Swedish Green Bond Market

Do firms benefit from green bonds through a lower cost of capital?

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Abstract:

Green bonds are one of the most important assets in sustainable finance that are projected to reach a market size of 1 trillion USD by the end of 2022. This thesis looks into the Swedish corporate bond market from 2014 to March 2022 with the goal of understanding if firms benefit from a lower cost of capital from the issuance of green bonds. Specifically, we examine whether investors accept lower returns from green bonds compared to conventional bonds ("green premium") and whether there is a positive stock price reaction following green bond issuance. We found that companies issuing green bonds have a big pricing benefit of 33.0 - 44.4 basis points compared to firms that issue conventional bonds. From a cost of equity perspective, we do not find evidence of a significant positive stock price reaction upon the green bond issuance event. However, we found that investors actively seek information regarding green bonds issuance, as shown by the increase in GSVI.

Keywords:

Green bond, green premium, stock price reaction, investor attention

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1. Introduction

Green bonds are one of the most prominent financial instruments used in sustainable investing. Similar to conventional bonds, green bonds are a type of financial instrument used by corporations and governments to borrow money in exchange for a promise to repay the loan at a fixed date plus interest. Green bonds, however, include an extra promise to exclusively use the loan proceeds for projects with environmental benefits, such as water and energy efficiency, clean transport, and climate change mitigation (IFC, 2020).

Since its introduction, the green bond market has increased significantly and the overall green bond market has grown to a total of USD 1.3 trillion bonds issued until 2021 (*Market Data*, 2021). With most countries committing to limit their carbon gas emissions following the Paris Agreement, the green bond market is expected to continue growing with double digits in 2022 potentially reaching 1 trillion USD in a single year (*SEB's Green Bond Report: 2022 Transition and Sustainable Financing Outlooks*, 2021). The still rapidly growing market shows that interest in sustainable finance is strong both on the issuer and investor side and that green bonds might become a dominant debt instrument in the market. However, despite the increasing popularity of green bonds, little is yet known about the new financial instrument (Flammer, 2021). This makes it even more important to study the dynamics behind the green bond market.

As green bond proceeds can only be used for projects with environmental benefits, it might seem counterintuitive for companies to issue such financial instruments in lieu of conventional bonds. Moreover, some issuers might find it costly to issue green bonds as such issuance would require a third-party certification to verify the expected use of the proceeds (Tang & Zhang, 2020). However, issuing green bonds can be used as a signalling instrument to show the market the firm's commitment to sustainability (Flammer, 2021), a factor that is increasingly important for investors. Considering the trade-off between issuing conventional and green bonds, this study seeks to shed light on the potential benefits of issuing green bonds, specifically on the firm's cost of capital.

There has been a growing interest in studying whether firms with sustainable behaviour get access to cheaper financing – to a lower cost of capital which is one of the most important measures in corporate finance that determines a firms' financing opportunities. In relation to this, there have been a number of empirical studies that have found that a strong environmental

performance can indeed have a favourable impact on the cost of debt (e.g. Schneider, 2011) as well as on the cost of equity through a positive stock price reaction (e.g. Flammer, 2015).

This thesis seeks to shed light on whether companies and their shareholders in Sweden benefit from a lower cost of capital through green bond issuance. Specifically, this thesis tests the **impact of green bond issuance on cost of capital** through two factors:

1) **Lower cost of debt on the green bond**: we examine whether there is a green premium on bonds - whether investors accept a lower return at issuance for green bonds compared to conventional bonds.

2) **Lower cost of equity**: we observe whether there is a positive stock price reaction (i.e. significant increase in share price) upon the issuance of a green bond

Despite the increasing popularity of green bonds, the studies so far have been focused at the global level (Cortellini and Panetta, 2021). In our thesis, we aim to focus on Sweden, one of the front-runners of sustainability and one of the biggest and most mature green bond markets with a market size of USD 16.18 billion in 2021 (*Market Data*, 2021). Green bonds also constitute a larger share within the overall bond market in Sweden compared to other markets. For example, 20% of bonds issued in SEK are labelled green while that share is only up to 5% for other currencies such as EUR, GBP, and USD (Ferlin & Sternbeck Fryxell, 2020). Moreover, the green bond market represents 20% of the Swedish corporate bond market too (Pareto Asset Management, 2020).

As green bonds are not as scarce of a debt instrument in Sweden, it is possible that investors are not willing to pay as high premiums as in other countries for them. On the other hand, Swedish private and institutional investors have stronger preferences toward sustainability-focused businesses and companies (Lagerkvist et al., 2020, Nachemson-Ekwall, 2019) which could be a driver behind green premium. In terms of cost of equity, green behaviour in general is expected to have a positive effect on the stock price in Sweden due to its investors' sustainability preferences. Nevertheless, as a considerable part of Swedish businesses already has mandates regarding sustainability (Torvanger et al., 2021), it is possible that their green behaviour is already priced into their stock price. Overall, these distinct characteristics make the Swedish green bond market interesting to analyse as its results might differ from the studies conducted on a global level for a number of reasons. To understand whether green bonds have a lower yield required by investors, we ran OLS and time-fixed

effects regressions and found a significant green premium ranging from 33.0 - 44.4 basis points, implying a significant pricing benefit for the issuing firms. We also compare bond yields within the same firm: although the results with this tightest specification become insignificant, there are not enough firms issuing both green and conventional bonds to rule out the existence of green premium based on this regression.

