



UNIVERSIDADE CATÓLICA PORTUGUESA

The determinants of firms' debt choice: sustainable bonds versus loans

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Resumo

O aumento da preocupação com problemas ambientais tem gerado um foco considerável no mercado financeiro sustentável e “mais verde”. Embora se tenha vindo a desenvolver rapidamente, as razões por detrás do crescimento deste mercado ainda estão por explorar, nomeadamente do ponto de vista empírico. Neste estudo examinamos os fatores que influenciam a escolha das empresas, na obtenção de dívida sustentável, entre obrigações sustentáveis e empréstimos bancários sustentáveis. Para tal, utilizamos uma amostra de empréstimos sindicados sustentáveis e uma amostra de obrigações sustentáveis, fechados/emitidas entre 2018 e 2022. Com estas amostras e em conjunto com dados financeiros das empresas retirados da base de dados Datastream, descobrimos que economias de escala, custos de agência e assimetria de informação afetam a escolha entre os dois instrumentos financeiros sustentáveis. Os resultados mostram que obrigações sustentáveis apresentam maturidades mais longas e são a principal escolha das empresas com melhor rating de crédito, enquanto custos de financiamento mais elevados e operações de maior dimensão aumentam a probabilidade da escolha de empréstimos sustentáveis versus a utilização do mercado de capitais.

Palavras-chave: sustainable finance; green finance; corporate social responsibility; ESG; loans versus bonds.

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Abstract

Increasingly serious ecological problems have generated considerable focus on the environmental-friendly sustainable financial market. Although it has been experiencing rapid development, the rationales behind its growth remain largely unexplored. We examine the factors that influence firms' choice between sustainable bonds and sustainable loans and identify its statistically significant determinants. A sample of sustainable loan deals and a matching sample of sustainable bond deals closed between 2018 and 2022, retrieved from DCM and Loan Analytics, was used. Using contractual information in conjunction with borrowing firms' accounting and financial data, extracted from Datastream, we find that economies of scale, agency costs of debt and information asymmetry arguments affect the choice between sustainable loan and bond deals. The results show that sustainable bonds have longer maturities and are the preferred debt choice for firms with better creditworthiness, while high interest rates and larger deals make sustainable loans the primary choice.

Keywords: sustainable finance; green finance; corporate social responsibility; ESG; loans versus bonds.

Table of Contents

Agradecimientos	iii
Resumo	v
Abstract	vii
Table of Contents	ix
List of Tables.....	xi
Introduction.....	1
1. Literature Review	4
1.1 Climate change	4
1.2 Sustainable development	5
1.3 Sustainable Finance.....	8
1.3.1 Sustainable Bonds.....	10
1.3.2 Sustainable Loans	13
1.4 Determinants of firms' financing choice.....	14
2. Research Questions and Hypotheses.....	18
3. Data and Methodology	21
3.1 Sample Selection.....	21
3.2 Regression model and variables	27
3.2.1 Dependent variable	27
3.2.2 Contractual characteristics	27
3.2.2 Firm characteristics.....	29
3.2.3 Macroeconomic factors	29
4. Univariate Analysis	30

5. Results	32
5.1 Is issue maturity longer for sustainable bonds than for sustainable loans?	37
5.2 Does issue size negatively influence the preference for sustainable loans?	37
5.3 Do companies with higher creditworthiness choose sustainable bonds over sustainable loans?.....	38
5.4 Do high interest rates promote sustainable bonds' issuance?	38
Conclusion	39
References	41
Appendices	45
Appendix A: Summary statistics.....	45
Appendix B: Definition of variables and findings.....	46

List of Tables

Table 1: Bonds and loans by ESG type.....	22
Table 2: Geographic, industrial and yearly distribution, top issuers/borrowers, and switchers, retrieved from DCM and Loan Analytics.....	24
Table 3: Univariate Analysis.	31
Table 4: Logit models.	33
Table 5: Logit models controlling for non-switcher companies.....	34
Table 6: Logit models controlling for tranche spread, in basis points.	35
Table 7: Logit models controlling for industry fixed effects.....	36

Introduction

“Finance and sustainability both look at the future.” (Schoenmaker and Schramade, 2019).

According to the World Economic Forum (2022), the world’s economies are already absorbing the costs of climate change. There is an urgent need to create a sustainable, inclusive, and climate-resilient future. This will require the development of a new economic model that can generate long-term value by balancing natural, social, human, and financial conditions. As a universal call to action to protect the planet, and improve living conditions around the world, the United Nations created the 17 Sustainable Development Goals (SDGs) as part of the 2030 Agenda for Sustainable Development (United Nations, 2020). These have been adopted by all United Nations Member States in 2015 and are expected to be achieved by 2030.

“The drive to sustainability is transforming the way we live” (World Economic Forum, 2022). Despite being a relatively new field of study, sustainable finance plays a key role in the world’s transition to an environmentally friendly economy by channelling private sources of capital into carbon-neutral projects. Literature on the topic has emerged over the last few years, but its definition is still very broad, encompassing countless dimensions of sustainable ways to attain finance and investment goals (Kumar et al., 2022). The European Commission defines sustainable finance as “the process of taking environmental, social and governance (ESG) considerations into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic activities and projects”. As such, ESG considerations have come to dominate many investment and financing decisions in recent years

(Busch et al., 2015; World Economic Forum, 2022). This is the result of regulators, consumers, and investors' pressure on companies to address ESG concerns and prioritize sustainability in their strategic decision-making.

Despite the firms' increasing interest on sustainable finance, there is currently hardly any literature addressing the reasoning behind their decision to pursue sustainability. Prior literature on the topic focuses on studying the effects of green financial instruments issuance (Fan et al., 2021; Tang and Zhang, 2018) and green bond pricing (Agliardi and Agliardi, 2021; Almeida and Pinto, 2021; Löffler et al., 2021). Neef et al. (2022) found that a company's ESG performance evolves differently following a green loan issuance compared to a sustainable loan issuance, while Cicchiello et al. (2022) studied the factors that influence the green bonds issuance contrasting them with conventional bonds. To the best of our knowledge, there is no research on the choice between the two sustainable instruments. The objective of this dissertation is to contribute to the literature and empirical research and fill this gap – the lack of a comprehensive model to examine business motivations for sustainability engagement - by empirically examining the emerging but fast-growing sustainable bond and loan markets. As such, we are motivated by the need to identify the primary motivations for corporate engagement in sustainability, with a view to encourage further research in this area. There is literature that examines the choice between bank and public debt (Altunbas et al., 2009; Denis and Mihov, 2003; Esho et al., 2001; Krishnaswami et al., 1999; Pinto and Santos, 2020). We extend this literature by focusing on sustainable debt instruments.

Our study aims to identify the macroeconomic factors, contractual terms and firm characteristics that determine the use of sustainable bonds over sustainable loans. We intend to answer the following research questions: Which contractual characteristics determine the firms' choice between sustainable bonds and loans?; What are the macroeconomic factors that influence the choice between

sustainable bonds and loans?"; and "Which firms' characteristics determine the choice between sustainable bonds and sustainable loans?". To do this, we begin our analysis by searching for literature on this topic. Subsequently, we construct a dataset compiled from DCM and Loan Analytics, which includes syndicated loans and bond transactions issued between 2018 and 2022. In the empirical analysis, we model the potential determinants divided into three main categories: (i) issue characteristics; (ii) issuers' specific characteristics; and (iii) macroeconomic factors. We find that sustainable bonds have longer maturities and are the preferred debt choice for firms with good creditworthiness, while interest rates and issue size are negatively related to the choice of sustainable bonds over sustainable loans. We thus conclude that different contractual, issuer and macroeconomic characteristics significantly impact the decision between ESG bonds or ESG loans.

The remainder of this work is organized as follows. Chapter 1 introduces the theoretical background on climate change, sustainable development and how it led to the dissemination of sustainable finance. This chapter also reviews literature on the determinants of firms' financing choices between public and private debt. Chapter 2 formulates the research questions and hypotheses. Chapter 3 describes the data set and methodology used in the study. Chapter 4 presents a comparative analysis of ESG bonds and loans. Chapter 5 unveils and discusses the results from the logit regression model. The last section summarizes the main conclusions of the paper and puts forward some implications, limitations, and future research perspectives.

Chapter 1

1. Literature Review

As a starting point for studying sustainable finance, it is crucial to understand the context in which the concept was introduced.

1.1 Climate change

Climate change has become a global concern over the last decades and is presently the most pressing ecological constraint or planetary boundary (Schoenmaker and Schramade, 2019). The rising sea levels, the intense drought and the warming oceans exemplify the impacts of global warming in our world. Global warming is causing increased, and sometimes irreversible changes to rainfall patterns, oceans, and winds in all regions of the world. According to Gilchrist et al. (2021), these issues have elevated the demand for solutions to maintain economic growth while assuring the future ecological sustainability of our planet. The WWF (2010) estimated that without significant improvements, humanity will require the capacity of two Earths by 2030.

