align with the literature. The literature on environmental entrepreneurship focuses on cleantech companies that usually have a high demand for capital, including clean communication technology. These start-ups usually get their funding from VC funds (O'Rourke et al., 2021; Bürer and Wüstenhagen, 2008; Hargadon and Kenney, 2011; Wüstenhagen and Teppo, 2006; Randjelovic et al., 2003). Cleantech start-ups, which have higher capital requirements than other start-ups Bergset et al. (2017) , receive more money from venture capital funds. The average volume of greenhouse gas emission of the 45: communication industry, which receives the highest amount of funding on average, is one of the lowest (39 tones of CO^2). Moreover, the insurance Agents, Brokers, And Service Industries talks the

most about greenness and being environmental responsible (i.e., highest number of greenness word count on their websites), and it is one of the industries that receive the highest amount of VC funding, on average (US$ 158 million). This indicates that for this specific industry where start-ups talk the most about greenness there is a high funding amount.

Table 3 shows the means of My dependent variable (total emissions) and My key independent variables of greenness (total emissions for industry 1 & Website Word Count) classified by 2-digit SIC industry for industry 1. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020. Total emissions per start-up is sorted in descending order, number IPO start-up represents the number of start-ups that went through an IPO for each industry. Website Word Count per start-up represents the Website Word Count per start-up in each industry and Total Funding per start-up and Total Funding '000USD represent the average funding.

Table 3. Industry1 descriptive statistics

Industry 1	SIC 1	Total emissions industry 1 per start-up	Number IPO start-ups	Website Word Count per start-up	Total Funding per start-up	Total Funding '000USD
Agriculture, forestry and fishing	1	1835.71	0	43	22321.19	22321.18
Electric, Gas, And Sanitary Services	49	712.87	0	1	4792.69	4792.68
Food And Kindred Products	20	474.9	0	13	19403.26	19403.26
Building Materials, Hardware, Garden Supply, And Mobile Home Dealers	52	437.8	0	0	27184.25	27184.25
Oil and gas extraction	13	408.21	0	4	60376.25	60376.25
Chemicals And Allied Products	28	361.72	6	27	118077.17	118077.17
Transportation Equipment	37	351.16	1	13	317863.33	317863.33
Wholesale Trade-non-durable Goods	51	337.32	0	0	28140	28140
Wholesale Trade-durable Goods	50	271.74	2	47	76723.06	76723.05
Eating And Drinking Places	58	255.33	0	0	25860.43	25860.43
Apparel and other finished products	23	244.18	2	31	83667.42	83667.42
Building Construction General Contractors And Operative Builders	15	243.99	0	10	22708.77	22708.76
Communications	45	222.64	0	0	15674.97	15674.97
Transportation Services	47	222.51	1	52	61466.65	61466.65
Electronic And Other Electrical Equipment And Components	36	210.46	2	2	197243.41	197243.41

Measuring, Analyzing, And Controlling Instruments; Photographic, Medical And Optical Goods; Watches And Clocks	38	185.76	0	0	9582.46	9582.46
Printing, Publishing, and Allied Industrie	27	178.1	0	1	94698.2	94698.2
Home Furniture, Furnishings, And Equipment Stores	57	176.19	0	7	109080.29	109080.29
Educational Services	82	160.63	0	1	62517.92	62517.91
Social services	83	132.19	0	3	42138.68	42138.67
Engineering, Accounting, Research, Management, And Related Services	87	127.56	17	15	113781.18	113781.18
Real Estate	65	126.16	0	5	31170.88	31170.88
Food and beverage service activities	56	123.41	0	14	40960.3	40960.3
General Merchandise Stores	53	120.44	0	5	13050	13050
Commercial establishments	70	111.8	0	11	78551.43	78551.43
Administration Of Human Resource Programs	94	111.59	0	4	97451.69	97451.7
Health services	80	109.39	1	8	79355.81	79355.81
Other investment offices	67	77.58	0	0	21712.52	21712.52
Motion pictures	78	70.04	0	4	59413.97	59413.96
Business services	73	68.7	1	101	75451.76	75451.76
Communications	48	62.14	0	0	22133.33	22133.33
Computer programming, consultancy and related activities	62	59.86	0	53	67827.05	67827.05
Agents and brokers dealing in insurance	64	44.62	0	79	158592.66	158592.66
Non-depository Credit Institutions	61	39.02	1	2	164716.67	164716.67
Insurance companies	63	28.9	0	1	73467.43	73467.43
Depository institutions	60	27.22	1	20	92690.9	92690.9

On the same subject, Table 4 presents mean values of the Total emissions, Total emissions for industry 2 and Website Word Count by each second main industry (i.e., industry 2) my sample start-ups operate in. Table 4 shows that industries receive different amounts of funding from venture capital funds. Table 4 gives us an insight that is different from Table 3. With regards to the second industry, VCs are investing more in other industries such as 1: Agriculture, forestry and fishing with US$ 185 million of total funding on average. 1: Agriculture, forestry and fishing industry has high greenhouse gas emission (1835Tons). It is also one of the industries where start-ups from my sample talk the most about greenness and sustainability.

Table 4 shows the means of my dependent variable (total emissions) and y key independent variables of greenness (total emissions for industry 2 and Website Word Count) classified by 2-digit SIC industry for industry 2. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020. Total emissions per start-up is sorted in descending order, number IPO start-up represents the number of start-ups that went through an IPO for each industry. Website Word Count per start-up represents the Website Word Count per start-up in each industry and Total Funding per start-up and Total Funding '000USD represent the average funding.

Table 4. Industry2 descriptive statistics

Industry 2	SIC 2	Total emissions industry 1 per start-up	Number IPO start-ups	Website Word Count per start-up	Total Funding per start-up	Total Funding '000USD
Agriculture, forestry and fishing	1	1314.39	0	8	185430	1,835.71
Wholesale Trade-non-durable Goods	51	474.9	0	0	22005.96	337.31
Wholesale Trade-durable Goods	50	438.86	0	43	82114.15	271.74
Communications	45	351.16	1	13	413860	222.63
Industrial and Commercial Machinery and Computer Equipment	35	349.02	0	4	25160.67	237.59
Motion pictures	78	313.4	0	3	220742.11	70.03
Electronic And Other Electrical Equipment And Components	36	248.95	2	6	190085.4	210.45
Food And Kindred Products	20	245.64	0	8	22757.55	474.9
Apparel and other finished products	23	242.53	0	40	81817.2	244.17
Electric, Gas, And Sanitary Services	49	230.46	0	4	70675.08	712.86
Engineering, Accounting, Research, Management, And Related Services	87	216.33	16	49	124970.13	127.55
Food and beverage service activities	56	211.25	2	47	46594.86	123.41
Real Estate	65	197.75	0	0	51862.93	126.16
Home Furniture, Furnishings, And Equipment Stores	57	187.15	0	9	24779.83	176.19
Transportation Equipment	37	184.63	0	0	68000	351.15
Educational Services	82	175.81	0	2	19764.93	160.63
Transportation Services	47	161.12	0	59	99609.5	222.51
Justice, Public Order, And Safety	92	160.63	0	0	3325	127.67
Social services	83	155.8	0	10	65761.21	132.19
Commercial establishments	70	153.87	0	5	35242.73	111.8

Computer programming, consultancy and related activities	62	153.3	1	16	54916.58	59.85
Building Materials, Hardware, Garden Supply, And Mobile Home Dealers	52	149.89	0	12	118801.03	437.79
Measuring, Analyzing, And Controlling Instruments; Photographic, Medical And Optical Goods; Watches And Clocks	38	141.18	0	3	106394.82	185.75
Health services	80	138.74	9	23	100755.4	109.39
Building Construction General Contractors And Operative Builders	15	132.75	0	0	46103.67	243.99
Business services	73	128.23	3	151	64732.41	68.69
Communications	48	124.62	0	2	158249.92	62.13
Administration Of Human Resource Programs	94	115.97	0	12	86391.27	111.58
Chemicals And Allied Products	28	114.98	0	1	72000	361.71
Insurance companies	63	112.9	0	1	38952.12	28.9
Other investment offices	67	102.57	0	0	4606.3	77.58
Agents and brokers dealing in insurance	64	98.86	1	18	101030.4	44.61
Depository institutions	60	83.06	1	23	58537.87	27.21
Eating And Drinking Places	58	68.7	0	1	150850	255.33

For the website greenness-related words count variable (i.e., word count), the mean dropped from 0.7 for start-ups which received their series A funding in 2016 and 2018 to 0.5 for start-ups which received their series A funding in 2020. In my sample of the US-based start-ups, the start-ups that received their series A funding in 2016 and 2018 talked more about greenness in their websites than the start-ups that received their series A funding in 2020. Total emissions for industry 1 and 2 remained almost unchanged.