We used event-study methodology to analyse the stock price reaction to green bond issuance, however, no statistically significant increase in the share price has been detected, nor a significant difference from the reaction to non-green bonds. However, we found that there is a significant increase in Google Search Volume Indexes for green bond issuances compared to conventional bonds which implies that green bond issuance has indeed additional information value for investors and that consequently, this suggests that the firm's sustainability aspect has been already taken into consideration in its pricing.

Our study contributes to the understanding of the financial benefits that companies can get access to by the issuance of green bonds in Sweden. Our methodology differs from most research by not only looking at green bonds on their own in the analysis of stock price reaction and investor attention, but taking into consideration and comparing them to conventional bonds as well. Finally, our research provides some insight on how investors value information related to green behaviour.

2. Background and literature review

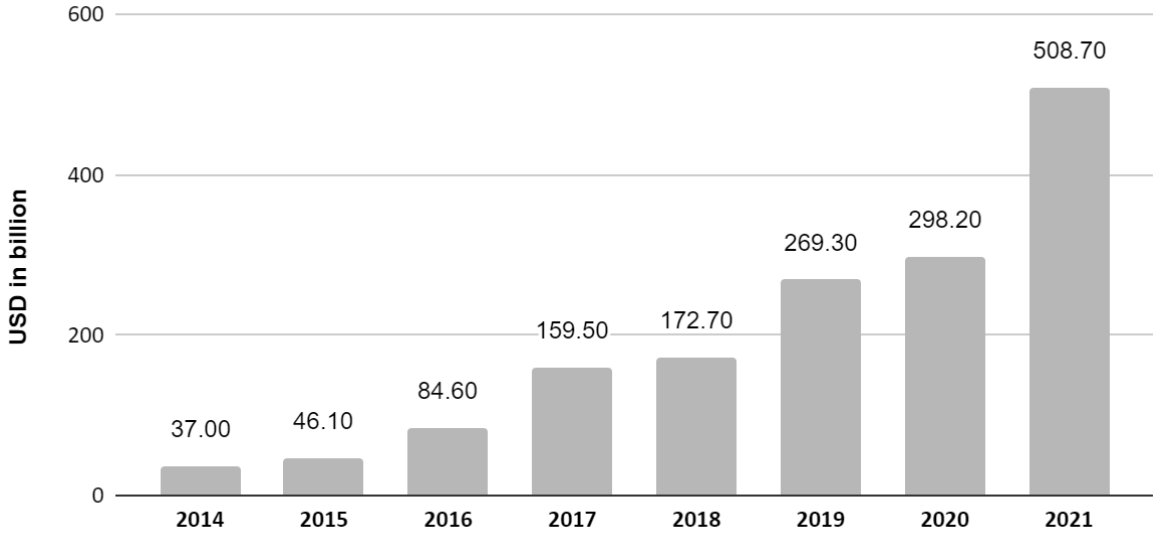
2.1. Green bond market background

Although the first green bond (under the name of "Green Awareness Bond") was issued by the European Investment Bank in 2007, there weren't any clear criteria that differentiated green bonds from conventional bonds for years (Cortellini and Panetta, 2021). During that period, the primary issuers of green bonds have been supranational and national institutions (Cortellini and Panetta, 2021).

In 2014, ICMA published its first Green Bond Principles which was the first set of guidelines that was made to certify green bonds and that was recognized internationally (Cortellini & Panetta, 2021). This was an important milestone to convince investors of the credibility of green bonds and to limit greenwashing practices. Since then, the green bond market started to increase significantly among financial and corporate actors as well.

The green bond market has been rising significantly and growing year by year since 2014. In 2021, the market has grown by USD 211 billion which is almost double the size of the previous year. This increase was largely coming from the corporate sector: the issuance amount grew by 141% in financial corporations, and by 110% in non-financial corporations (*Market Data*, 2021).

Figure 1: Global green bond market data



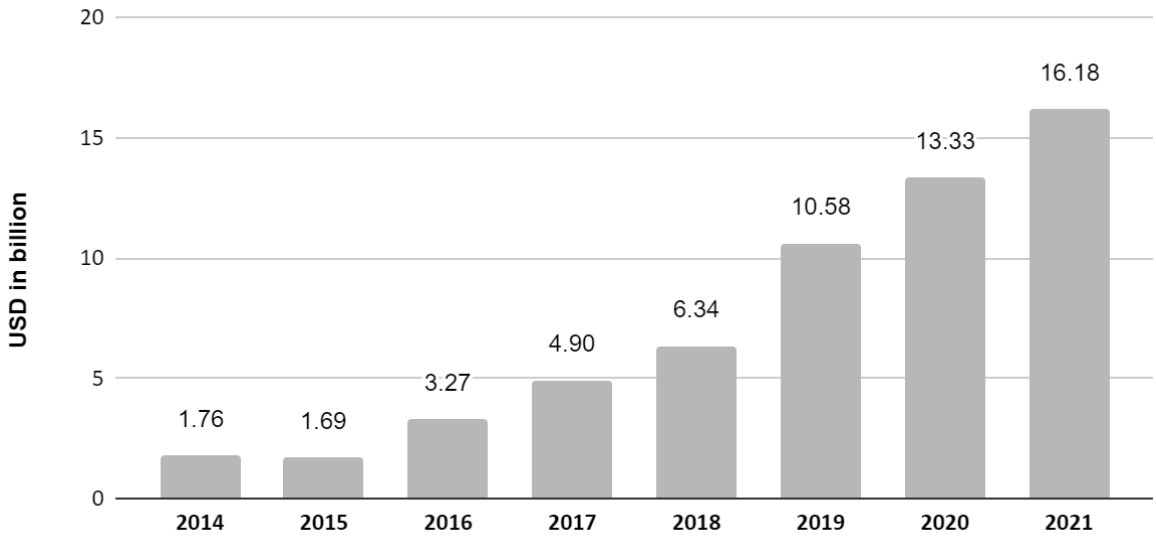
Source: *Market Data* (2021)