Taking urgent measures to fight the climate crisis and its catastrophic consequences is imperative. In 2015, world leaders agreed on new goals in the fight against climate change. Governments consented on an action plan to limit global warming and keep the increase in global average temperature below 2°C above pre-industrial levels and to pursue efforts to limit it to 1.5°C (United Nation, 2015). Years later, in December 2019, European Union (EU) leaders, under the European climate law, agreed that the EU countries must cut greenhouse gas emissions by at least 55% by 2030, aiming to achieve climate-

neutrality by 2050. The achievement of this goal will inevitably require the application of financial instruments (Ozili, 2022).

In 2019, the European Council adopted legislation to direct private capital to more sustainable investments on the capital market by improving transparency obligations for financial intermediaries to incorporate ESG into their risk assessment processes. This created new benchmarks for sustainable investments which help investors compare the carbon footprint of their investments and establish a unified EU taxonomy of sustainable economic activities.

Also looking to guide the transition towards a sustainable economy, the United Nations published the 2030 Agenda for Sustainable Development (United Nations, 2015), which consists of 17 Sustainable Development Goals. One of the goals revolve around climate change and promotes urgent action against its impacts. According to Schoenmaker and Schramade (2019), pursuing these goals will require firms' behavioural change.

1.2 Sustainable development

According to Simões-Coelho and Figueira (2021), the term "sustainable development" was coined in 1987 by the World Commission on Environment and Development as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". When looking at the scope of this definition from a corporate perspective, two other concepts come to mind. First, the combination of ecological and social concerns is often summarized as Corporate Social Responsibility (CSR). Second, the concepts of ESG.

The concept of CSR was introduced in the early 1950s as the charitable or social contribution of the company. Since then, it has been discussed and re-shaped to include companies' socially sustainable actions. McWilliams and Siegel's (2001) define CSR as "actions that appear to further some social good, beyond the interests of the firm and that which is required by law". Cortellini and Panetta

(2021) add that CSR activities not only affect investing stakeholders such as stockholders and debtholders, but also non-investing stakeholders such as customers, community, social organizations, and others. Ghoul et al. (2011) point out that firms with higher CSR scores benefit from a lower cost of equity capital than low CSR-scored firms. Likewise, Sharfman and Fernando (2008) also found that firms with better social performance have easier access to debt financing. However, Aupperle et al. (1985) could not find any relationship between CSR and profitability.

According to Coletton et al. (2020), ESG takes into account environmental considerations such as climate change mitigation and its related risks, like natural disasters. Moreover, the social dimension of the ESG concept addresses issues of inclusiveness, labour relations, investment in human capital and communities. Lastly, the notion of governance is crucial in ensuring the incorporation of environmental and social considerations in the public and private institutions decision-making process as it comprises management structures, employee relations and executive remuneration. Cornell and Damodaran (2020) conjecture that the governance incorporated in the ESG concept differs from the conventional governance measures. The authors stated that the concept of governance underlying ESG relates to a stakeholder value mindset opposed to the corporate shareholder theory. This means that companies are focused on creating the best return possible for all their stakeholders. On the other hand, Milton Friedman (1962) argues that companies should solely focus on shareholder's value creation. For Friedman (1962), "There is one and only one social responsibility of business – to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud."

A study by Simões-Coelho and Figueira (2021) concluded that "modern" corporations are no longer solely a means of creating jobs and rewarding

investors. Similarly, Cornell and Damodaran (2020) assert that in the last decade, companies have been pressured to be socially conscious and environmentally responsible, meaning that their decision-making process should take into consideration ESG principles. However, when the authors studied the relationship between ESG related investment criteria and value creation, they found out that the link between ESG and firm's performance is ambiguous. There is no conclusive evidence that firms being socially responsible will increase profits or generate positive excess returns. Their view is that firms should focus on maximizing shareholder value and that, with the proper regulatory framework, there is no need for companies to bear the burden of being socially responsible.

Busch et al. (2015) evaluated the extent to which financial markets foster sustainable business practices. Authors conclude that on the one hand, financial market investors increasingly integrate ESG criteria into their investment decisions, while on the other hand, there seem to be no real shift in terms of organizational reality. Companies, and particularly high-profile institutional investors, have been progressively incorporating ESG considerations in their investment decision making process. Simões-Coelho and Figueira (2021) disclosed four main motivations for corporate engagement in sustainability. They first point out "Legitimacy", meaning companies want their actions to be perceived as appropriate within a socially acceptable system of norms and beliefs. Second, companies wish for "Market Success" portrayed by performance improvements, turnover increase, or brand equity due to sustainable practices and "Process Improvement", specifically sustainability-oriented optimization of processes and innovation. The authors finally add "Social Insurance" as one of the reasons why firms engage in sustainability. Adopting sustainable practices works as an insurance against reputation or goodwill losses.

One critical question that often arises is whether ESG impacts performance and risk. Lee et al. (2014) showed that there is a positive relationship between

environmental responsibility and firms' financial and operational performance by proving a positive effect of environmental responsibility on the return on equity (ROE) and return on assets (ROA) indicators. Furthermore, they concluded that the reported positive relationship is impacted by the governance dimension at the corporate level, considering that top management and board members' commitment and involvement in strategic planning processes plays a key role in the ESG performance. According to Humphrey et al. (2012), firms with high and low Corporate Social Performance (CSP) do not differ in terms of risk-adjusted performances of portfolios or idiosyncratic risk, contradicting the hypothesis that CSP has a systematic effect, either positive or negative, on market-based financial performance. On their analysis of the United Kingdom bond market, the authors concluded that English firms are able to implement an ESG strategy without incurring in a significant financial cost or benefit in terms of risk or return. This is particularly relevant considering that for Versal and Sholoiko (2022) the need to fund a green economy as part of sustainable development is undeniable.

1.3 Sustainable Finance

Finance can be instrumental in allocating funding to sustainable projects and accelerating the transition to a low carbon and more green economy. The European Banking Institute (2021) points out that since a huge amount of capital is needed to achieve this objective, the role of the financial services sector in funding such investments and allocating capital towards sustainable projects is pivotal.

Zhang et al. (2019) found that there has been a substantial increase in the interest of academics on green finance since 2015, a year marked by the Paris Agreement. After reviewing the existing research on green finance, the authors concluded that there is no consensus on a clear conceptual definition of green finance. This is also true for the concept of sustainable finance.

Sustainable finance is understood by the EU as a way of supporting economic growth while reducing pressures on the environment and considering social and governance aspects. It helps mitigate the risks related to ESG factors that may have an impact on the financial system, through the appropriate governance of financial and corporate institutions. Furthermore, Soppe (2004) describes sustainable corporate finance as a “multi-attribute approach in which financial, social and environmental elements are interrelated and integrated”. The author believes that the concept of sustainable finance is a reintegration of social values into the economy while linking present and future generations. Concomitantly, Coleton et al. (2020) claimed that sustainable finance is now part of the lexicon of both supervisors and financial institutions and is described as “the provision of finance to investments taking into account environmental, social and governance considerations”. Similarly, Schoenmaker and Schramade (2019) defined sustainable finance as finance’s interaction with economic, social, and environmental issues, which means it comprises both green and social financial products. They add that the focus of sustainable finance is gradually shifting from short-term profit towards long term value creation and that financial institutions are starting to invest only in sustainable companies. According to the authors, firms are pivotal in the development of a sustainable economy, and it is important to have them broaden their objective from shareholder value to stakeholder value, by integrating financial, social and environmental value. The sustainable finance market is attracting the attention of many investors who wish to signal a commitment towards not only the environment but also the society.

Neef et al. (2022) stated that “the increased focus on sustainable finance in recent years driven by political movements, investor demand, and regulatory changes has led to the development of a new green market offering sustainable debt”. According to Versal and Sholoiko (2022), financial institutions were the first to come forward with sustainable development funding and kicked off the creation of new financial instruments aimed at financing both green and social

projects, leading to the emergence of sustainable finance instruments. We will specifically focus on the study of two sustainable finance instruments: sustainable bonds and sustainable loans. Based on Gilchrist et al. (2021) findings, these two instruments are key when it comes to the increase in responsiveness that companies show towards ecological sustainability by positively influencing them. Their study also adds that central banks view these instruments as a way of greening the financial system itself and consequently shift to a green economy.

1.3.1 Sustainable Bonds

Even though the use of sustainable bonds has become more prevalent in practice, we know very little about these new financial instruments.

According to Sangiorgi and Schopohl (2021), the potential of the global bond market has just now started to be explored. They mention, however, that both the World Bank and the OECD consider this market a crucial source for funding the transition to a green world.