For the Exit status of the start-ups 35 start-ups went public and 876 did not go through an IPO. This can show that for the 911 start-ups that I use as a sample for my thesis, the ones that start-ups that received their Series A funding earlier go public more than the start-ups that receive their series A funding later (2016 in comparison to 2020).

To explain more, when I observe at the differences in the total funding, based on the year of the series A funding, there is not much change in the values of total amount of funding between the start-ups of the sample used in this thesis. Equally important, when I look at the Exist status, the earlier the start-up gets its series A funding the more likely it is to go public which makes sense. Start-ups that received their series A later will need more years to go public or go through a different exit status. Finally, the carbon gas emissions

remained similar for start-ups who received their series A in 2016, 2018 and 2020.

Table 5 presents the Mean and Median of Total funding ‘000USD based on the Word count. I attribute 0 to the companies that did not talk about being environmentally responsible and 0 to the companies that did not talk about being environmentally responsible in their website. I also, calculate the mean and median of the Total funding ‘000USD for the two groups. The median and mean of the Total funding ‘000USD per start-up are higher (respectively $31M and $102M) for start-ups that talk about greenness than the median and mean for those who never talked about greenness in their website (respectively $30M and $81M). The t-statistic equals to -1.32, this value is small which makes the difference between the means of total funding for companies who talk about greenness in their website and those who do not insignificant.

This Table presents the Mean and Median of Total funding ‘000USD based on the Word count. I attribute 0 to the companies that do not talk about being environmentally responsible and 1 to the companies that do talk about being environmentally responsible in their website. I also, calculate the mean and median of the Total funding ‘000USD for the two groups.

Table 5. Mean and Median of Total funding ‘000USD based on the Word count

Website Word Count	Total funding ‘000USD Median	Total funding ‘000USD Mean
0	30,700	81,015
1	31,883	102,069
	t = -1.32	

Table 6 provides the correlation between all variables. The correlation between the Exit status, total funding and Total emissions of industry 1 is negative. When the volume of Total emissions of the sum of emissions of industry 1 increases the total amount of funding that a start-up receives decreases. This indicates that venture capital funds are likely to invest more money in start-ups that fall under industries with a decreasing total greenhouse gas emission.

On one hand, the Table shows a negative correlation between the total greenhouse gas emission of the main industry (industry1) that the start-up operates in and the total amount of funding that start-ups receive. On the other hand, Table 6 shows a low positive

correlation of (0.0461) between the amount of funding received by start-ups and the total greenhouse gas emission of the 2nd industry.

The Exit status variable is positively correlated with word count (0.017), Total emissions industry 1 (0.0147) and Total emissions industry (0.0147). In other words, if the word count or the total emissions industry1, or the total emissions industry 2 increase the start-up is more likely to go public. The Exit status variable is positively correlated with Total funding '000USD.

Table 6 showcases a low and positive correlation of 0.0396 between the Website Word Count and the amount of funding received by start-ups. It indicates that the more a start-up talks about greenness and environmental responsibility, the higher is the amount of VC funds that it receives.

Table 6 presents correlation coefficients between the dependent variable (Total funding '000USD and Exit status), My key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1.

Table 6. Correlation Table

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exit Status (1)	1							
Total Funding '000 USD (2)	0.29*	1						
Website Word Count (3)	0.01	0.04	1					
	0.75	0.23						
Total emissions industry 1 (4)	0.01	-0.04	0.09*	1				
	0.66	0.29	0.00					
Total emissions industry 2 (5)	-0.02	0.05	0.06	0.33*	1			
	0.51	0.16	0.08	0				
Start-up location	-0.03	0.06	-0.04	0.02	-0.01	1		

(6)	0.33	0.09	0.24	0.63	0.77			
Start-up founding date	-0.05	0.05	0.00	-0.01	-0.03	0.07*	1	
(7)	0.15	0.15	0.94	0.74	0.45	0.02		
Total VC funding	0.01	0.00	0.05	0.04	0.04	-0.06	-0.45*	1
(8)	0.82	0.97	0.10	0.18	0.18	0.05	0.00	

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The sum of the Table statistics present that the low amount of funding received from venture capital funds in 2020 in comparison to 2016 and 2018 can be explained by the covid-19 impact. This observation is aligned with the literature. The literature shows that the covid-19 pandemic impacted the total amount of funding negatively (Bellavitis et al, 2022). In addition to that, based on the descriptive statistics mentioned in Table 3, we can observe a certain alignment with the literature when it comes to investors' preference in allocating more funds to companies that are more environmentally committed. Equally important, while start-ups that operate under less polluting industries (Industry 1) are part of the start-ups that are more likely to get higher funding, this is not necessarily the case for industry 2. In the same context, Table 4 confirms that VC funds focus more on the main industry of the start-up and do not necessarily pay much attention to the other industries that the start-up falls under. It is important to mention that based on Table 5, start-ups who talk about greenness tend to receive more funding than those who do not. Based on Table 6, I can argue that investors are more likely to consider the main industry start-ups operate in, and tend not to pay a lot of attention to the sub-industry. In the case of my sample, VCs focus more on the greenhouse gas emission of the main industry that the core operations of the start-up fall under when it comes to deciding in which start-up to. The correlation between total emissions industry 1 and Website Word Count as well as the correlation between total funding and exit status and the correlation between total emissions industry 1 and total emissions industry 2 are significant.

To deepen the understanding of the above findings I investigate the empirical results.

Chapter 4. Empirical Results and Discussion

4.1 Empirical Results

To test my Hypothesis 1, I run a cross-sectional ordinary least squares (OLS) estimation where I regress Total VC Funding on my key independent variables and I control for Start-up location, Start-up founding date and Total VC Funding. I use heteroskedasticity robust standard errors.

Table 7 presents the regressions results of the relation between the greenness of start-ups and the amount of VC funding they receive. My dependent variable is *Total funding '000USD*, measured by Crunchbase based on the total amount of the total amount of venture capital funding each start-up received. My key independent variables are Total emissions industry 1, Website Word Count, Total emissions industry 2 that are my proxies for greenness. Start-up location, Start-up founding date and Total VC Funding are included in the regressions as control variables. I also include year fixed effects to address concerns of not controlling for (unobserved) time variant factors.

In model (1) of Table 7, I show that the Total emissions industry1 coefficient is negative and statistically significant at the 5% level. The t-statistics value for this variable is around (-1.97) in the model where I add the time fixed effect and around (-2.11) in the model where I do not consider the time fixed effect and the coefficients are respectively, -25.71 and -27.1. The GHG emissions of the main industry in which the start-up operates in has a significant impact on the amount of Venture Capital funds invested in the start-up. From a statistical standpoint, if the amount of greenhouse gas emitted by the main industry that the start-up falls under increases by 1 ton, the amount of funding that the start-up receives will decrease by US$25,714. These results support the Hypothesis 1.