Not only have the market size and the distribution of the different types of issuers changed in the last years, but the geography of the bonds has also become more diverse. Bond issuances have also started to gain popularity in emerging countries (especially in China) reaching roughly a fifth of global issuance. In Europe, the number of green bond issuer countries has almost tripled between 2014 and 2021. In terms of currency, the euro has been the clear leading currency in the last three years. On the other hand, the use of proceeds has been dominated by three main categories throughout the years: energy (56%), transport (20%), and building (11%) which was 87% of the total use of proceeds in 2021 (*Market Data, 2021)*. Additionally, the energy crisis in Europe and Asia could also add to the need for green investments in renewable energy (*SEB's Green Bond Report: 2022 Transition and Sustainable Financing Outlooks*, 2021).

As mentioned in the introduction, Sweden is considered one of the front-runners of sustainability globally (Maltais & Nykvist, 2020). In line with governmental efforts, Swedish businesses and the financial sector have a higher focus on sustainability compared to other countries. For example, AP pension funds and Folksam, an insurance fund, have been active supporters in the development of the green bond market in Sweden (Torvanger et al., 2021). In addition, the sustainability mandate that many Swedish corporations have from their shareholders makes them more interested in green financial innovations. Moreover, sustainability seems to have a positive impact not only on reputation but also on public relations building in Sweden which can lead to higher visibility in the media and society (Torvanger et al., 2021).

The first bond under the name "Green bond" was issued by the World Bank in partnership with a Swedish bank, SEB, in 2008. The issued amount was SEK 3.35 billion and the project goal was to find innovative solutions to climate financing. SEB has been followed by other Swedish banks early on supporting the development of the green bond market (Torvanger et al., 2021). The first corporate green bond was also issued in Sweden by Vasakronan, a company operating in the real estate industry (*Vasakronan Pioneered Green Certificates*, 2018).

Figure 2: Swedish green bond market



Source: *Market Data* (2021)

The Swedish green bond market has been growing every year since 2015, reaching USD 16.18 billion in 2021. The biggest jump in the last 5 years was between 2018 and 2019 with USD 4.2 billion (67% increase). In 2020 and 2021, the green bond market in Sweden has still produced double-digit growth even while the sustainable debt market has become more diversified with the growing popularity of social and sustainable bonds. In terms of issuer types, in 2020, roughly half of the issuances came from financial and non-financial corporates. Within that, property and real estate issuers play a dominant role in Sweden.

As discussed above, the third most popular use of the proceeds globally is on contributing to more sustainable buildings which might also mean that corporations within this industry have a higher chance of successfully issuing green bonds. Thus, the high number of active real estate corporations in Sweden could have been a driver behind the strong development of the Swedish green bond market (Torvanger et al., 2021) besides the country's sustainability targets. Furthermore, the relatively large and diversified corporate sector of Sweden (Torvanger et al., 2021) can be regarded as another favourable condition for the corporate green bond market in general.

2.2. Literature review

The relationship between sustainability in general and cost of capital has received a lot of research attention in the past decades due to the growing importance of sustainability in investment decisions and financial asset pricing. The empirical and theoretical studies on the topic have shown an inverse relationship between a firm's sustainability effort and its cost of capital, implying that companies that have better environmental performance were able to achieve lower financing while at the same time showing that investors do price sustainability in their investment (Gianfrate et al., 2019).

Cost of capital is the cost that firms have to pay in order to finance their operations and investments, in other words, it is the rate of return investors require in exchange for providing financing for a company. The lower the cost of debt, the lower the interest rates companies have to pay on their debt. The lower the cost of equity, the higher the price a firm gets for its shares.

From the cost of debt perspective, Schneider (2011) has identified a statistically significant inverse relationship between a firm's environmental performance, as measured by its toxic release, and the firm’s yield spread. The study also highlighted that this relationship is stronger for bonds with lower rating compared to bonds with higher ratings. Similarly, Oikonomou et al. (2011) studied 3,240 bond issuances between 1991 and 2008 in the US and found that poor CSR performers were penalised with higher yield while better CSR performers were rewarded with lower yield. Furthermore, a study conducted in an emerging market has also shown similar results where Fonseka et al. (2019) showed a negative relationship between environmental energy disclosure and cost of debt in Chinese energy firms during 2008 - 2014.

From the cost of equity side, empirical study by Klassen and McLaughlin (1996) showed that stock price increased significantly upon the release of positive environmental performance news. The study argues that as the market continuously assesses, values, and reflects new public information into the firm’s stock price, the expected value of having better environmental performance is reflected in the firm's market value as it becomes public information. A similar positive stock reaction was also observed in companies' stocks after they announced corporate social responsibility (CSR) proposals (Flammer, 2015). The author argued that companies that have CSR proposals will have higher productivity due to higher employee satisfaction and higher sales due to increased ability to cater to environmentally

conscious customers. Similarly, Ziegler et al., (2007) also found that firms that have better environmental performance are also awarded premiums by the market.