The first green bond was issued in 2007 by the European Investment Bank and at the time it was called “climate awareness bond”. Since then, the green bond market has been growing rapidly, but there are still disputes regarding definitions, guidelines and green taxonomy. In general, there are two green bond “standards”: Green Bond Principles (GBP) and the Climate Bond Initiative (CBI). The former consists of guidelines that endorse a transparent process and full disclosure of the green bond, to clarify investors about their choices, while the latter is an international organisation working to mobilise global capital for climate action. The CBI defined the Climate Bond Standards and Certification Scheme and provides a directory of third-party verifiers for green bonds. Their strategy is focused on the development of the green and climate bond market, by promoting the investment in projects for a rapid transition to a low carbon economy.

Later on, the concept of sustainable bond also started to unfold. The International Capital Market Association (ICMA) describe sustainable bonds as “any type of bond instrument where the proceeds or an equivalent amount will be exclusively applied to finance or re-finance a combination of both Green and Social Projects” (ICMA, 2021). Sustainability bonds should follow the Sustainability Bond Guidelines from ICMA, which are aligned with both the GBP and Social Bond Principles (SBP) with the latter being relevant to underlying Social Projects (ICMA, 2018).

Tang and Zhang (2018) described green bonds as fixed income securities issued to fund their environmentally friendly projects, such as renewable energy, sustainable water management, pollution prevention, climate change adaptation and so on. In their study of the green bond market, the authors found out that the market values firms’ engagement in the green bond market. They demonstrated that stock prices of issuers react positively to green bond issuance announcements, which means green bonds can increase firm value in the short run.

Sangiorgi e Schopohl (2021) investigated the motivations behind investors’ decision to fund the green bond market. Their survey concluded that the main drivers of green bond issuances are reputational benefits, the green market signal and the desire to constraint climate change. Furthermore, new joiners to the green bond market view this financial as an enabler for changing their business model. The authors also identified the high investor demand as one of the main benefits of issuing green bonds, with 70% of survey respondents claiming that their green issuances generated higher levels of investor demand and almost all reporting that green bonds attracted new investors, suggesting that green bonds help issuers to diversify their investor base.

Flammer (2021) concluded that companies credibly signal their commitment toward the environment by issuing green bonds. The author also claims that this issuance is more than just “greenwashing” as companies show improved

environmental performance, which in turn makes them more attractive for an investor clientele that cares about the environment. Nevertheless, as previously mentioned, being sustainable is more than being green. Norström et al. (2014) stated that although a partial solution to the present environmental, societal and economic challenges might be tempting, it is crucial to embrace an integrated social-ecological system perspective.

Lin and Su (2022) found that the choice between green and conventional bonds is significantly affected by three firms' characteristics, namely profitability (measured by EBIT to total assets), current ratio and the firms' green and environmental responsibility emphasis. Companies with poor profitability and low current ratio are more likely to enter the green bond market. Firms that attribute greater importance to green and environmental responsibility have larger probability to issue green bonds.

Several authors point out that the lower financing cost of green bonds successfully attracts the attention of corporate issuers (Nanayakkara and Colombage, 2019; Löffler et al., 2021). Gianfrate and Peri (2019) showed that there is a green negative premium of around -17 basis points and that the lower issuance costs make green bonds convenient for issuers. On the other hand, Flammer (2021) did not find a significant bond yield difference between green and conventional bonds. The author suggests that companies use corporate green bonds to reduce the information asymmetry between them and investors. Green bonds send investors a signal that the company is taking actions that credibly convey this information. The green bond market relies on private governance regimes such as the certification standards. These results indicate that companies improve their environmental performance following the issuance of green bonds. These findings indicate that the issuance of green bonds helps attract an investor clientele that values the long term and the natural environment.

1.3.2 Sustainable Loans

The terms “sustainable loans”, “green loans” and “sustainability linked loans” are often used interchangeably but they refer to three distinct financial products.

The Loan Market Association (LMA) defines green loans as “any type of loan instrument made available exclusively to finance or re-finance, in whole or in part, new and/or existing eligible Green Projects” (Loan Market Association, 2019). This encourages market participants to develop their sustainability objectives based on that borrower’s sustainability profile. The LMA, with the support of the ICMA, published the Green Loan Principles and Sustainability Linked Loan Principles in 2018 and 2019, respectively, aiming to set out a framework that allows market participants to clearly understand the characteristics of a green or sustainability linked loan. The Sustainability Linked Loan Principles determine that the goal of sustainable loans is the achievement of ambitious sustainability performance targets and thus having a positive impact on firms’ sustainability profile and development (Loan Market Association, 2019).

Russell and Fuller (2020) define green loans as loans in which the proceeds must be applied towards an environmental purpose, namely financing energy efficient projects, such as wind farms or sustainable fisheries. The authors state that sustainability linked loans do not need to invest in environmentally friendly projects and are not concerned with the application of the proceeds of the loan. A sustainability linked loan intends to associate the lender’s pricing to the borrower’s sustainability performance, meaning that the margin will be adjusted throughout the lifetime of the loan based on the borrower meeting certain pre-agreed sustainability criteria. Worthington and Judd (2021) admitted that the growth of the sustainability linked loan market has increased over the past few years. This type of financial instrument allows borrowers to have access to cheaper funds whenever they achieve specific sustainable or ESG sustainability performance targets. Neef et al. (2022) found that the issuance of a sustainability-

linked loan leads to improvements in a firm's overall ESG performance in the long run, by increasing their environmental and governance scores.

Given the fact that a theoretical definition of sustainable loan is lacking, we will denote sustainable loans as syndicated credit facilities where the terms of the deal offer the borrower some form of incentive to improve their sustainability performance. In the scope of this definition, we include both loans whose proceeds are earmarked for sustainable projects, and loans whose pricing is linked to the borrowers' sustainability performance, regardless of the application of the proceeds.

1.4 Determinants of firms' financing choice

Debt is by far the major source of external financing for large firms. Syndicated loans and corporate bonds allow firms to raise large amounts of funds with medium and long-term maturities (Altunbas et al., 2009).

Corporate bonds are fixed income instruments issued by a private or public entity. The issuer gets the capital it needs and in return pays the bondholder a pre-established number of interest payments – coupons - during a specified period of time. On the bonds' maturity date, the issuer has to repay the investor the nominal amount. Bonds are often issued to provide short-term capital for a particular project a company wants to undertake.

Syndicated loans are a form of lending in which a pool of lenders provides financing to a borrower under a single credit facility agreement. There is typically a lead arranger who negotiates the terms of the contract with the borrower and organizes a syndicate of lenders who each fund a portion of the loan, each with different repayment terms or maturities (Ball et al., 2008). Syndicating the loan allows lenders to spread the risk of a borrower default and participate in financial opportunities that may be too large for their individual capital base. Altunbas et al. (2006) describe syndicated lending as a large and increasingly important source of corporate financing and a crucial element of the global financial system.

Unquestionably, syndicated loans are the only alternative to bond financing for large firms considering the size and maturity of the funds that can be provided. Altunbas et al. (2009) found that the motivation and financial features that lead very large firms in the euro area to enter the two markets are different. But when the authors considered the whole spectrum of firms, regardless of size, they realized that the incentives of firms entering these two alternative markets are actually similar. Research in this area focuses on lenders' motivations to syndicate loans and the impact of information asymmetries on the composition of the syndicate (Wittenberg-Moerman, 2006; Ball et al., 2008). From a theoretical perspective there are three main arguments which can explain firms' choices of financing when deciding between public (bonds) and private (bank loans) debt – asymmetries of information, economies of scale and agency costs (Altunbas et al., 2009; Denis and Mihov, 2003; Esho et al., 2001; Krishnaswami et al., 1999)

Ball et al. (2008) pointed out that there are information asymmetries between the borrower and lenders but also among the lenders themselves. The relationship between lenders and borrowers and the fact that the lead arranger's due diligence and monitoring efforts are not easily visible, can originate potential severe adverse selection and moral hazard problems.

Alves and Pinto (2020) determined that economies of scale, agency costs and information asymmetry arguments affect the choice of on-versus off-balance-sheet funding. They showed that less profitable firms choose to use project financing, as it allows the reduction of deadweight costs from information asymmetries and the mitigation of underinvestment problems due to distress costs. Concomitantly, Krishnaswami et al. (1999) studied the impact of flotation costs, agency conflicts and information asymmetries on a firm's portion of long-term privately placed debt. Flotation costs respect to the expenses incurred by a publicly traded company when it issues new debt securities, for example legal registration or underwriting fees. The authors found that larger firms and those with larger issue sizes take advantage of scale economies in issuance costs of

public debt and thus have lower proportions of private debt. On the other hand, younger firms with greater potential information asymmetries tend to opt for private debt when private lenders are better informed than public lenders. Additionally, the authors determined that firms with higher contracting costs due to moral hazard request higher issues of private debt.