In models (2) and (3), I regress the total funding on the Website Word Count and the total greenhouse gas emission of industry 2, respectively while controlling for the start-up location, start-up founding date and total VC funding in the year of founding of the start-up in the two regressions (2) and (3). Website Word Count and Total emissions industry 2 are both insignificant. Thus, if I am looking at the greenness solely from a perspective of how much start-ups talk about greenness and environmental responsibility or from the

perspective of the greenhouse gas emissions of the second industry that the start-up falls under, the findings do not reveal much information because this variable is insignificant. In these two regressions, there is no conclusive evidence that there is an effect of the Word count and the total greenhouse gas emission of industry 2 variables. Whereas, in models (2') and (3'), the total emissions industry 2 remain insignificant. the word count variable becomes significant when I remove the time fixed effect component. The t-value for word count improves from 1.63 to 1.76. I test the different regressions with and without the time fixed effect element to improve the results and understand more the impact of greenness on the total amount of funding received by the different start-ups.

This Table provides the results of the regressions of the dependent variable (Total funding '000USD), My key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1. In models (1), (2) and (3) I regress dependent variable (Total funding '000USD) respectively on the independent variables Total emissions for industry 1, Total emissions for industry 2 and Website Word Count while controlling for the start-ups' location and founding date as well as the total amount of funding. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively. Models (1'), (2') and (3') are the same models as (1), (2) and (3) but without the time fixed effect element.

Table 7. Models (1), (2) and (3)

	(1)	(2')	(2)	(1')	(3)	(3')
VARIABLES	Total Funding '000USD	Total Funding '000USD	Total Funding '000USD	Total Funding '000USD	Total Funding '000USD	Total Funding '000USD
Total emissions industry1	-25.71**	-27.10**				
	(-1.97)	(-2.11)				
Website Word Count			1,859.90	2,058.74*		
			(1.63)	(1.76)		
Total emissions industry2					51.60	56.54
					(1.08)	(1.11)
Control Variables						
Start-up location	20,768.00	3,331.00	20,903.17	26,364.14	20,512.05	3,326.61*
	(0.92)	(1.64)	(0.92)	(1.15)	(0.91)	(1.64)
Start-up founding date	7,310.89***	0.00	7,280.41***	3,241.65	7,334.19***	0.00
	(3.51)	(0.95)	(3.49)	(1.60)	(3.52)	(0.84)
Total VC funding	-0.00	-6.64Mn	-0.00	0.00	-0.00	-6.64Mn
	(-1.01)	(-1.62)	(-1.14)	(0.83)	(-1.11)	(-1.63)
Observations	911	911	911	911	911	911
Constant	-14.586Mn***	-6.6457Mn	-14.527Mn***	-6.4689Mn	-14.642Mn***	-6.64Mn
	(-3.47)	(-1.62)	(-3.45)	(-1.58)	(-3.49)	(-1.63)
Year FE	YES	NO	YES	NO	YES	NO
Adjusted R-squared	0.035	0.00	0.03	0.00	0.03	0.003

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Furthermore, I test combinations of variables to get a better understanding of the different possibilities of impact the independent variables might have on the dependent variable. These regressions are explained in Table 8 through models (4),(4'),(5) and (5').

Table 8 presents the regression results for the relationship between the amount of funding received by start-ups from venture capital funds and the greenness of these start-ups. Regressions include Total emissions industry 1, Website Word Count, Total emissions industry 2 as independent variables and Start-up location, Start-up founding date and Total VC Funding as control variables. For models, (4) and (5) I include year fixed effects to address concerns of not controlling for (unobserved) time variant factors.

Based on the model (4) and (4') regression, the Total emissions industry1 coefficient is negative. If the amount of greenhouse gas emitted by the main industry that the start-up falls under increases by 1 ton, the amount of funding that the start-up receives will decrease by $28,345 in the case of the time fixed effect model and will decrease by $30,086 if we don't control for unobserved time variant factors. The T-value for the total emission industry1 is (-2.17) if we control for time fixed effect and (-2.352) if we do not.

The Website Word Count coefficient is positive in both cases. The coefficient is around 2,038 for regression (4) and 2,248 for regression (4'). When it comes to the t-values we observe (1.95) for the time fixed effect model and (2.11) for the model where I do not control for time fixed effect. Thus, the more the start-up talks about greenness and being environmentally responsible in their website the more capital it receives venture capital funds. Based on model (4), if the occurrence of words related to greenness increases by 1 unit, the amount of funding that the start-up receives will increase by around $2M in both cases. This evidence works for the 911 US-based start-ups observed in this thesis. The Total emissions industry 1 as well the Website Word Count variables are both significant respectively at the 10% and 5% level. My findings support the Hypothesis 1.

Based on the model (5) regression, the Total emissions industry1 coefficient is negative. If the amount of greenhouse gas emitted by the main industry that the start-up falls under increases by 1 ton, the amount of funding that the start-up receives will decrease by $43,100.3 in the case of the time fixed effect model and will decrease by up to $46,185 in the case of regression (5'). The Website Word Count coefficient is positive in both cases. Thus, the more the start-up talks about greenness and being environmentally responsible in their website the more funding it receives venture capital funds. Based on the model (5) regression, if the occurrence of words related to greenness increases by 1 unit, the amount of funding that the start-up receives will increase by $1.9M if we control for time fixed effect and by around $2.1M if we do not control for time fixed effect. The Total emissions industry 1 as well the Website Word Count variables are both significant respectively at the 10% and 5% level. When I look at the Total emissions for industry2, I find that this variable is unsignificant in both cases with t-values of (1.55) if we control for time fixed effect and (1.59) if we do not.

This Table provides the results of the regressions of the dependent variable (Total funding '000USD), My key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1. In model (4) and (5) I regress dependent variable (Total funding '000USD) respectively on the independent variables Total emissions industry1 & Website Word Count and Total emissions industry1, Total emissions industry2 and Website Word Count while controlling for the start-ups' location

and founding date as well as the total amount of funding. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively. Models (4') and (5') are the same models as (4) and (5) but without the time fixed effect element. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 8. Main regressions

VARIABLES	(4) Total Funding '000USD	(4') Total Funding '000USD	(5) Total Funding '000USD	(5') Total Funding '000USD
Website Word Count	2,038.89*	2,248.16**	1,961.63*	2,162.32*
	(1.95)	(2.116)	(1.79)	(1.92)
Total emissions industry1	-28.34**	-30.08**	-43.10***	-46.18***
	(-2.17)	(-2.352)	(-2.87)	(-3.05)
Total emissions industry2			72.43	78.91
			(1.55)	(1.59)
Control Variables				
Start-up location	21,365.05	26,792.68	21,693.38	27,159.22
	(0.94)	(1.171)	(0.96)	(1.18)
Start-up founding date	7,266.97***	3,258.57	7,292.00***	3,296.91
	(3.48)	(1.604)	(3.49)	(1.61)
Total VC funding	-0.00	0.00	-0.00	0.00
	(-1.08)	(0.873)	(-1.09)	(0.82)
Observations	911	911	911	911
Constant	-14.49Mn***	-6.4992Mn	-14.55Mn***	-6.58Mn
	(-3.44)	(-1.584)	(-3.45)	(-1.60)
Year FE	YES	NO	YES	NO
Adjusted R-squared	0.03	0.003	0.03	0.00

Based on models (4) and (5), the time variable was highly significant. Based on this observation, I run regressions (6), (7) and (8) which are the same as regression (5) but with different samples. The samples are start-ups grouped separately based on the year of obtention of the series A of funding. These 3 regressions are particularly important to study how the coefficients change for start-ups that got their first rounds of funding in different years. The sign of the coefficient remains negative for the total emissions industry1 (negative) and total emissions industry 2 (positive). However, the total emissions industry 1 became insignificant for years 2016 and 2018 with t-values of (-0.138 and -1.464). When it comes to the Website Word Count, the coefficient for 2016 is positive and significant but for 2018, and 2020 the coefficient became negative and insignificant. It is important to mention that models (6), (7) and (8), show the exact same results with and without the time fixed effect component and that is why we didn't show both results. There is no clear common trend in the change of the significance or the sign of the coefficients.