From the theoretical perspective, most studies seek to explain the relationship between sustainability and cost of capital by looking into how sustainability affects firm performance and risk. For example, McGuire et al. (1998) summarised the financial argument for social responsibility by suggesting that even though improving firms' environmental performance could be costly, better environmental performance could significantly increase revenue and reduce other costs. This is because firms that engage in more sustainable practices could benefit from catering to changing consumer behaviour as consumers are showing preferences for more sustainable and eco-friendly products (e.g. Rosewicz, 1990; Rokka & Uusitalo, 2008). On the other hand, companies that become more sustainable by addressing efficiency and waste management issues could gain financially (e.g. Rusinko, 2007; Russo & Harrison, 2005).

In the following sections, we assess the existing literature on the effect of green bond issuance in relation to cost of debt and cost of equity. More specifically, we want to see whether previous research has found evidence 1) on the existence of a green premium and 2) on a positive stock price reaction following a green bond issuance. In relation to stock price reaction, we will also take into consideration whether investor attention increases upon green bond issuance as a potential channel for an increase in stock price.

2.2.1. Cost of debt - Green Premium

The concept of green premium suggests that, ceteris paribus, it is cheaper for issuer companies to gain access to capital by issuing green, rather than conventional bonds. In other words, companies issuing a green bond would not have to offer as high yields as conventional bonds and thus, their cost of debt would be lower. From an investor perspective, that suggests that investors are willing to pay a higher price (same as accepting a lower yield) for green bonds.

Observed green premium

A systematic literature review on green bond premium by MacAskill et al. (2021) found that 56% of the examined research in the primary market found evidence of green bond premium. Moreover, they observed a big variation in greenium results within the primary market ranging from -85 to +312 basis points. Based on their analysis, the green bond premium depends on bond governance (e.g., whether a bond is certified) and credit rating, but not so

much on issuer type (e.g., government, corporate) or on the timeframe used (e.g., recent or broad time frame). Based on Torvanger et al.'s study (2021), Swedish investors also believe that there is at least a small premium on green bonds compared to conventional ones.

There are many studies that reinforce the concept of green premium. The research by Gianfrate and Peri (2019) found evidence for a green premium of 5-13 basis points based on 121 green bonds in the primary market within the EU between 2013-17 and observed a higher premium for corporate issuers compared to e.g., government issuances. The results of the study by Wang et al. (2019) show an even higher premium for corporations: on average, green bonds had a 34 basis points lower yield spread compared to conventional bonds in China between 2016-19. Interestingly, research by Zhang et al. (2021) finds that green bond issuers can not only lower their cost of debt but that of their overall capital too. Examining green bonds in China between 2016-20, the observed yield spread was 24.9 basis points lower compared to conventional bonds.

Nevertheless, there are studies that could not confirm a significant green premium. Tang and Zhang (2020) had a global focus, analysing 1,510 bonds, and used a bigger time frame (2007-17) in their search for green premium. After controlling for firm and bond characteristics, as well as issuer and time fixed effects, their results on green premium were insignificant. The research by Partridge and Medda (2019) did not show significant premiums either within municipalities. A potential explanation according to Partridge and Medda (2019) is the "green halo effect" which suggests that green bond issuance *"can put downward pressure on the company's entire bond curve"* (Hale, 2018).

In order to understand the potential pricing difference between conventional and green bonds, it is important to examine what affects the level of yield that investors demand on conventional bonds and how green bond characteristics can differ from that based on the existing literature.

Bond yield factors

The yield to maturity of a corporate bond can depend on multiple factors including bond-, firm-, and market characteristics and can be divided into two parts: the treasury yield and the yield spread that investors demand from the firm (Wu et al., 2019). In our thesis, we compare the yield spread at issuance between green and non-green bonds, thus, we will focus on the characteristics that can affect the yield spread.

Credit risk is considered one of the most important factors that determine the yield of a bond. The higher the credit risk, the higher yield spreads investors ask for in exchange (Wu et al., 2019). Liquidity risk can affect the price of any security, including that of bonds (Wu et al., 2019) but can only be measured in the secondary market while we are interested in the primary market results. Good corporate governance can ensure that the company operates in an efficient manner, making the right investments which can reduce the company's default risk and thus, the yield spread they need in order to gain financing through bonds. Another factor can be accounting quality (Wu et al., 2019) as high transparency can lower the information asymmetry between issuers and investors which in turn can lower the required yield spread. Other firm factors can include equity volatility, leverage, industry, and market position (Wu et al., 2019).

The main difference between green and conventional bonds is that the use of proceeds is restricted to green projects for green bonds. Thus, certified green bonds have to report clearly what exactly the proceeds are used for. Moreover, these reports usually have to be verified by external reviewers. This can increase transparency for investors compared to a regular bond issuance which in theory decreases the required yield spread. Environmental concerns in connection with a company can also have a negative effect on the cost of debt for companies (Gianfrate and Peri, 2019) while green bonds can serve as a credible signal to investors regarding the firm's commitment to sustainability (Flammer, 2018).