When a firm decides to issue debt, it must simultaneously make decisions concerning several features of the debt contract, such as maturity, priority or convertibility. As stated by Denis and Mihov (2003), these characteristics of debt contracts systematically vary among different sources of funding. They claim that bank loans tend to have shorter maturities, high priority and can be more flexible in terms of borrowing and repayment. Contrastingly, public debt usually has longer maturity, low priority and less flexibility. The authors proved that profitable firms are more prone to issue public debt while firms with a high likelihood of bankruptcy are likely to borrow privately.

Furthermore, Pinto and Santos (2020) concluded that firms' characteristics like size, profitability, leverage, asset tangibility, growth opportunities, and credit risk are critical when firms choose between structured or straight debt financing. Altunbas et al. (2009) also find evidence that the pricing of syndicated loans is dependent on the lender's characteristics and the borrower's default risk. Fama (1990) claims that debt securities, such as loans and bonds, play an important role in reducing the contract costs by delegating the assessment of risk of fixed-payoff contracts to credible specialists. In other words, loans and bonds centralize monitoring of default risks on agents who specialize in evaluating default risks, namely financial intermediaries, credit-rating agencies, and auditors. This allows other agents (suppliers and labor) to focus instead on their specialties. Fama hypothesises that renewable fixed-payoff contracts in an organization creates incentives for centralized credible monitoring of default risks and renewal risks and avoids duplication of monitoring costs among agents. Denis and Mihov (2003) found that the choice of debt instrument is most strongly linked with the

credit history of the issuing firm and the current credit quality of the issuer. Companies with a higher credit rating exhibit a strong preference for public debt, while firms with credit ratings towards the middle of the spectrum borrow from banks, and those at the bottom of the credit rating spectrum borrow from non-bank private sources.

2. Research Questions and Hypotheses

Sustainable finance is a fast-expanding market. The world is currently transitioning to a greener, more circular economy and companies are now concerned with making conscious financial and strategic decisions.

Despite the firms' increasing interest on sustainable finance, there is currently hardly any literature addressing the reasoning behind their choice to pursue sustainability. Ozili (2022) found that despite the lack of awareness, inconsistent definitions, lack of policy coordination, inconsistent policies, and lack of incentives to investors and financial institutions, green finance can significantly impact our society and the environment. Empirical research on the topic of sustainable finance is still in its infancy as it is a very recent topic and there is currently no substantial sample in the market.

Even though studies on the rationales of green bonds and loans issuance are lacking, previous research on the financing choices conducted its investigation based on three categories of variables. Cicchiello et al. (2022) examined the factors that explain firms' choice between green bonds and conventional bonds centred on three aspects: issue conditions, issuers financial features, and external ambience conditions. Similarly, Barua and Chiesa (2019) found that financing size of green bonds could be influenced by various factors related to the issuer and bond specific characteristics, and market factors, though their effects do not always persist and are heterogeneous. Although these studies contribute to the motivations behind the issuance of green and sustainable bonds, they do not systematically investigate the determinants of the choice between the two types of financing instruments: bonds and loans. This gap motivates us to question the factors that determine an issuer's choice between the bonds and loans within the sustainable finance market. We intend to fill this gap by answering the three following research questions: "Which firms' characteristics determine the choice

between sustainable bonds and sustainable loans?”, “Which contractual characteristics determine the choice between sustainable bonds and loans?” and “What macroeconomic factors influence the choice between sustainable bonds and loans?”. Our main objective is to investigate the rationales behind firms’ debt choice between raising funds in the sustainable loan market and the sustainable bond market. Like previous studies, we consider potential factors from the deal characteristics, issuers' characteristics, and macroeconomic factors.

The impact of information asymmetries on syndicated loan deals can be manifested in formal contractual features such as loan amount, maturity, or interest rate (Ball et al., 2008). Lin and Su (2022) also advocate that a longer bond maturity would require a larger issue size and affect the financing cost, making conventional bonds preferable. When studying the syndicated loan market, Wittenberg-Moerman (2006) found evidence that information asymmetry increases the cost of debt capital and decreases debt maturity. Having this in mind, we argue that:

Hypothesis 1 (H1): Issue maturity is longer for sustainable bonds than for sustainable loans.

According to Krishnaswami et al. (1999), larger firms take advantage of scale economies in the costs of public debt by issuing larger deals. In other words, small public debt issues are not cost efficient and firms only resort to public capital markets when issuing large amounts of debt to benefit from economies of scale. As such, we look to assess if the same applies to the sustainable finance market, by determining whether:

Hypothesis 2 (H2): Issue size negatively influences the preference for sustainable loans.

Denis and Mihov (2003) detected that the choice of debt instrument is most strongly linked with the credit history of the issuing firm and the current credit quality of the issuer. Cicchiello et al. (2022) concluded that very large firms with high profitability and high credibility prefer syndicated loans over corporate

bonds financing. We thus want to verify if creditworthiness is determining when firms choose between the two debt instruments in the sustainable finance market, by testing the following hypothesis:

Hypothesis 3 (H3): Companies with higher creditworthiness choose sustainable bonds over sustainable loans.

Finally, we find it relevant to examine whether macroeconomic factors, such as market interest rate or economy size, have an impact on the choice between sustainable loans and sustainable bonds. Having higher alternative financing costs, we believe firms would more easily opt for bonds. We intend to test whether:

Hypothesis 4 (H4): High interest rates promote sustainable bonds' issuance.

3. Data and Methodology

3.1 Sample Selection

We compiled a dataset of ESG debt instruments from DCM Analytics and Loan Analytics databases. The dataset covers the Global Sustainable Finance Bonds and Loans issued by public and private companies and provides extensive individual deal-by-deal information on the bond issuer and the loan borrower characteristics. Macroeconomic data on country risk, Vigeo ESG ratings and environmental policy were retrieved from Thomson Reuters Datastream database.

When constructing the dataset, we first identified the firms that borrowed ESG loans and issued ESG bonds during our sample period. We use Loan Analytics classification - Green Loan Principles (“GLP”), “Social Loan” and Sustainability Linked Loan Principles (“SLLP”) - to identify which conventional loans could be considered ESG loans. We also use DCM Analytics classification to identify which corporate bonds are green, social or sustainable bonds – Green Bond Instrument Type. Since Loan Analytics only started labelling loan tranches as ESG in 2018, our loan sample contains all loan tranches from the 1st of June of 2018 until the 31st of December of 2022. Even though the first green bond was issued in 2013, our bond sample comprises all ESG bonds issued from the 1st of June of 2018 until the 31st of December of 2022. This ensures that during this period companies could have chosen between the two instruments. Table 1 presents the distribution of both those instruments per ESG type: sustainable, green and social.

Table 1: Bonds and loans by ESG type.

Number of tranches by ESG type				
ESG	Loans		Bonds	
	Number	Percentage	Number	Percentage
Sustainable	468	83.27%	334	12.93%
Green	84	14.95%	2,107	81.54%
Social	10	1.78%	143	5.53%
Total	562	100.00%	2,584	100.00%
Percentage of tranche volume by ESG type				
ESG	Loans		Bonds	
	Total value [€ Million]	Percent of loans total value	Total value [€ Million]	Percent of bonds total value
Sustainable	369,543.01	96.95%	88,678.74	14.04%
Green	11,299.74	2.96%	505,735.74	80.06%
Social	331.88	0.09%	37,295.46	5.90%
Total	381,174.63	100.00%	631,709.94	100.00%

We consider investment grade corporate bonds and high yield corporate bonds from the primary bond market. We focused on the corporate bond issuers' behaviour, as the use of debt is different for financial and non-financial firms and followed the same rationale for loan borrowers. Hence, we excluded bonds and loans issued by banks, financial companies, or governmental platforms, which general industry was "Insurance" or "Finance", as these could skew the results. Lastly, we excluded bond deals with perpetual maturity. After removing missing information and outliers, the final ESG bond sample consists of 2,584 tranches and the final ESG loan sample consists of 562 tranches. Data is presented in Euros and the spread in basis points (bps).

Panel A presents the geographical distribution of the ESG bonds and loans in the world. We can observe that North America was responsible for around 76% of ESG loans total value in our sample between 2018 and 2022, with the United States contributing with around 74%. When it comes to ESG bonds its percentage in total value is only 17%. Europe is responsible for almost half of the ESG bonds value in our sample, and only 22% of ESG Loans total value. The Asian countries represent a residual percentage of the ESG loans value, 0.38% but 35% of ESG bonds value issued in the sample period.

Panel B comprises the industrial distribution of ESG bonds and ESG loans in our sample. Regarding ESG bonds, the Utilities industry leads in number of tranches and total value, representing 37.26% of the amount issued between 2018 and 2022. The Real Estate and Transportation sectors follow constituting 20.65% and 11.37% of the bonds value, respectively. Concerning ESG loans, the Real Estate sector leads in terms of number of tranches and total value. It corresponds to 20.51% of the loan amount borrowed in the period of 2018-2022. Computers and Electronics, Utilities and Automotive represent 13.55%, 13.46% and 7.89%, respectively, of the loans total value.