Table 9 provides the results of the regressions of the dependent variable (Total funding '000USD), My key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1. I regress dependent variable (Total funding '000USD) on the independent variables Total emissions industry1, Total emissions industry2 and Website Word Count while controlling for the start-ups' location and founding date as well as the total amount of funding. My samples consist of 252, 301 and 348 US-based start-ups which raised their series A consequently in 2016, 2018 and 2020. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 9. Exit Status regressions per year

VARIABLES	(6) Total Funding '000USD 2016	(7) Total Funding '000USD 2018	(8) Total Funding '000USD 2020
Website Word Count	4,567.81***	-1,958.72	-1,924.08
	(3.69)	(-0.87)	(-1.61)
Total emissions industry1	-9.79	-57.77*	-12.22
	(-0.13)	(-1.72)	(-1.46)
Total emissions industry2	177.87**	62.09	2.47
	(2.36)	(1.01)	(0.13)
Control variables			
Start-up location	20,089.38	56,624.28	-3,976.24
	(0.56)	(0.81)	(-0.44)
Start-up founding date	10,943.99**	10,167.80**	-258.01
	(2.32)	(2.56)	(-0.09)
Total VC funding	-0.00	-0.00	-0.00**
	(-1.28)	(-0.69)	(-2.21)
Constant	-21.86Mn**	-20.33Mn**	616,341.93
	(-2.31)	(-2.55)	(0.11)
Observations	252	301	358
Year FE	YES	YES	YES
Adjusted R-squared	0.03	0.01	0.02

Model (9) regression is a logit model. The exit status is a (binary) dependent variable. The (9-a-b-c) regressions did not give any significant results. For model (9), the total emissions industry 1 is significant at 10%. Total emissions industry 2 is also significant. Total emissions industry1, the coefficient is 0.0005 and the z-statistics value is 1.667. For my 911 US-based start-ups sample, the total emissions industry1 coefficient means that if the GHG emissions of industry 1 increases there is a probability of 0.05% that the start-up goes public. Equally important, the coefficient of the Total emissions industry2 is negative. In other words, if the total GHG emissions of the second industry of the start-up, there will be a 0.16% probability that the start-up will go public. The Website

Word Count in insignificant in model (9). This suggests that the Website Word Count has no impact on the destiny of the start-up.

Table 10 provides the results of the regressions of the dependent variable (Exit status), my key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1. In model (9) I regress dependent variable (Exit status) on the independent variables Total emissions industry1, Total emissions industry2 and Website Word Count while controlling for the start-ups' location and founding date as well as the total amount of funding. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 10. Exit status regressions

VARIABLES	(9-a) Exit status	(9-b) Exit status	(9-c) Exit status	(9) Exit status
Website Word Count	0.01			0.01
	(0.39)			(0.37)
Total emissions industry1		0.00		0.00*
		(1.041)		(1.66)
Total emissions industry2			-0.00	-0.00*
			(-1.50)	(-1.86)
Start-up location	-0.54	-0.54	-0.54	-0.54
	(-0.87)	(-0.88)	(-0.88)	(-0.88)
Start-up founding date	-0.07	-0.07	-0.07	-0.07
	(-1.25)	(-1.25)	(-1.25)	(-1.27)
Total VC funding	-0.00	-0.00	-0.00	-0.00
	(-0.27)	(-0.27)	(-0.22)	(-0.26)
Constant	147.64	147.77	147.08	149.31
	(1.22)	(1.22)	(1.23)	(1.24)
Pseudo R2	0.00	0.01	0.01	0.01
Observations	911	911	911	911

In model (10), the quartile regression of my dependent variable (Total funding '000USD), on key variables of greenness (total emissions for industry 1 and 2 and Website Word Count) while controlling for start-up location, founding date and total VC funding show only one significant independent variable at 10% level. This variable is total emissions. The coefficient for the latter is (-3.1461) and the t-value is (-1.887). The coefficient of total emissions industry1 being negative is consistent with the findings from regression (5). This means that the more polluting the main industry under which the start-up operates the less funding the start-up gets. The Word Count variable as well as the total emissions industry 2 are not significant in this regression. The start-up founding date being one of the control variables is significant at 1% level with a positive coefficient.

Table 11 presents the quantile (quartile in this case) regression of my dependent variable (Total funding '000USD), on my key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 11. Model (10)

VARIABLES	(10) Total Funding '000USD
Website Word Count	669.12
	(1.47)
Total emissions industry1	-3.14*
	(-1.8)
Total emissions industry2	-2.15
	(-0.73)
Control variable	
Start-up location	2,524.55
	(0.92)
Start-up founding date	880.08***
	(9.89)
Total VC funding	0.00
	(0.74)
Constant	-1.76Mn***
	(-9.92)
Observations	911

When we compare model (9) to model (5), we can notice that the coefficient of the total emissions industry 1 is negative when it is used in a regression where the dependent variable is total funding received by the start-up. This means that the more polluting the first industry of the start-up is, the less funding the start-up will get. Whereas, when used as an independent variable along with other independent variables and control variables in a regression where the exit status of the start-up is the dependent variable the total emissions industry1, will have a positive coefficient. When it comes to total emissions industry 2, this variable has an insignificant coefficient when we use it in a regression with the total amount of funding and a positive significant coefficient when we use it in a regression with the exit status variable. None of the three main independent variables of the models has the same impact on the exit destiny of the start-up and the amount of venture capital funding the start-up receives.

4.2 Discussion

One of my first findings, while controlling for start-up location, founding date and total VC funding is the following: start-ups who operate within an industry that has higher greenhouse gas emission get lower funding than start-ups that operate within an industry that pollutes less. This is the first finding of this thesis.

The second finding is evidence that the use of words related to greenness and being environmentally responsible on the website of the start-up has a significant impact on the total amount of funding that start-ups receive from venture capital funds.

For the 911 US-based start-ups sample there is empirical evidence that first, the total greenhouse gas emissions of the main industry of the start-up have a significant negative impact on the total amount of funding that the start-up receives. Second, showing environmental commitment of the start-up through the number of greenness-related words used in the start-up website has a positive significant impact on the total amount of funding the start-ups receive from venture capital funds. These findings confirm my Hypothesis 1.

Furthermore, investors look at the first industry that the start-up operates in. The less polluting industry1 is, the more funds venture capital funds will invest in the start-ups operating in that industry. Investors are not necessarily looking at the greenhouse gas emissions of the second industry of the start-up. This can be explained by the insignificance of industry2 of the start-ups in model (5). Investors in the case of the 911 US-based start-ups investigated in this thesis are indifferent when it comes to incorporate the polluting impact of the 2^{nd} industry that the start-up operates under. In that regard, more tests can be run to confirm and generalize this finding. The robustness test can test the significance of the impact of the 3^{rd}, 4^{th}, 5^{th} industries that the start-up operates under on the total funding that the start-up receives from venture capital funds.

Equally important, based on the findings, if the start-up talks about being environmentally committed or not the destiny of the start-up will not change much. To put it in another way, the probability of a start-up going public or going through a mergers and acquisitions or being bought by a private equity firm or going bankrupt does not get affected if start-up portrays itself as environmentally committed.