As summarised in a green bond literature review made by Cortellini and Panetta (2021), researchers came up with different potential reasons that can explain why green premium can be present due to their "green label". Investors might be willing to trade off part of the returns in exchange for a guarantee that the proceeds are used for sustainable projects or for supporting a green company. Environmental issues such as climate change mitigation is becoming one of the top criteria for institutional investors and thus, it is possible that bond pricing is not only determined by economic factors (MacAskill et al., 2021). Another possible explanation is that green bonds are still less abundant compared to conventional bonds and that there is a shortage of these instruments compared to the investor demand for green assets. There is an increasing number of investors with a green mandate who would have to consider additional perspectives besides the traditional risk-return characteristics. This theory is supported by the fact that a lot of green bonds are oversubscribed at issuance (MacAskill et al., 2021).

Nevertheless, there are additional costs for a company that issues green bonds such as the certification and the reporting on how the proceeds are used (Flammer, 2018) which could reduce the overall financial benefit for green issuers. On the other hand, these costs are usually not more than 0.3-0.6 basis points (Hachenberg & Schiereck, 2018). The Climate Bonds Initiative charges 0.1 basis points for green bond certification (*Basic Certification*, 2022).

2.2.2. Cost of equity - stock price reaction to bond issuance

Green bonds possess the same characteristics as conventional bonds with the exception of the use of proceeds that are tied to specific green projects. Therefore, it is important to understand the effect of 1) conventional bond issuance and 2) how the commitment to use the proceeds for sustainability-related projects could affect the stock price.

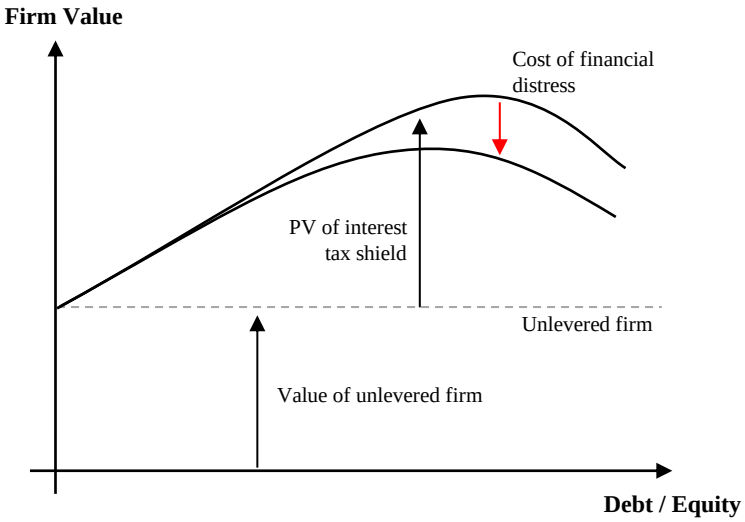
The empirical studies regarding the issuance of bonds have been inconclusive as research have shown an inverse or no relationship between the two. For example, Antweiler and Frank (2006) investigated the effect of bond issuance in the US between the period of 1973 and 2001 and found no reaction after the announcement. This is in line with Shyam-Sunder (1991) that observed no stock price reaction upon the issuance of bonds, even after controlling for different bond ratings. On the other hand, Eckbo (1985) found a negative stock reaction upon the issuance of straight and convertible bonds in the US. This result was also observed by Ammann et al. (2006) who found significantly negative abnormal returns upon the issuance of convertible and exchangeable bonds using data from Swiss and German markets from 1996 to 2003.

Similarly, the existing theory on capital structure also offers contradictory views on how the market would react to the issuance of a debt instrument. The Modigliani-Miller theorem (1958) posits that a firm's value is based on the present value of its total expected cash flows which will not change regardless of the capital structure. The theory hence concludes that capital structure on its own has no intrinsic value, and, consequently, the issuance of a debt instrument should leave the issuing company’s market value unchanged.

On the other hand, the trade-off theory of capital structure proposes that the optimum level of debt is when the marginal cost of issuing debt equals the marginal benefits. In other words, this theory suggests that companies could maximise their value by trading off between

the cost of financial distress and the tax-shield benefit of issuing debts (Kraus and Litzenberger, 1973). Therefore, the trade-off theory implies that the issuance of debt should send positive news to the market as it signals the company's increased ability to benefit from debt.

Figure 3: Trade-off Theory of Capital Structure



The issuance of green bonds could also be perceived as a credible signal that attest to the firm's commitment to sustainability as it ties a significant portion of firm's financing to a green project. A credible signal is valuable as previous research has suggested that investors often find it difficult to distinguish more sustainable companies from the lesser sustainable ones (e.g. Lyon and Montgomery, 2015). In other words, the issuance of green bonds is valuable as it could help reduce the information asymmetry between management and investors regarding the firm's actual commitment towards the environment. Therefore, firms that issue green bonds could expect to see a positive stock price reaction if investors learn new valuable information regarding the firm's green commitment.

While the issuance of green bonds is a credible signal for sustainability, the effect of the valuable information it conveys might not be immediately observable if the sustainability aspect of the company has already been priced in beforehand. On the other hand, this new information might not be reflected in the stock price as investor's attention is a limited cognitive resource (Kahneman, 1973) and, hence, investors would prioritise their attention to information that they believe would reduce investment risks (Schmidt, 2013).

3. Hypothesis Development

In order to understand the effect of green bond issuance on cost of capital, we investigate whether green bond issuers have: 1) lower cost of debt on green bonds observed through green premium; and 2) lower cost of equity through a positive stock price reaction upon issuance.