Panel C describes the distribution of ESG bonds and ESG loans by year of issuance. Number of tranches issued of ESG bonds and ESG loans have increased rapidly between 2018 and 2022. Total value issued, of both bonds and loans, has also increased in the period of 2018-2021, but decreased slightly in 2022.

Panel D contains the 10 top issuers of each type of bond for the period 2018-2022. The top ten ESG loan borrowers are responsible for 14.45% of the total value, while the top ten ESG bond issuers are responsible for 23.24% of the total value of this type of bonds. Ford Motor leads by far the ESG Loans rank, representing 5.25% of the total amount borrowed. On the ESG bond side, TenneT Holding BV, the issuer of 2.23% of the ESG bond total value, leads by a slight difference.

Lastly, Panel E includes the ESG loan and bond switchers between 2018 and 2022 period. For the purpose of this study, we define a switcher company as one that issued both ESG loans and ESG bonds during the sampling period.

Table 2: Geographic, industrial and yearly distribution, top issuers/borrowers, and switchers, retrieved from DCM and Loan Analytics.

Panel A: Geographic distribution				
Company Nationality	ESG Loan tranches		ESG Bond deals	
	Total value [€ Million]	Percent of loans total value	Total value [€ Million]	Percent of bonds total value
<i>Asia</i>	1,528.55	0.38%	223,126.11	35.32%
<i>Australia and Pacific</i>	1,297.24	0.33%	9,558.75	1.51%
<i>Europe</i>	90,135.86	22.15%	273,781.62	43.34%
Denmark	6,159.46	1.16%	6,583.02	1.04%
Finland	1,060.00	0.27%	7,392.18	1.17%
France	22,076.33	5.49%	37,540.20	5.94%
Germany	7,786.23	1.45%	47,500.00	7.52%
Ireland	1,000.00	0.25%	5,262.15	0.83%
Italy	3,930.00	0.99%	14,800.00	2.34%
Luxembourg	1,915.00	0.48%	7,706.96	1.22%
Netherlands	7,188.43	1.84%	37,183.42	5.89%
Norway	5,063.18	1.27%	8,245.29	1.31%
Portugal	-	0.00%	8,320.13	1.32%
Spain	18,215.34	4.60%	14,768.60	2.34%
Sweden	1,804.95	0.45%	17,811.60	2.82%
Switzerland	3,793.33	0.95%	2,980.16	0.47%
United Kingdom	10,143.61	2.95%	32,267.52	5.11%
<i>Latin America</i>	4,963.69	1.25%	11,205.99	1.77%
<i>Middle East</i>	-	0.00%	3,893.78	0.62%
<i>North America</i>	283,249.29	75.89%	110,143.70	17.44%
Canada	8,929.62	2.24%	10,731.82	1.70%
United States	274,319.67	73.65%	99,411.88	15.74%
Total	381,174.63	100.00%	631,709.95	100.00%

Panel B: Distribution by industry						
Company Nationality	ESG Loans			ESG Bonds		
	Number of tranches	Total value [€ Million]	Percent of loans total value	Number of tranches	Total value [€ Million]	Percent of bonds total value
Agriculture, Forestry and Fishing	4	455.00	0.12%	8	2,000.18	0.32%
Communications	15	13,209.28	3.47%	41	18,976.34	3.00%
Construction/Heavy Engineering	39	13,771.68	3.61%	172	29,268.17	4.63%
<i>Manufacturing</i>						
Aerospace	4	2,220.00	0.58%	2	371.13	0.06%
Auto/Truck	22	30,055.82	7.89%	58	31,239.93	4.95%
Chemicals	26	11,557.97	3.03%	57	14,144.24	2.24%
Computers and Electronics	27	51,655.69	13.55%	83	33,746.94	5.34%
Food and Beverage	24	12,392.40	3.25%	33	8,066.49	1.28%
Machinery	18	10,129.44	2.66%	26	3,845.75	0.61%
Metal and Steel	8	6,001.19	1.57%	38	8,854.19	1.40%
Textile	3	1,001.50	0.26%	1	73.77	0.01%
Other	16	4,272.46	1.12%	20	6,777.14	1.07%
Mining and Natural Resources	15	13,660.98	3.58%	32	8,671.78	1.37%
Oil and Gas	15	19,713.37	5.17%	27	3,975.28	0.63%
Real Estate	167	78,184.46	20.51%	722	130,445.36	20.65%
Retail Trade	18	12,028.00	3.16%	17	4,466.02	0.71%
<i>Services</i>						
Healthcare	24	24,370.37	6.39%	23	7,149.27	1.13%
Leisure and Recreation	1	1,050.00	0.28%	2	129.76	0.02%
Professional Services	23	9,142.90	2.40%	42	5,204.33	0.82%
<i>Utilities</i>	61	51,295.28	13.46%	797	235,405.75	37.26%
<i>Transportation</i>	20	10,768.83	2.83%	346	71,820.23	11.37%
<i>Multiple</i>	12	4,237.99	1.11%	37	7,077.89	1.12%
Total	562	381,174.63	100.00%	2,584	631,709.95	100.00%

Panel C: Distribution by year								
Year	ESG Loans				ESG Bonds			
	Number of tranches	Total value [€ Million]	Percent of loans total value	Percent of total value per year	Number of tranches	Total value [€ Million]	Percent of bonds total value	Percent of total value per year
2018	5	2,926.99	0.77%	16.03%	75	15,326.95	2.43%	83.97%
2019	37	13,798.62	3.62%	17.40%	308	65,508.18	10.37%	82.60%
2020	63	26,510.78	6.96%	14.41%	623	157,420.87	24.92%	85.59%
2021	228	188,496.17	49.45%	48.59%	763	199,421.14	31.57%	51.41%
2022	229	149,442.07	39.21%	43.51%	815	194,032.81	30.72%	56.49%
Total	562	381,174.63	100.00%	-	2,584	631,709.95	100.00%	-

Panel D: Top 10 ESG Loans and ESG Bonds borrowers/issuers

ESG Loans			ESG Bonds		
Company	By value of tranches	By number of tranches	Company	By value of tranches	By number of tranches
Ford Motor Co	5.25%	1.07%	TenneT Holding BV	2.23%	0.81%
Pfizer Inc	3.44%	0.36%	East Nippon Expressway Co Ltd	2.09%	1.97%
Dell Inc	2.70%	0.36%	China Three Gorges Corp	1.58%	1.16%
American Electric Power Co Inc	2.32%	0.71%	Alphabet Inc	1.55%	0.23%
Alphabet Inc	2.18%	0.36%	Societe du Grand Paris	1.31%	0.19%
Prologis LP	2.05%	1.25%	E. ON SE	1.27%	0.43%
Welltower Inc	1.41%	1.07%	Volkswagen International Finance NV	1.27%	0.35%
Crown Castle International Corp	1.37%	0.36%	ENGIE SA	1.20%	0.39%
Equinor ASA	1.31%	0.18%	West Nippon Expressway Co Ltd	1.09%	0.54%
AP Moller - Maersk A/S	1.21%	0.18%	Iberdrola Finanzas SAU	0.87%	0.27%

Panel E: Switchers in the 2018-2022 period

Company	Number of switches	Total number of tranches
<i>Sustainable</i>		
Aeon REIT Investment Corp	1	3
Alphabet Inc	1	8
Daiwa House REIT Investment Corp	1	3
GLP J-REIT	2	9
HP Inc	1	2
Koninklijke Ahold Delhaize NV	1	2
Northwest Natural Gas Co	1	2
Pfizer Inc	1	3
<i>Green</i>		
Aeon REIT Investment Corp	1	2
Canadian Solar Infrastructure Fund Inc	1	2
CRE Logistics REIT	1	6
Daiwa Office Investment Corp	1	6
Hoshino Resorts REIT Inc	1	10
Itochu Advance Logistics Investment Corp	2	4
Japan Excellent Inc	3	7
Nippon Building Fund Inc	1	2
One REIT Inc	1	3
Prisa Lhc LLC	1	3
SK Battery America Inc	1	3
Sosila Logistics REIT Inc	2	13
<i>Social</i>		
Daiwa Securities Living Investment Corp	1	6
Healthcare & Medical Investment Corp	1	5

3.2 Regression model and variables

We aim to investigate the factors that influence firms' choice of debt between the two sources of funding: ESG loans and ESG bonds. Literature on the determinants of firms' financing choice utilizes a single equation regression approach. We follow that trend, by estimating a logistic regression model, to link the discrete variable and its determinants:

$$\text{Choice of debt}_{i,t} = \alpha_0 + \beta_1 \text{Contractual characteristics}_{i,t-1} + \beta_2 \text{Firm characteristics}_{i,t} + \beta_3 \text{Macroeconomic factors}_t + \varepsilon_{i,t}$$

where the subscripts refer to deal i at time t .