The comparison between models (5) and (9) can be explained by the Hypothesis 3

along with the literature that suggests that there is less information asymmetry pre-IPO due to the thorough due diligence conducted by parties involved in the IPO process (Bui and Frongillo, 2020; Labbé, 2016; Kao and Chen, 2020). When start-ups raise their series of funding there is always room to pitch the start-up in a certain polished way to investors and portray the start-up as environmentally responsible which explains the significance of the word count variable and the positive sign of its coefficient in model (5) which uses the total amount of funding receiving from venture capital funds as a measure of success. Whereas, in model (9) where our main measure of success is the exit status (IPO), the word count variable becomes insignificant. This can be explained by the detailed due diligence conducted by the parties involved in the pre-IPO process. At this stage of the life of the start-up, talking about being environmentally friendly doesn't influence whether the start-up will go public or not. In other words, greenwashing – having a gap between what the start-up does and what it says on its website about environmental commitments – does not have the same impact it has on the amount of funding the start-up can get from venture capital funds. Having said that, despite the growing literature on ESG and CSR my findings among other findings remain inconclusive (Gillan et al, 2021).

To summarize, in the case of the total funding received from venture capital funds for the 911 US-based start-ups sample, investors are indifferent about the greenhouse gas emission of the 2nd industry of the start-up (sub-industry). The greenhouse gas emission of the 1st industry and the environmental commitment (represented by the Website Word Count of environment-related words) have significant impact on the amount of funding that start-up receives venture capital funds. Total emissions industry 1 has a statistically negative impact on the amount of funding and the Website Word Count has a positive impact. When it comes to the Exit status of start-ups, the Website Word Count is an insignificant variable that has no impact on the exit situation of the start-up. For the total emissions industry 1 and total emissions industry 2 they both have a significant impact on the probability of the start-up going public or not. The total emissions industry 1's coefficient is positive and the total emissions industry 2's coefficient is negative.

That being said, and as Gillan et al (2021) mention, results in this matter cannot be conclusive as there is still debate in the literature regarding whether or not CSR and ESG

activities can reduce firm risk and possibly increase firm value, despite the growing body of evidence in that matter.

Chapter 5. Conclusion

This thesis investigates the impact of environmental commitment and the industry's GHG emission of start-ups on start-up success. I study environmental commitment and industry gas emission along with funding data for 911 start-ups based in the United States. These start-ups were founded in the year between 2001 and 2020 and received their Series A in 2016, 2108 and 2020.

My findings support the idea that the degree of pollution from a GHG emission perspective, of the main industry that the start-up operates in and the association of the start-up to being environmentally responsible influences the amount of funding a start-up receives venture capital funds. I also looked at the impact of the greenhouse gas emission of the 2nd industry that the start-up can fall under, and the results suggested that this variable was insignificant. This finding suggests that when it comes to the venture capital space, investors mainly examine the degree of pollution of the main industry of the start-up and are indifferent of the sub-industry of the start-up. This thesis adds significant insights to the rapidly growing inquiry and groundwork of the green start-ups and venture capital space. From a greenwashing perspective, there is potential inconclusive evidence that greenwashing can have a positive impact on the amount of venture capital funding a start-up can get but has no significant impact on the IPO of a start-up. IPOs are not impacted by how much the start-up talks about environmental commitment or not. The greenhouse gas emission of the 1st industry of the start-up has a positive significant impact on whether the start-up goes public or not and the greenhouse gas emission of the 2nd industry of the start-up has a negative impact on the destiny of the start-up.

Even though start-ups and their eco-system can be challenging to understand because of the lack of access to the data that reflects their reality, there are a lot of areas to investigate in terms of the relationship between start-ups and venture capital funds. My goal is to contribute to the existing research by first, focusing on the main engine behind start-ups which is funding as well as the importance that these entities give to being environmentally responsible entities, second the impact that the greenhouse gas emission of the main industry and the 2nd industry of the start-up on IPO and the third the potential impact of greenwashing on the different start-up success measures.

I hope that my research will serve as yet another important step toward gaining a deeper comprehension of the dynamics of venture capital funds, start-ups and greenness and may even provide an answer to some of the most contentious issues in the field, such as the gap between what businesses say they do for the environment and what they actually do from an operations standpoint. The research in this area can be applied to start-ups in the ideation phase to predict their success, in addition to the focus on startups that have already secured their first funding round. Particularly, as I demonstrate in this thesis, important areas for future research include the link between the industry of start-ups, preferences of venture capital funds, and the environmental commitments of start-ups.

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Appendix

Table A

This Table provides different ESG frameworks that companies are using today. It shows the different pillars of these frameworks as well as the categories that fall under the pillars and the available measurement techniques.

Framework[4]	Pillars	Categories	Measurement
1) Asset 4 Data	Economic performance	- Client loyalty - Performance - Shareholders loyalty	-
	Environmental Performance	- Resource Reduction - Emission Reduction - Product Innovation	-
	Social Performance	- Employment quality - Health and safety - Training & Development - Diversity - Human rights - Community - Product responsibility	-
	Corporate Governance Performance	- Board structure - Compensation policy - Board functions - Shareholders Rights - Vision & Strategy	-
2) Sustainability Accounting Standards Board framework	Environment	- GHG emissions - Air quality - Energy management - Fuel	-

[4] Annex 1-B presents snapshots of the different designs of the ESG frame words.

		management	
		- Water and wastewater management	
		- Waste and hazardous materials management	
		- Biodiversity impacts	
	Social capital	- Human rights and community relations	-
		- Access and affordability	
		- Customer welfare	
		- Data security and customer privacy	
		- Fair disclosure and labelling	
		- Fair marketing and advertising	
	Human capital	- Labour relations	-
		- Fair labour practices	
		- Diversity and inclusion	
		- Employee health, safety, and wellbeing	
		- Compensation and benefits	
		- Recruitment, development, and retention	
	Business model and innovation	- Lifecycle impacts of products and services	-
		- Environmental and social	

			impacts on assets and operations - Product packaging - Product quality and safety	
		Leadership and governance	- Systemic risk management - Accident and safety management - Business ethics and transparency of payments - Competitive behaviour - Regulatory capture and political influence - Materials sourcing - Supply chain management	-
3)	MSCI ESG	Environment pillar	- Climate change (Carbon emission , Product carbon, footprint, Financing Environmental impact, Climate change vulnerability) - Natural capital (Water stress, Biodiversity and land use, Raw material sourcing) - Pollution and waste (Toxic emissions and waste,	

		Packaging material and waste, Electronic waste - Environment opportunities (Clean tech, Green building, Renewable energy)	
	Social Pillar	- Human Capital (Labour management, Health and safety, Human capital development , Supply chain labor standards) - Product liability (Product safety and quality, Chemical safety, Consumer financial protection, Privacy and data security, Responsible investment, Insuring health and demographic risk) - Stakeholder opposition (Controversial sourcing , Community relations) - Social Opportunities (Access to communication, Access to finance , Access to health care,	-

				Opportunities in nutrition and health)	
		Governance pillar	-	Corporate Governance (Board, Pay, Ownership, Accounting) - Corporate Behaviour (Business ethics, Tax transparency)	-
4)	Allianz Global Investors framework: EM sovereign bonds ESG rating	Environmental (20%)	-	Environmental performance index - Air quality - Natura resources Depletion (% des BSP) - Water stress index	-
		Social (30%)	-	GINI coefficient - Gender Inequality index - Infant mortality rate - Life expectancy - Homicide rate (Per 100'000) - Mobile cellular subscriptions (per 100 people) - Youth literacy rate	-
		Governance (50%)	-	WGI (Government effectiveness, Reg quality, Rule of law)	-