Based on our literature review, there are mixed results on whether green bonds can be issued at a lower yield compared to conventional peers. On the other hand, the corporate sector is more likely to show signs of a premium compared to other sectors. As such, we expect that:

Hypothesis 1: There is a greenium on Swedish corporate bonds

As previously discussed, the effect of issuing green bonds on cost of equity could be driven by two potential factors, including 1) the issuance of a bond and 2) the signalling of commitment to the environment. While most studies have documented either no effect or a weak negative effect on the stock price, the issuance of green bonds can be seen as valuable information that signals a firm's commitment to sustainability. In relation to that, firms that are more sustainable have been shown to have lower cost of equity through significant positive stock reactions. Given the interaction between the two potential effects, we expect the following:

Hypothesis 2: Stock prices increase upon the issuance of firms' green bonds

Furthermore, in order to better understand if the issuance of green bonds conveys significantly different information than that of conventional bonds, we looked into the changes in investor attention upon the issuance of green bonds. If the issuance of green bonds is indeed valuable and could give additional information to a conventional bond issuance that helps investors make stock-pricing decisions, we should expect such issuance to be attention grabbing and hence increase the investor attention on such firms.

Hypothesis 2.1.: The issuance of green bonds increases investor attention

4. Data structure and methodology

In this chapter, we will discuss how we test if the issuance of green bonds has any effect on a firm's cost of capital, including on 1) cost of debt through lower yield at issuance (green premium); and 2) cost of equity through positive stock price reaction. Finally, we will briefly introduce the method used for measuring investor attention within stock price reaction.

4.1. Dataset

Our initial green bond dataset was obtained from Eikon. As we focus on Swedish public companies, we excluded agency, supranational, and sovereign bonds from our data. We included only certified green bonds because uncertified bonds might not have the same effect due to greenwashing risk. Our time frame is from 2014 until the beginning of 2022. 2014 is the earliest year that a Swedish public bond was issued and we included data points from 2022 in order to consider as many green bonds as possible. The initial dataset of green bonds contained 161 green bonds from 34 unique issuer companies. The first Swedish, publicly listed company was in 2014 March by Svenska Cellulosa AB (SCA) and the last green bond that was reported by Eikon at the time of our data collection was issued in March 2022 by K2A Knaust and Andersson Fastigheter AB.

We also established a non-green bond database for comparison for which we used SDC Platinum. We downloaded bonds issued between 2013 and 2022 and obtained a sample of 1,347 which already includes the 161 green bonds which makes the total number of conventional (non-green) bonds 1,286.

The green bond database was also complemented with the additional bond information found on SDC Platinum, including company name, issuance date, maturity date, issue size (total proceeds), investment-grade vs. high yield distinction, industry, price, and yield to maturity information of fixed-rate bonds. Information about the yield to maturity for the floating rate bonds was added later from Bloomberg Terminal as the exact rate was not specified in Eikon. In some cases, manual search was needed in order to complete the rate.

Table 1: Bond dataset

	Green	Conventional	Total
# bond of issuances	161	1,186	1,347
Excluding incomplete data	(38)	(159)	(197)
# of bond issuances with complete data	123	1,027	1,150
Final dataset after matching analysis			
# of issuances	*123*	*179*	*302*
of which real estate # (%)	*108 (87.8 %)*	*84 (46.9 %)*	*192 (63.6 %)*
# of companies	*24*	*49*	*61*
of which real estate # (%)	*15 (62.5 %)*	*16 (32.7 %)*	*31 (50.8 %)*

In order to control for not only bonds but also for firm characteristics in the green premium regression, we used the Eikon database to obtain company information. Finally, in order to analyse the stock price reaction to green issuances, we again used the Eikon database to obtain the stock price data of firms. Our initial dataset had to be reduced where information was missing on almost all firm data points, see our final dataset above. Over 50% of the green bond issuances come from real estate firms which shows the importance of the sector in the Swedish green bond market.

To perform our analysis on investor attention, we have gathered the weekly Google search volume index from Google Trends between 2013 and 2022. In this research, we focused on the search volume based on the issuing firm's names rather than the formal ticker as used in some research (e.g. Da et al., 2011) as we believe that this method is more effective in capturing a wider range of investors' attention (e.g. retail investors) who might not be well acquainted with a firm's formal ticker name or bond's ISIN numbers.

4.2. Methodology

In this section we first explain the methodology of selecting the conventional bonds that will match the green bond dataset in the rest of our analysis. That is followed by methodologies that test two main hypotheses: fixed effects regression for the green premium and event study for the stock price reaction. We will also briefly discuss the methodology to measure the change in investor attention through changes in Google search index volume (GSVI).

4.2.1. Matching

The benefits of green bond issuance cannot be explored by only looking at green bonds: we need to compare them to conventional bonds in order to identify any difference that being green adds. Similar to other research on greenium (Tang & Zhang, 2020; Gianfrate & Peri, 2019; Partridge & Medda, 2019), we use the nearest neighbour matching method in order to get a subset of the conventional bonds with which we will compare the green bonds with. Matching is a great way to estimate the effects of green bonds using observational data in a way that the control and treated groups are more balanced and similar to each other (Stuart, 2010).