We follow prior literature and control for 15 potential issuance determinants of three aspects: issued bond characteristics, issuer-specific characteristics, and market external conditions.

3.2.1 Dependent variable

We use a binary variable - choice of debt - as the dependent variable, while controlling for contractual, firm, and macroeconomic factors.

Choice of debt is a dummy variable that takes the value of 1 if the firm issues a sustainable bond and 0 if it decides upon a sustainable loan.

3.2.2 Contractual characteristics

Firstly, following Pinto and Santos (2020) work, we use deal size as a proxy for economies of scale. To capture the tranche size, we use the logarithm of the tranche face value in Euros.

Secondly, we include tranche spread. For loans we consider the tranche all-in pricing as the interest rate the borrower pays to the lender on the amount issued

for the loan. For bonds, we use the tranche spread to benchmark, in basis-points (bps), as the “price for the risk associated with the bond at closing, defined as the margin yielded by the security at issue above a corresponding currency treasury benchmark with a comparable maturity” (Marques and Pinto, 2020). We expect issuance costs to be negatively related to the issuance of bonds. Empirical studies on green bonds reveal that the lower financing cost attracts corporate issuers, but if issuance costs rise, green bonds are no longer preferred to corporate bonds (Cicchello et al., 2022; Löffler et al., 2021).

We also account for maturity using information on tranche years to maturity. Denis and Mihov (2003) claim that bank loans tend to have shorter maturities, high priority and can be more flexible in terms of borrowing and repayment, so we expect this variable to be positively related to bond issuance.

For information on the tranches’ credit risk, we use credit ratings assigned by Moody’s, S&P or Fitch converted into a numerical scale that go from 1 (AAA=1) to 24 (D=24) for Moody’s and S&P, and 22 (D=22) for Fitch. This means that the higher the number of the rating, the riskier the deal is. As some tranches had two or three different credit ratings, we calculated the average of the ratings provided. Moreover, and since some tranches may not be rated, we used a dummy variable, *Tranche Rated* that takes the value of 1 if the tranching has been rated, and 0 otherwise.

To control for risk differences in different tranches, we consider a dummy variable, *subordinated*, that takes the value of 1 when the tranche is subordinated, and 0 otherwise.

Finally, we include a dummy variable, *tranching*, that takes the value 1 if the loan is tranching, and 0 if not, to account for the fact that the deals might be tranching. If that is the case, we additionally control for the number of tranches in a transaction, *number of tranches*.

3.2.2 Firm characteristics

Building on the theoretical literature, we focus on firms' financial characteristics that reflect agency and transaction costs and information asymmetries. We include information on the borrower credit rating. Borrower credit rating, credit rating assigned by Moody's, S&P or Fitch converted into a numerical scale that go from 1 (AAA=1) to 24 (D=24) for Moody's and S&P, and 22 (D=22) for Fitch. The higher the numerical value, the lower the credit rating and the higher the risk associated with that specific firm. We included a dummy variable to account for Switcher companies. Like previously mentioned, a switcher is a company that issued both ESG loans and ESG bonds during the sampling period.

3.2.3 Macroeconomic factors

Finally, we considered the effect of macroeconomic conditions on the choice of debt. Considering that the deals in our data sample were closed in several different countries, we found it crucial to control for country risk. We include a country risk variable, that matches the S&P rating of the country with the tranche pricing date and attributes it a numerical scale following the same logic as mentioned above.

To account for the changes in the financial markets, we make use of interest rates, measured as the one-year money market rate, and computed as the difference between the five-year Euro swap rate and the 3-month Libor rate (EUSA5y-Libor3M). Finally, we considered the market volatility, measured by the Chicago Board Options Exchange Volatility Index (VIX).

Appendix B includes a full description of all variables that are used in the model as well as their source.

4. Univariate Analysis

We start our analysis by comparing the characteristics of ESG bond and ESG loan tranches. Table 3 provides the results of the t-tests for continuous variables and Fisher's exact tests for discrete variables.

The univariate analysis shows that, the spread, in basis points (bps), of an ESG loan is, on average, higher (181.87 bps) than ESG bond spreads (164.20 bps), with a 1% level significance. The tranche size is also lower for ESG bonds, with an average amount of 245.63 million euros contrasting with 683.94 million euros for ESG loans. On average, the number of tranches on ESG loans is significantly higher (2.41 tranches) than ESG bonds, with an average tranches' number of 1.69. Regarding maturity, ESG bonds last, on average, 8 years, while ESG loans mature in 5.31 years.

Credit ratings are slightly better for ESG bonds at the 1% level, with an average rating of 4.06 (approximately AA-) opposed to the 5.61 rating (approximately A) for ESG loans. Nearly half of ESG loans, 52.58%, and ESG bonds, 54.68%, are rated.

The average country risk is significantly higher at the 1% level for ESG loans (3.27) than for ESG bonds (3.94), both approximately AA. The average rating for the ESG loans' borrowers is 4.96, approximately AA-, worse than the average rating for companies that issued ESG bonds is 3.64, approximately AA.

Regarding the dummy variables in the sample, 65.29% of ESG loans and 34.56% of ESG bonds are tranchéd. Almost half of the issuing companies for both loans and bonds are rated, but only 28.67% are experienced ESG loan issuers. The figure changes when we are talking about ESG bonds. 62.49% of issuers are experienced in the ESG bond market, having issued two or more ESG bonds during the sample period. Finally, only 0.34% of the ESG loans are subordinated, while 1.69% of the ESG bonds are subordinated.

Table 3: Univariate Analysis.

Variable of interest		ESG Loans		ESG Bonds	
<i>Continuous variables</i>					
Tranche spread (bps)	Mean	181.60		160.30	
	Median	130.00	***	127.85	***
	Number	523.00		1,078.00	
Tranche size (€ million)	Mean	678.25		244.47	
	Median	305.43	***	132.04	***
	Number	562.00		2,584.00	
Tranche rating	Mean	5.67		4.08	
	Median	7.00	***	4.00	***
	Number	562.00		2,584	
5yTB-3mTB	Mean	88.48		63.84	
	Median	84.20	***	61.75	***
	Number	562.00		2,584.00	
Volatility	Mean	22.09		23.10	
	Median	21.14	***	22.18	***
	Number	562.00		2,584.00	
Country risk	Mean	3.28		3.89	
	Median	1.00	***	5.00	***
	Number	562.00		2,584.00	
Maturity	Mean	5.31		8.07	
	Median	5.00	***	5.06	***
	Number	562.00		2,584.00	
Number of tranches	Mean	2.41		1.71	
	Median	2.00	***	1.00	***
	Number	562.00		2,584.00	
Company rating	Mean	5.02		3.65	
	Median	0.00	***	0.00	***
	Number	562.00		2,584.00	
<i>Dummy variables</i>					
Switcher	Number	562.00		2,584.00	
	Nr. (D=1)	59.00	***	45.00	***
	% of total	10.50%		1.74%	
Tranched	Number	562.00		2,584.00	
	Nr. (D=1)	363.00	***	940.00	***
	% of total	64.59%		36.38%	
Subordinated	Number	562.00		2,584.00	
	Nr. (D=1)	2.00		26.00	
	% of total	0.36%		1.01%	
Tranche rated	Number	562.00		2,584.00	
	Nr. (D=1)	300.00		1,422.00	
	% of total	53.38%		55.03%	
Experienced	Number	545.00		2,584.00	
	Nr. (D=1)	158.00	***	1,598.00	***
	% of total	28.99%		61.84%	
Company rated	Number	562.00		2,584.00	
	Nr. (D=1)	275.00		1,221.00	
	% of total	48.93%		47.25%	

Notes: (***) indicates significant difference at the 1% level. (**) indicates significant difference between the 1% level and the 5% level. (*) indicates significant difference at the 10%. Table A, in the appendix, includes summary statistics for the variables above.

5. Results

Models [1] to [12] report the results of the logistic regression model detailed in chapter 3. Considering that there might be cross-country differences and varying risk premia, we estimated the standard errors clustered by country and by year and adjust the equation to possible heteroskedasticity.

The models presented in table 4 comprehend firms that closed sustainable loans and/or sustainable bonds deals during the sample period. Model [1] uses a high-information sample of 3,129 tranches, of which 545 loans and 2,584 bonds. On the other hand, model [2] specifically addresses the regression on sustainable financial instruments, using a subsample of 789 tranches, while model [3] considers green financial instruments, with a sample of 2,167 green bond and green loan tranches.

To account for dissimilarities in firms' access to both financial markets, we focused our study on firms that have issued only one type of debt, either sustainable bonds or sustainable loans, over the sample period. Table 5 presents the results of the regression for a subsample of tranches closed during the sampling period only by non-switcher firms.

Additionally, we included tranche spread as an explanatory variable. Models [7], [8] and [9], on table 6, revealed that this variable significantly explains our dependent variable. When testing this new regression equation on the same three sub-samples as before, we found that ESG loans show higher spreads than ESG bonds.