		- Legal system and property rights - Corruption Perception index - Open budget Index - State fragility index - Press freedom - Freedom house index	
5) Framework: ESG related AI impacts based on the United Nation's Sustainable development goals (SDGs) :	Environment	- 6. Green water and sanitation - 7. Affordable and green energy - 9. Industry innovation and infrastructure - 11. Sustainable cities and communities - 12. Responsible consumption and production - 13. Climate action - 14. Life below water - 15. Life on land	- Micro Do the company's AI system positively impact workers/ individuals through job creation? - Meso Do the company's AI system positively impact other workers, particular groups, sectors and organizations - Macro Do the company's AI system significantly contribute to reduced poverty? Promote innovation and further development? Have positive environmental impacts?
	Social	- 1. No poverty - 2. Zero hunger - 3. Good health and well being - 4. Quality education - 5. Gender equality - 6. Clean water and sanitation - 8. Decent work and economic	

			growth - 9. Industry innovation and infrastructure - 10. Reduced inequalities - 12. Responsible consumption and production - 16. Peace, justice and strong institutions	
		Governance	- 5. Gender equality - 8. Decent work and economic growth - 9. Industry, innovation and infrastructure - 11. Sustainable cities and communities - 12. Responsible consumption and production - 13. Climate Action - 16. Peace, justice and strong institutions - 17. Partnerships for the goals	
6/ Mansouri and Momtaz (2021)'s Machine learning and start-up ESG related dictionary tool	- Creating a Start-up ESG related dictionary -		- 70 words related to the environment, 38 to the social impact and 46 to governance - Created combinations	- A machine learning tool to calculate the number of occurrences of the

		between these words	dictionary words separately.

Table 1. Main descriptive statistics

This Table reports summary statistics for the dependent variable (Total funding '000USD), My key variables of greenness and a set of control variables. This Table shows the mean, standard deviation minimum and maximum values in terms of number of observations of total funding '000USD, total emissions for industry 1 and 2, Website Word Count, start-up location and founding date as well as the total VC funding. All variables are defined in Annex A-1. The sample comprises 911 observations covering 911 unique start-ups that got their series A funding in 2016, 2018 and 2020. Total funding '000USD is the total amount of funding received by the start-up in thousand dollars.

Variable	Obs			Mean	Std. dev	Min	Max
		Binary					
	Total	0	1				
Total Funding '000USD	911			83,973.08	16,631	750	1.89Mn
				(15.23)			
Website Word Count	911			0.63	3.26	0	76
				(5.84)			
Total emissions 1 (tons of CO2 equivalent)	911			170.29	224.83	27.22	1,835.71
				(22.86)			
Total emissions 2 (tons of CO2 equivalent)	911			132.96	137.79	27.22	1,835.71
				(29.12)			
Start-up location	911	788	123	-	0.34	0	1
				(12.08)			
Start-up founding date	911			2014.6	2.90	2001	2020
				(2000)			
Total VC funding	911			115Bn	31Mn	23Bn	165Bn
				(110,755)			
Exit status	911	876	35	-	0.19	0	1
				(6.11)			
Number of fuding rounds	911			4.39	2.34	1	19

Table 2. Descriptive statistics by year

This Table shows the means of my dependent variable (total emissions) and my key independent variables of greenness (total emissions for industry 1 and 2 and Website Word Count) classified by the year when the start-up raised its series A. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020.

Year	Exit status		Total Funding '000USD	Total emissions industry1	Total emissions industry2	Website Word Count
	0	1				
2016	230	22	103,274.31	163.97	132.51	0.71
			(-7.00)	(-0.95)	(-0.95)	(-0.45)
2018	292	9	104,269.66	180.07	142.44	0.72
			(-3.04)	(-0.11)	(0.24)	(0.69)
2020	354	4	53,321.741	166.52	125.31	0.50
			(-7.85)	(0.14)	(-0.28)	(0.27)
Total	876	35	83,973.082	170.29	132.96	0.63

Table 3. Industry1 descriptive statistics

This Table shows the means of My dependent variable (total emissions) and My key independent variables of greenness (total emissions for industry 1 & Website Word Count) classified by 2-digit SIC industry for industry 1. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020. Total emissions per start-up is sorted in descending order, number IPO start-up represents the number of start-ups that went through an IPO for each industry. Website Word Count per start-up represents the Website Word Count per start-up in each industry and Total Funding per start-up and Total Funding '000USD represent the average funding

Industry 1	SIC 1	Total emissions industry 1 per start-up	Number IPO start-ups	Website Word Count per start-up	Total Funding per start-up	Total Funding '000USD
Agriculture, forestry and fishing	1	1835.71	0	43	22321.19	22321.18
Electric, Gas, And Sanitary Services	49	712.87	0	1	4792.69	4792.68
Food And Kindred Products	20	474.9	0	13	19403.26	19403.26
Building Materials, Hardware, Garden Supply, And Mobile Home Dealers	52	437.8	0	0	27184.25	27184.25
Oil and gas extraction	13	408.21	0	4	60376.25	60376.25
Chemicals And Allied Products	28	361.72	6	27	118077.17	118077.17
Transportation Equipment	37	351.16	1	13	317863.33	317863.33
Wholesale Trade-non-durable Goods	51	337.32	0	0	28140	28140
Wholesale Trade-durable Goods	50	271.74	2	47	76723.06	76723.05
Eating And Drinking Places	58	255.33	0	0	25860.43	25860.43
Apparel and other finished products	23	244.18	2	31	83667.42	83667.42
Building Construction General Contractors And Operative Builders	15	243.99	0	10	22708.77	22708.76
Communications	45	222.64	0	0	15674.97	15674.97
Transportation Services	47	222.51	1	52	61466.65	61466.65
Electronic And Other Electrical Equipment And Components	36	210.46	2	2	197243.41	197243.41
Measuring, Analyzing, And Controlling Instruments; Photographic, Medical And Optical Goods; Watches And Clocks	38	185.76	0	0	9582.46	9582.46
Printing, Publishing, and Allied Industrie	27	178.1	0	1	94698.2	94698.2
Home Furniture, Furnishings, And Equipment Stores	57	176.19	0	7	109080.29	109080.29
Educational Services	82	160.63	0	1	62517.92	62517.91
Social services	83	132.19	0	3	42138.68	42138.67
Engineering, Accounting, Research, Management, And Related Services	87	127.56	17	15	113781.18	113781.18
Real Estate	65	126.16	0	5	31170.88	31170.88
Food and beverage service activities	56	123.41	0	14	40960.3	40960.3
General Merchandise Stores	53	120.44	0	5	13050	13050
Commercial establishments	70	111.8	0	11	78551.43	78551.43
Administration Of Human Resource Programs	94	111.59	0	4	97451.69	97451.7
Health services	80	109.39	1	8	79355.81	79355.81

Other investment offices	67	77.58	0	0	21712.52	21712.52
Motion pictures	78	70.04	0	4	59413.97	59413.96
Business services	73	68.7	1	101	75451.76	75451.76
Communications	48	62.14	0	0	22133.33	22133.33
Computer programming, consultancy and related activities	62	59.86	0	53	67827.05	67827.05
Agents and brokers dealing in insurance	64	44.62	0	79	158592.66	158592.66
Non-depository Credit Institutions	61	39.02	1	2	164716.67	164716.67
Insurance companies	63	28.9	0	1	73467.43	73467.43
Depository institutions	60	27.22	1	20	92690.9	92690.9

Table 4. Industry2 descriptive statistics

This Table shows the means of My dependent variable (total emissions) and y key independent variables of greenness (total emissions for industry 2 and Website Word Count) classified by 2-digit SIC industry for industry 2. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020. Total emissions per start-up is sorted in descending order, number IPO start-up represents the number of start-ups that went through an IPO for each industry. Website Word Count per start-up represents the Website Word Count per start-up in each industry and Total Funding per start-up and Total Funding '000USD represent the average funding