Based on the research by Tang and Zhang (2020) we matched green bonds first with a conventional bond from the same company if any were found. In cases where there has been more than one conventional bond from the same company, the bond closest in terms of issuance date was selected. In total, there were 56 green issuances that had a conventional, "within-firm" match. The relatively little sample has been complemented with conventional bond matches with the difference that the issuer company was different from the green bond issuer company. In order to ensure that the matched bonds' firms are still similar, four characteristics were considered in the matching based on the methodology of Tang and Zhang (2020): the logarithm of the firm's market size, market to book ratio, stock price liquidity, and the year of bond issuance. For stock liquidity, we used share turnover as a measure and calculated it as the turnover of volume divided by the number of shares from the Eikon database. This way, all of the 123 green bonds were matched to a conventional one.

Tang and Zhang (2020) use the matching results only to examine whether there is a green premium compared to non-green bonds, however, they do not compare the effect of green bonds on the stock price to that of conventional bonds. As there are studies that show a negative stock reaction to the issuance of conventional bonds, this paper will take into consideration not only the stock price reaction to green bond issuance but also the difference from conventional bonds. Finally, matching results will be also used when measuring investor attention.

4.2.2. Green premium

In our green premium regression, the dependent variable is the yield spread which we define as *the yield difference from the treasury rate at issuance in basis points*. Thus, the yield spread used in our analysis should not be confused with the difference in yields between the bonds of

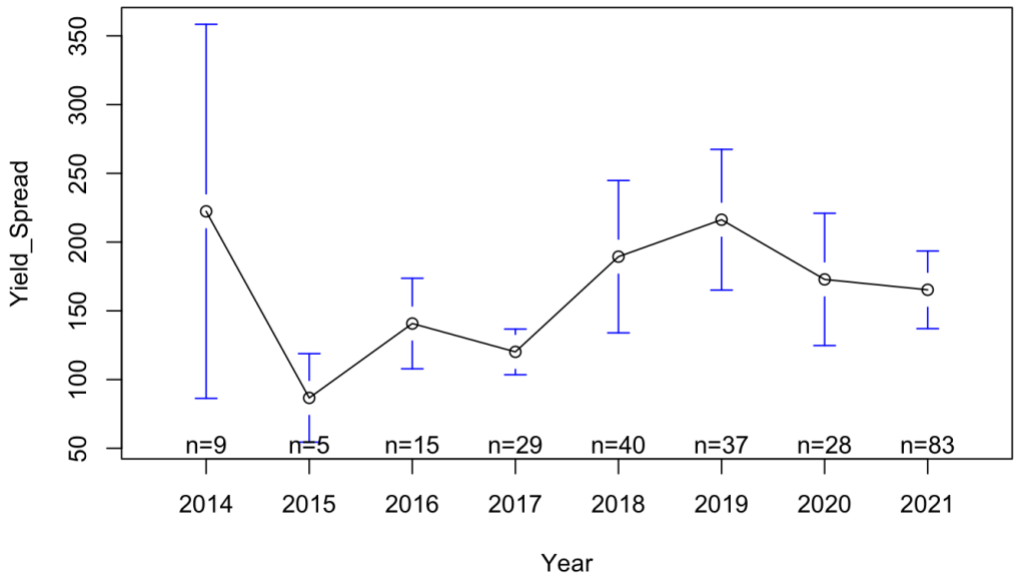
the two matched firms. The green dummy in the regression is used to show if there is any green premium detected for bonds due to being green (in other words, negative effect on the yield spread).

As the price of a bond can be affected by many variables other than the "green effect", they also have to be included in the regression. The control variables in the regression were chosen based on previous studies (Tang & Zhang, 2020; Gianfrate & Peri, 2019; Partridge & Medda, 2019). The high yield dummy and the company leverage are used to capture the credit risk of the bond which we expect to increase the yield spread. Similarly, we expect that the higher the maturity, the higher the yield spread as the longer the investor has to wait for the bond to be repaid. Equity volatility also in some way controls for company risk and the lower the volatility, the lower the yield spread is expected to be. On the other hand, market capitalization is expected to adversely affect the yield spread as bigger companies usually have more cash which lowers credit risk. Also, usually more analysts cover big companies which increases transparency. Thus, we seek to explain the green effect to yield spread by the following regression:

$$\begin{aligned} Yield\ spread_{i,t} = {} & \beta_0 + \beta_1 Green_{i,t} + \beta_2 Issue\ size_{i,t} + \beta_3 Maturity_{i,t} + \beta_4 High\ yield_{i,t} \\ & + \beta_5 Equity\ Volatility_{i,t} + \beta_6 Market\ Cap_{i,t} + \beta_7 Leverage_{i,t} + Issuer\ Year\ FE \\ & + Firm\ FE + \varepsilon_{i,t} \end{aligned}$$

We add time (year, year-month) to the regression in order to capture any heterogeneity due to this factor. For example, the observed yield spreads show quite big differences throughout the years. The figure below shows the average yield spread from the treasury rate in basis points while the blue lines show the yield spread's 95% confidence interval. On the other hand, it is important to note that a big part of the observed bond issuances was made in 2021.