Lastly, as financing choice may be sector-specific, we re-estimated models [1], [2] and [3], on table 7, to control for industry fixed effects.

Table 4: Logit models.

Dependent variable:	Bond = 1, Loan = 0	Bond = 1, Loan = 0, ESG = 1	Bond = 1, Loan = 0, ESG = 2
	Model [1] ESG Bonds versus ESG Loans	Model [2] Sustainable Bonds versus Sustainable Loans	Model [3] Green Bonds versus Green Loans
Independent variables:			
Intercept	2.469 ** (1.069)	-2.353 * (1.384)	3.855 *** (1.187)
Deal size (€ million)	-0.655 *** (0.188)	-0.728 *** (0.151)	0.067 (0.137)
Tranche rating	-0.514 *** (0.082)	-0.556 *** (0.14)	-0.572 *** (0.19)
5yTB-3mTB	-0.004 * (0.002)	-0.004 (0.002)	-0.001 (0.004)
Volatility	0.027 (0.031)	0.035 (0.03)	0.010 (0.043)
Country risk	0.101 (0.099)	0.083 (0.093)	0.073 (0.122)
Maturity	1.192 *** (0.342)	2.387 *** (0.453)	-0.259 (0.427)
Number of tranches	-0.109 (0.131)	0.370 *** (0.124)	-0.233 (0.21)
Company rating	0.155 ** (0.07)	0.151 (0.141)	0.030 (0.139)
Switcher	-3.237 *** (0.737)	-0.039 (0.387)	-4.328 *** (0.717)
Tranched	-1.454 *** (0.452)	-2.717 *** (0.512)	-0.984 * (0.556)
Subordinated	-0.069 (1.049)	-0.802 (0.82)	
Tranche rated	6.138 *** (0.874)	7.515 *** (1.646)	6.494 *** (1.811)
Experienced	1.118 *** (0.239)	1.070 *** (0.339)	0.780 (0.501)
Company rated	-2.247 *** (0.839)	-2.380 (1.732)	-0.494 (1.337)
Number of observations	3,129.00	789.00	2,167.00
Correct predictions	87.41%	84.66%	97.23%
Pseudo-R ²	0.343	0.495	0.427

Table 5: Logit models controlling for non-switcher companies.

Dependent variable:	Bond = 1, Loan = 0, Switcher = 0	Bond = 1, Loan = 0, ESG = 1 Switcher = 0	Bond = 1, Loan = 0, ESG = 2, Switcher = 0
	Model [4] ESG Bonds versus ESG Loans	Model [5] Sustainable Bonds versus Sustainable Loans	Model [6] Green Bonds versus Green Loans
Independent variables:			
Intercept	2.903 *** (1.121)	-2.466 * (1.417)	4.995 *** (1.253)
Deal size (€ million)	-0.751 *** (0.218)	-0.688 *** (0.157)	0.121 (0.14)
Tranche rating	-0.503 *** (0.085)	-0.567 *** (0.15)	-0.604 *** (0.174)
5yTB-3mTB	-0.004 (0.002)	-0.003 (0.002)	-0.002 (0.005)
Volatility	0.025 (0.031)	0.032 (0.03)	-0.016 (0.03)
Country risk	0.107 (0.102)	0.100 (0.095)	0.093 (0.126)
Maturity	1.168 *** (0.392)	2.366 *** (0.447)	-1.032 ** (0.482)
Number of tranches	-0.067 (0.121)	0.378 *** (0.126)	-0.003 (0.309)
Company rating	0.162 ** (0.067)	0.147 (0.161)	-0.056 (0.14)
Switcher	0.000 -	0.000 -	0.000 -
Tranched	-1.559 *** (0.42)	-2.850 *** (0.521)	-1.168 * (0.603)
Subordinated	-0.119 (1.059)	-0.804 (0.837)	
Tranche rated	6.093 *** (0.936)	7.567 *** (1.722)	6.724 *** (1.751)
Experienced	1.329 *** (0.23)	1.117 *** (0.345)	1.754 *** (0.502)
Company rated	-2.327 *** (0.803)	-2.358 (1.89)	0.591 (1.346)
Number of observations	3,025.00	757.00	2,106.00
Correct predictions	88.07%	84.54%	98.05%
Pseudo-R ²	0.343	0.497	0.241

Table 6: Logit models controlling for tranche spread, in basis points.

Dependent variable:	Bond = 1, Loan = 0	Bond = 1, Loan = 0, ESG = 1	Bond = 1, Loan = 0, ESG = 2,
	Model [7] ESG Bonds versus ESG Loans	Model [8] Sustainable Bonds versus Sustainable Loans	Model [9] Green Bonds versus Green Loans
Independent variables:			
Intercept	2.770 *** (1.064)	-1.791 (1.332)	4.295 *** (1.158)
Tranche spread (bps)	-0.005 *** (0.001)	-0.011 *** (0.003)	-0.004 *** (0.001)
Deal size (€ million)	-0.630 *** (0.19)	-0.697 *** (0.164)	0.113 (0.136)
Tranche rating	-0.426 *** (0.087)	-0.532 *** (0.13)	-0.417 ** (0.188)
5yTB-3mTB	-0.005 ** (0.002)	-0.005 ** (0.002)	-0.001 (0.004)
Volatility	0.030 (0.031)	0.046 * (0.027)	0.012 (0.044)
Country risk	0.063 (0.086)	0.108 (0.098)	0.008 (0.103)
Maturity	1.389 *** (0.332)	2.550 *** (0.443)	-0.238 (0.423)
Number of tranches	-0.125 *** (0.122)	0.292 ** (0.118)	-0.202 (0.208)
Company rating	0.146 * (0.078)	0.229 ** (0.116)	-0.027 (0.152)
Switcher	-3.558 *** (0.728)	-0.412 (0.424)	-4.447 *** (0.716)
Tranched	-1.510 *** (0.436)	-2.366 *** (0.501)	-1.272 ** (0.603)
Subordinated	0.290 (1.475)	-2.311 *** (0.834)	
Tranche rated	5.557 *** (0.962)	7.436 *** (1.471)	5.479 *** (1.652)
Experienced	1.140 *** (0.225)	1.012 *** (0.311)	0.757 (0.504)
Company rated	-2.370 ** (0.943)	-3.270 ** (1.451)	-0.227 (1,3936)
Number of observations	3,129.00	789.00	2,167.00
Correct predictions	88.02%	89.73%	97.28%
Pseudo-R ²	0.389	0.567	0.454

Table 7: Logit models controlling for industry fixed effects.

Dependent variable:	Bond = 1, Loan = 0		Bond = 1, Loan = 0, ESG = 1		Bond = 1, Loan = 0, ESG = 2,	
	Model [10] ESG Bonds versus ESG Loans		Model [11] Sustainable Bonds versus Sustainable Loans		Model [12] Green Bonds versus Green Loans	
Independent variables:						
Intercept	3.350 (1.174)	***	-3.050 (1.498)	**	3.673 (1.544)	**
Deal size (€ million)	-0.725 (0.178)	***	0.154 (-4.9)	***	-0.074 (0.139)	
Tranche rating	-0.513 (0.077)	***	-0.666 (0.16)	***	-0.528 (0.176)	***
5yTB-3mTB	-0.004 (0.002)	**	-0.003 (0.002)		0.000 (0.004)	
Volatility	0.024 (0.027)		0.038 (0.033)		0.001 (0.042)	
Country risk	0.080 (0.101)		0.087 (0.107)		0.098 (0.137)	
Maturity	1.374 (0.359)	***	2.589 (0.492)	***	-0.145 (0.403)	
Number of tranches	-0.157 (0.116)		0.351 (0.123)	***	-0.222 (0.198)	
Company rating	0.165 (0.065)	**	0.204 (0.144)		-0.018 (0.148)	
Switcher	-3.302 (0.696)	***	-0.134 (0.471)		-4.697 (0.977)	***
Tranched	-1.402 (0.426)	***	-2.971 (0.538)	***	-1.103 (0.593)	*
Subordinated	-0.040 (0.874)		-0.787 (0.785)			
Tranche rated	6.168 (0.808)	***	8.492 (1.719)	***	6.422 (1.574)	***
Experienced	0.956 (0.217)	***	1.087 (0.35)	***	1.139 (0.641)	*
Company rated	-2.404 (0.771)	***	-2.776 (1.83)		-0.271 (1.448)	
Industry fixed effects	Yes		Yes		Yes	
Number of observations	3,129.00		763.00		1,903.00	
Correct predictions	88.05%		85.71%		97.00%	
Pseudo- R^2	0.384		0.522		0.452	

Note: ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. The t-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors. Due to time varying risk premia and cross-country differences, we estimate standard errors clustered by year and country.