Industry 2	SIC 2	Total emissions industry 1 per start-up	Number IPO start-ups	Website Word Count per start-up	Total Funding per start-up	Total Funding '000USD
Agriculture, forestry and fishing	1	1314.39	0	8	185430	1,835.71
Wholesale Trade-non-durable Goods	51	474.9	0	0	22005.96	337.31
Wholesale Trade-durable Goods	50	438.86	0	43	82114.15	271.74
Communications	45	351.16	1	13	413860	222.63
Industrial and Commercial Machinery and Computer Equipment	35	349.02	0	4	25160.67	237.59
Motion pictures	78	313.4	0	3	220742.11	70.03
Electronic And Other Electrical Equipment And Components	36	248.95	2	6	190085.4	210.45
Food And Kindred Products	20	245.64	0	8	22757.55	474.9
Apparel and other finished products	23	242.53	0	40	81817.2	244.17
Electric, Gas, And Sanitary Services	49	230.46	0	4	70675.08	712.86
Engineering, Accounting, Research, Management, And Related Services	87	216.33	16	49	124970.13	127.55
Food and beverage service activities	56	211.25	2	47	46594.86	123.41
Real Estate	65	197.75	0	0	51862.93	126.16
Home Furniture, Furnishings, And Equipment Stores	57	187.15	0	9	24779.83	176.19
Transportation Equipment	37	184.63	0	0	68000	351.15
Educational Services	82	175.81	0	2	19764.93	160.63
Transportation Services	47	161.12	0	59	99609.5	222.51
Justice, Public Order, And Safety	92	160.63	0	0	3325	127.67
Social services	83	155.8	0	10	65761.21	132.19
Commercial establishments	70	153.87	0	5	35242.73	111.8
Computer programming, consultancy and related activities	62	153.3	1	16	54916.58	59.85
Building Materials, Hardware, Garden Supply, And Mobile Home Dealers	52	149.89	0	12	118801.03	437.79
Measuring, Analyzing, And Controlling Instruments; Photographic, Medical And Optical Goods; Watches And Clocks	38	141.18	0	3	106394.82	185.75
Health services	80	138.74	9	23	100755.4	109.39
Building Construction General Contractors And Operative Builders	15	132.75	0	0	46103.67	243.99
Business services	73	128.23	3	151	64732.41	68.69
Communications	48	124.62	0	2	158249.92	62.13

Administration Of Human Resource Programs	94	115.97	0	12	86391.27	111.58
Chemicals And Allied Products	28	114.98	0	1	72000	361.71
Insurance companies	63	112.9	0	1	38952.12	28.9
Other investment offices	67	102.57	0	0	4606.3	77.58
Agents and brokers dealing in insurance	64	98.86	1	18	101030.4	44.61
Depository institutions	60	83.06	1	23	58537.87	27.21
Eating And Drinking Places	58	68.7	0	1	150850	255.33

Table 5. Mean and Median of Total funding ‘000USD based on the Word count

This Table presents the Mean and Median of Total funding ‘000USD based on the Word count. I attribute 0 to the companies that don’t talk about being environmentally responsible and 1 to the companies that do talk about being environmentally responsible in their website. I also, calculate the mean and median of the Total funding ‘000USD for the two groups.

Website Word Count	Total funding ‘000USD Median	Total funding ‘000USD Mean
0	30,700	81,015
1	31,883	102,069
	t = -1.32	

Table 6. Correlation Table

This Table presents correlation coefficients between the dependent variable (Total funding ‘000USD and Exit status), My key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exit Status	1							
(1)								
Total Funding '000 USD	0.29*	1						
(2)	0							
Website Word Count	0.01	0.04	1					
(3)	0.75	0.23						
Total emissions industry 1	0.01	-0.04	0.09*	1				
(4)	0.66	0.29	0.00					
Total emissions industry 2	-0.02	0.05	0.06	0.33*	1			
(5)	0.51	0.16	0.08	0				
Start-up location	-0.03	0.06	-0.04	0.02	-0.01	1		
(6)	0.33	0.09	0.24	0.63	0.77			
Start-up founding date	-0.05	0.05	0.00	-0.01	-0.03	0.07*	1	
(7)	0.15	0.15	0.94	0.74	0.45	0.02		
Total VC funding	0.01	0.00	0.05	0.04	0.04	-0.06	-0.45*	1
(8)	0.82	0.97	0.10	0.18	0.18	0.05	0.00	

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7. Models (1), (2) and (3)

This Table provides the results of the regressions of the dependent variable (Total funding '000USD), My key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1. In models (1), (2) and (3) I regress dependent variable (Total funding '000USD) respectively on the independent variables Total emissions for industry 1, Total emissions for industry 2 and Website Word Count while controlling for the start-ups' location and founding date as well as the total amount of funding. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively. Models (1'), (2') and (3') are the same models as (1), (2) and (3) but without the time fixed effect element.

	(1)	(2')	(2)	(1')	(3)	(3')
VARIABLES	Total Funding '000USD	Total Funding '000USD	Total Funding '000USD	Total Funding '000USD	Total Funding '000USD	Total Funding '000USD
Total emissions industry1	-25.71**	-27.10**				
	(-1.97)	(-2.11)				
Website Word Count			1,859.90	2,058.74*		
			(1.63)	(1.76)		
Total emissions industry2					51.60	56.54
					(1.08)	(1.11)
Control Variables						
Start-up location	20,768.00	3,331.00	20,903.17	26,364.14	20,512.05	3,326.61*
	(0.92)	(1.64)	(0.92)	(1.15)	(0.91)	(1.64)
Start-up founding date	7,310.89***	0.00	7,280.41***	3,241.65	7,334.19***	0.00
	(3.51)	(0.95)	(3.49)	(1.60)	(3.52)	(0.84)
Total VC funding	-0.00	-6.64Mn	-0.00	0.00	-0.00	-6.64Mn
	(-1.01)	(-1.62)	(-1.14)	(0.83)	(-1.11)	(-1.63)
Observations	911	911	911	911	911	911
Constant	-14.586Mn***	-6.6457Mn	-14.527Mn***	-6.4689Mn	-14.642Mn***	-6.64Mn
	(-3.47)	(-1.62)	(-3.45)	(-1.58)	(-3.49)	(-1.63)
Year FE	YES	NO	YES	NO	YES	NO
Adjusted R-squared	0.035	0.00	0.03	0.00	0.03	0.003

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8. Main regressions

This Table provides the results of the regressions of the dependent variable (Total funding '000USD), My key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1. In model (4) and (5) I regress dependent variable (Total funding '000USD) respectively on the independent variables Total emissions industry1 & Website Word Count and Total emissions industry1, Total emissions industry2 and Website Word Count while controlling for the start-ups' location and founding date as well as the total amount of funding. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively. Models (4') and (5') are the same models as (4) and (5) but without the time fixed effect element. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

VARIABLES	(4) Total Funding '000USD	(4') Total Funding '000USD	(5) Total Funding '000USD	(5') Total Funding '000USD
Website Word Count	2,038.89*	2,248.16**	1,961.63*	2,162.32*
	(1.95)	(2.116)	(1.79)	(1.92)
Total emissions industry1	-28.34**	-30.08**	-43.10***	-46.18***
	(-2.17)	(-2.352)	(-2.87)	(-3.05)
Total emissions industry2			72.43	78.91
			(1.55)	(1.59)
Control Variables				
Start-up location	21,365.05	26,792.68	21,693.38	27,159.22
	(0.94)	(1.171)	(0.96)	(1.18)
Start-up founding date	7,266.97***	3,258.57	7,292.00***	3,296.91
	(3.48)	(1.604)	(3.49)	(1.61)
Total VC funding	-0.00	0.00	-0.00	0.00
	(-1.08)	(0.873)	(-1.09)	(0.82)
Observations	911	911	911	911
Constant	-14.49Mn***	-6.4992Mn	-14.55Mn***	-6.58Mn
	(-3.44)	(-1.584)	(-3.45)	(-1.60)
Year FE	YES	NO	YES	NO
Adjusted R-squared	0.03	0.003	0.03	0.00

Table 9. Exit Status regressions per year

This Table provides the results of the regressions of the dependent variable (Total funding '000USD), My key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1. I regress dependent variable (Total funding '000USD) on the independent variables Total emissions industry1, Total emissions industry2 and Website Word Count while controlling for the start-ups' location and founding date as well as the total amount of funding. My samples consist of 252, 301 and 348 US-based start-ups which raised their series A consequently in 2016, 2018 and 2020. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

VARIABLES	(6) Total Funding '000USD 2016	(7) Total Funding '000USD 2018	(8) Total Funding '000USD 2020
Website Word Count	4,567.81***	-1,958.72	-1,924.08
	(3.69)	(-0.87)	(-1.61)
Total emissions industry1	-9.79	-57.77*	-12.22
	(-0.13)	(-1.72)	(-1.46)
Total emissions industry2	177.87**	62.09	2.47
	(2.36)	(1.01)	(0.13)
Control variables			
Start-up location	20,089.38	56,624.28	-3,976.24
	(0.56)	(0.81)	(-0.44)
Start-up founding date	10,943.99**	10,167.80**	-258.01
	(2.32)	(2.56)	(-0.09)
Total VC funding	-0.00	-0.00	-0.00**
	(-1.28)	(-0.69)	(-2.21)
Constant	-21.86Mn**	-20.33Mn**	616,341.93
	(-2.31)	(-2.55)	(0.11)
Observations	252	301	358
Year FE	YES	YES	YES
Adjusted R-squared	0.03	0.01	0.02

Table 10. Exit status regressions

This Table provides the results of the regressions of the dependent variable (Exit status), my key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1. In model (9) I regress dependent variable (Exit status) on the independent variables Total emissions industry1, Total emissions industry2 and Website Word Count while controlling for the start-ups' location and founding date as well as the total amount of funding. My sample consists of 911 US-based start-ups which raised their series A in 2016, 2018 and 2020. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively

VARIABLES	(9-a) Exit status	(9-b) Exit status	(9-c) Exit status	(9) Exit status
Website Word Count	0.01			0.01
	(0.39)			(0.37)
Total emissions industry1		0.00		0.00*
		(1.041)		(1.66)
Total emissions industry2			-0.00	-0.00*
			(-1.50)	(-1.86)
Start-up location	-0.54	-0.54	-0.54	-0.54
	(-0.87)	(-0.88)	(-0.88)	(-0.88)
Start-up founding date	-0.07	-0.07	-0.07	-0.07
	(-1.25)	(-1.25)	(-1.25)	(-1.27)
Total VC funding	-0.00	-0.00	-0.00	-0.00
	(-0.27)	(-0.27)	(-0.22)	(-0.26)
Constant	147.64	147.77	147.08	149.31
	(1.22)	(1.22)	(1.23)	(1.24)
Pseudo R2	0.00	0.01	0.01	0.01
Observations	911	911	911	911

Table 11. Model (10)

This Table presents the quantile (quartile in this case) regression of my dependent variable (Total funding '000USD), on my key variables of greenness (total emissions for industry 1 and 2 and Website Word Count), and control variables (start-up location and founding date and total VC funding). All variables are defined in Annex A-1. Robust t-statistics are in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

VARIABLES	(10) Total Funding '000USD
Website Word Count	669.12
	(1.47)
Total emissions industry1	-3.14*
	(-1.8)
Total emissions industry2	-2.15
	(-0.73)
Control variable	
Start-up location	2,524.55
	(0.92)
Start-up founding date	880.08***
	(9.89)
Total VC funding	0.00
	(0.74)
Constant	-1.76Mn***
	(-9.92)
Observations	911

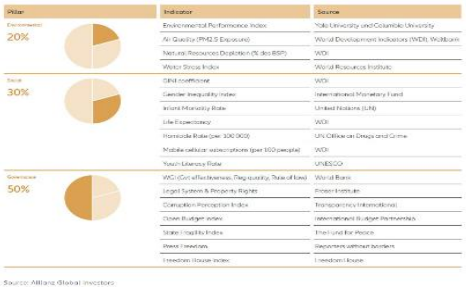
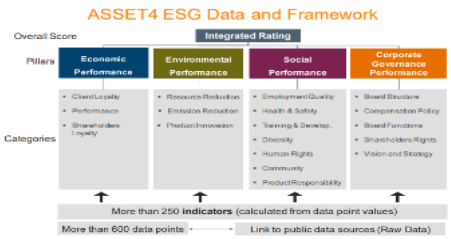
Annex A-1

The Table provides descriptions, calculation method and sources of all dependent and independent variables used in the regression analyses.

Variables	Definition	Calculation method	Source
Year	Series A year: The year when the start-up raised its series A.		Crunchbase
Total funding '000USD	Total amount of funding that the start-up received in '000USD		Crunchbase
Exit status	The status of the start-up from an exit standpoint. The different possibilities that the data set mentions are IPO, Seed, M&A, Early-stage venture, Late-stage venture and Private Equity.	Binary 1→ IPO 0→ Others	Crunchbase
Website Word Count	The occurrence of the words ESG, CSR, Greenness, GHG, Greenhouse Gas, GHG emission, GHG emissions, CO2, GHG scope3, GHG scope2, GHG scope1, Green, Greeness, sustainable, sustainability, net zero, net-zero, carbon and footprint in the start-up website through a python code.		Python code Crunchbase
Industry 1	Industry 1 is the main industry of the start-up.		Crunchbase
Industry 2	Industry 2 is the sub-industry of the start-up. In Crunchbase, different start-ups have 1 main industry and 2nd, 3rd, 4th and 5th sub-industries.		Crunchbase
Total emissions industry 1	The sum of the GHG scope 1,2 and 3 for industry 1 of the start-up. GHG scope1: direct emissions from production GHG scope2: indirect emissions from consumption of purchased electricity, heat, or steam GHG scope3: other indirect emissions from the production of purchased materials, product use, waste disposal, outsourced activities, etc	Tonnes of carbon dioxide	S&P500 database. page 519, JFE, Do investors care about carbon risk?
Total emissions industry 2	The sum of the GHG scope 1,2 and 3 for industry 2 of the start-up. GHG scope1: direct emissions from production GHG scope2: indirect emissions from consumption of purchased electricity, heat, or steam GHG scope3: other indirect emissions from the production of purchased materials, product use, waste disposal, outsourced activities, etc	Tonnes of carbon dioxide	page 519, JFE, Do investors care about carbon risk?
Control variables			
Total VC Funding	The total amount of funding that Venture capital funds invested in the founding year of the start-up in 000'USD.	000'USD	Crunchbase
Start-up location	1 if the start-up's location is Silicon Valley. 0 if elsewhere.	Binary	Crunchbase
Start-up founding date	Founding date of the start-up	year	Crunchbase

Annex A-2

This Table presents different snapshots of the ESG frameworks. Frameworks presented in this Table are the following: MSCI ESG, Allianz Global Investors framework: EM sovereign bonds ESG rating, ESG related AI impacts based on the United Nation's Sustainable development goals (SDGs) and Asset 4 Data.

Framework	Graph
MSCI ESG	
Allianz Global Investors framework: EM sovereign bonds ESG rating	
Framework: ESG related AI impacts based on the United Nation's Sustainable development goals (SDGs)	
Asset 4 Data	

Vita

Wafa Bardaa was born in 1997, in Sfax, in Tunisia. She was educated in local public schools and graduated from IHEC Carthage in 2019.

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