5.1 Is issue maturity longer for sustainable bonds than for sustainable loans?

Table 4 shows that, as expected, when the whole sample is considered (sustainable, green and social), ESG bonds have longer maturities than ESG loans. The same is true when we look solely to the sample of sustainable bonds and sustainable loans, but we could not find a statistically significant relationship between maturity and the choice of green bonds or green loans. The same results were obtained when we included the spread variable (Table 6), and when we controlled for industry effects (Table 7).

When we focus on non-switcher firms, the impact of maturity on the choice between the whole range of ESG financial instruments and between sustainable bonds and loans, seems to be very similar to models [1] and [2]. However, once again, the effect is different for green bonds and green loans. We find evidence that with a statistically significance of 5%, green bonds have lower maturities than green loans.

Overall, evidence shows that sustainable bonds have longer maturities than sustainable loans, so we can accept H1.

5.2 Does issue size negatively influence the preference for sustainable loans?

We expected issue size to be positively related to the issuance of bonds, as firms take advantage of scale economies in the costs of public debt by issuing larger deals (Krishnaswami et al., 1999). However, results reported in models [2], [5], [8] and [11] show that in the sustainable finance market, bonds have lower tranche sizes than loans. Thus, leading us to reject H2.

Our results also show that when we add green and social deals, the conclusion is the same. We could not find any statistically significant effect of tranche size when we exclusively focus on green transactions.

5.3 Do companies with higher creditworthiness choose sustainable bonds over sustainable loans?

We intend to understand whether firms with higher creditworthiness prefer sustainable bonds over sustainable loans. Looking at tables 4 to 7, we find that company rating is not statistically significant at the 1% level in any of the models. Once the spread is considered in the equation, the effect of company rating on the choice of sustainable bonds versus sustainable loans is statistically significant at the 5% level. Our findings support that companies with higher credit rating exhibit a preference for public debt (Denis and Mihov, 2003).

Interestingly, the variable company rated, which accounts for the fact that a company may be rated or not, shows us that for the high-information sample of green, social, and sustainable financing instruments, the fact that a company is not rated makes ESG loans preferable to ESG bonds.

The above results allow us to accept H3.

5.4 Do high interest rates promote sustainable bonds' issuance?

To answer the question, we look at the coefficients of variable 5yTB-3mTB in the regression models. The results show that interest rate only has a statistically significant impact on the choice between sustainable loans and sustainable bonds when we account for the tranche spread – model [8]. When interest rates are high, firms opt for sustainable loans. This is also true when we look at the whole sample of ESG instruments - models [1], [7] and [10]. We can conclude that high interest rates do not favour sustainable bond issuance so H4 is rejected.

Additionally, we found that both volatility and country risk do not play a significant part in the firms' debt choice between ESG loans and bonds.

Conclusion

This dissertation intended to compare the firms' choice between the sustainable bond market with the sustainable loan market. In order to do this, we used a sample of 3,146 tranches, of which 2,584 are ESG bonds and 562 are ESG loans.

Our logit model results revealed that different contractual, issuer and macroeconomic characteristics significantly affect the decision between undertaking ESG loans or ESG bonds. Our findings are consistent with the hypothesis that sustainable bonds have longer maturities and are the preferred debt choice for firms with good creditworthiness. Furthermore, we provide evidence that interest rates and issue size are negatively related to the choice of sustainable bonds over sustainable loans.

This study contributes to the growing literature on the sustainable finance market. While there is extensive literature concerned with sustainable bank lending and direct bond financing, most researchers consider the financing instruments individually. There is a lack of studies examining the rationales behind sustainable bond and loan issuance, which is crucial to promoting the development of the sustainable market.

Future studies will be essential to validate and expand the information on this topic as the present study faced some limitations. Data is scarce when it comes to sustainable finance instruments as this is a very recent subject. We leave it for future studies not only to revisit this topic, when larger and proper data samples are available, but also to study the relationship between the firms' financial performance and their debt choice. It would be interesting to determine this relationship by assessing whether firms' financial characteristics such as size, asset tangibility, leverage and profitability impact their financing choice.

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Appendices

Appendix A: Summary statistics.

Panel A: Continuous Variables												
Variable of interest	ESG Loans						ESG Bonds					
	Number	Mean	Median	Std. Dev.	Min.	Max.	Number	Mean	Median	Std. Dev.	Min.	Max.
<i>Contractual Characteristics</i>												
Tranche spread (bps)	523.00	181.60	130.00	133.96	5.00	850.00	1,078.00	160.30	127.85	129.11	0.19	1,154.00
Tranche size (€ million)	562.00	678.25	305.43	1,013.09	1.09	8,601.14	2,584.00	244.47	132.04	265.41	0.10	2,161.23
Tranche rating	562.00	5.67	7.00	5.74	2.00	16.00	2,584.00	4.08	4.00	4.23	1.00	17.00
Maturity	562.00	5.31	5.00	2.42	0.33	20.00	2,584.00	8.07	5.06	7.55	1.02	62.06
Number of tranches	562.00	2.41	2.00	1.52	1.00	8.00	2,584.00	1.71	1.00	1.39	1.00	13.00
<i>Macroeconomic factors</i>												
5yTB-3mTB	562.00	88.48	84.20	68.89	-	70.50	2,584.00	63.84	61.75	64.41	-	70.50
Volatility	562.00	22.09	21.14	6.30	11.75	82.69	2,584.00	23.10	22.18	7.98	11.54	76.45
Country risk	562.00	3.28	1.00	2.91	1.00	10.00	2,584.00	3.89	5.00	2.52	1.00	20.00
<i>Firms' Characteristics</i>												
Company rating	562.00	5.02	-	5.53	2.00	16.00	2,584.00	3.65	-	4.40	1.00	20.00
Panel B: Dummy Variables												
Variable of interest	ESG Loans			ESG Bonds								
	Number	% of total	Std. Dev.	Number	% of total	Std. Dev.						
Tranche rated	562.00	53.38%	49.76%	2,584.00	55.03%	49.93%						
Tranched	562.00	64.59%	48.12%	2,584.00	36.38%	47.87%						
Subordinated	562.00	0.36%	9.98%	2,584.00	1.01%	5.96%						
Switcher	562.00	10.50%	13.08%	2,584.00	1.74%	30.68%						
Experienced	545.00	28.99%	48.59%	2,584.00	61.84%	45.41%						
Company rated	562.00	48.93%	49.93%	2,584.00	47.25%	50.03%						

Appendix B: Definition of variables and findings.

Variable	Description	Source
Dependent variable		
Choice of debt	Dummy equal to 1 if the firm issues a sustainable bond and 0 if the firm borrows a sustainable loan.	-
Independent variables		
<i>Contractual Characteristics</i>		
Tranche spread	Margin yielded by the security at issue above a corresponding currency treasury benchmark with a comparable maturity.	DCM Analytics
Tranche size	Natural logarithm of the deal size measured in € million.	DCM/Loan Analytics
Maturity	Maturity of loan or bond in years.	DCM/Loan Analytics
Tranche rated	Dummy equal to 1 if the loan/bond tranche has a credit rating from Fitch, Moody's, and/or S&P, and 0 otherwise.	DCM/Loan Analytics
Tranched	Dummy equal to 1 if instrument is tranched into two or more facilities, and 0 otherwise.	DCM/Loan Analytics
Number of tranches	Number of loan or bond tranches.	DCM/Loan Analytics
Tranche rating	The Fitch, S&P, and/or Moody's tranche rating at closing; the rating is converted as follows: AAA=Aaa=1, AA+=Aa1=2, and so on until D=24. If a tranche has more than one credit rating, the average is computed.	DCM/Loan Analytics
Subordinated	Dummy equal to 1 if deal is subordinated, and 0 otherwise.	DCM/Loan Analytics
<i>Firms' characteristics</i>		
Company rating	The Fitch, S&P, and/or Moody's company rating at closing; the rating is converted as follows: AAA=Aaa=1, AA+=Aa1=2, and so on until D=24. If a company has more than one credit rating, the average is computed.	DCM/Loan Analytics
Company rated	Dummy equal to 1 if the borrower has a credit rating from Fitch, Moody's, and/or S&P, and 0 otherwise.	DCM/Loan Analytics
Switcher	Dummy equal to 1 if firms used both debt instruments within our sample period (June 1, 2018 – December 31, 2022) and 0, otherwise.	DCM/Loan Analytics
Experienced	Dummy equal to 1 if firms closed/issued more than one loan/bond within our sample period (June 1, 2018 – December 31, 2022) and 0, otherwise.	DCM/Loan Analytics
<i>Macroeconomic factors</i>		
Country risk	S&P's country credit rating at close. The rating is converted as follows: AAA=1, AA+=2, and so on until D=22.	S&P Global Ratings
EUSA5y-Libor3M	The slope of the Euro swap curve. Obtained as the difference between the five-year Euro swap rate and the 3-month Libor rate.	Datastream
Volatility	The Chicago Board Options Exchange Volatility Index (VIX). VIX reflects a market estimate of future volatility.	Datastream