Figure 4: Yield spread across years



After excluding incomplete information, the final dataset for the green premium regression is the following:

Table 2: Green premium dataset by industry

	Number of issuances			Number of companies			
Industry	Green	Conventional	Total	Only Green	Only Convt.	Mixed	Total
Real estate	92	65	157	6	4	7	17
Manufacturing	3	30	33	0	11	1	12
REIT	2	27	29	0	3	1	4
Pers/Bus/Rep Svc	0	12	12	0	4	0	4
Investment Bank	0	4	4	0	2	0	2
Wholesale	0	4	4	0	3	0	3
Electric Service	3	0	3	1	0	0	1
Construction	2	0	2	1	0	0	1
Commercial Bank	0	1	1	0	1	0	1
Radio/TV/Telecom	0	1	1	0	1	0	1
Total	**102**	**144**	**246**	**8**	**29**	**9**	**46**

In total, we include 102 green and 144 non-green bonds in our regression. In terms of companies, the 17 green bond issuer companies can be divided into companies that only issued green bonds (8 observations) and companies that issued both green and conventional bonds (9 observations). As discussed before, the biggest driver of the Swedish green bond market is the real estate sector: in this dataset, more than 90% of the number of issuances comes from this industry. Looking at the dataset more closely, there are in fact two real estate companies,

Fabage and Atrium Ljungberg, that established dominance in the issuance of green bonds in terms of quantity. Thus, including good explanatory variables that explain bond yield spread is very important in order to make sure that the green dummy does not capture some other characteristics of the issuer. The table below shows the statistics of the bond (yield spread, maturity, issue size) and the issuer firm characteristics at the moment of the issuance (market capitalization, volatility, and leverage).

Table 3: Summary statistics of the green premium data

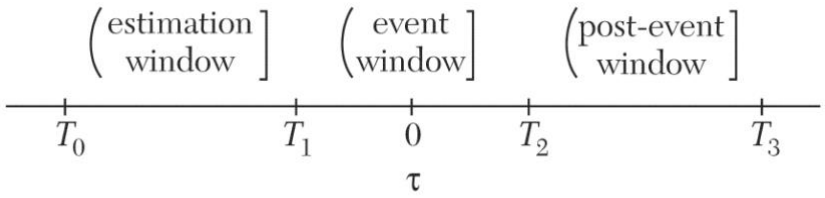
	Yield spread	Maturity	Issue size	Market cap.	Volatility	Leverage
	Basis points	*Years*	*USD million*	*SEK million*	*Percentage*	*Percentage*
Minimum	20	2	6	6	12	5
Maximum	850	100	1,177	12	46	98
Mean	171	5	91	10	20	49
Variance	17,966	115	22,347	1	34	290
Skewness	2	8	5	-2	2	0
Kurtosis	4	71	23	3	4	1

The unit of measure of the yield spread is in basis points and it varies between 20 and 850 from the treasury rate in our dataset. The market capitalization is in SEK million and as it is a highly-skewed variable, we take the logarithm of it in the regression. The maturity is in years and is calculated as the difference between the issuance and maturity date. For those bonds where the maturity is infinite, we filled in 100 years as maturity. The high yield dummy is 1 if a bond is not investment grade. Equity volatility and leverage are in percentage and the latter is calculated as the company's debt divided by the sum of the market capitalization and debt. The debt values are not updated daily by Eikon and thus, we control for leverage pre-issuance. The average leverage of 49% might sound high, however, this can be explained by the dominance of the real estate sector where the leverage can be on average more than 60% in Sweden (Pangea Property Partners, 2017).

4.2.3. Stock Price Reaction

In order to understand if there's any stock price reaction around the issuance of green bonds, we used event study methodology, similar to previous studies on the topics (Tang & Zhang, 2020; Flammer, 2021). The event study methodology has been widely used in various literature to observe what happens to security prices when a certain meaningful event occurs. A typical timeline for an event study includes two parameters, which are an estimation window and an event window (MacKinlay, 1997). An estimation window is a period prior to the event that is used to estimate the normal performance of a security. On the other hand, the event window is the period surrounding the date that an event occurs where any abnormal reaction can be observed.

Figure 5: Estimation and event windows



Source: MacKinlay (1997)

In conducting the event study, we used the issue date of the green bonds as the event date (time 0). In line with Flammer (2021), we took into account the possibility that some information might have been disseminated to the public prior to the issuance of the green bonds by including some trading days before the issue date in our study. Moreover, we also took into account the possibility of delay in response to the green bonds issuance by including some trading days after the issue date. Therefore, the baseline of our event window is [-10, 10] trading days since the event date. To consider different scenarios in information dissemination before and after the event date, we have also considered an event window of [-20, -11], [-10, -6], [-5, 10], and [-11, 20].

For each firm *i*, we computed the stock price reaction as the abnormal return during the event window based on the market model below. The below α_i and β_i were first estimated using the ordinary least squares (OLS) regression of the historical daily return based on the event window of 300 to 50 trading days prior to the event date. As our focus is on the Swedish

market, we have used the daily return of Swedish OMX for $R_{m,t}$. Mathematically, this market model is defined below:

$$R_{i,t} = \alpha_i + \beta_i \times R_{m,t} + \varepsilon_{i,t}$$

Based on the market model, we estimated the return of stock *i* on day *t*, during the event window as follow:

$$\hat{R}_{i,t} = \hat{\alpha}_i + \hat{\beta}_i \times \hat{R}_{m,t}$$

We then calculated the daily abnormal return (AR) of firm *i* on day *t* as follow:

$$AR_{i,t} = R_{i,t} - \hat{R}_{i,t}$$

A cumulative abnormal return (CAR) of firm *i* is then defined as the total AR during the predefined event windows. Consequently, a positive CAR would signify a positive stock reaction following the issuance of green bonds.

Investor attention

In order to confirm that investors take into consideration the new information signalled by the issuance of green bonds, we also looked into the change in investor attention upon such an event. More recent literature that seeks to understand the relationship between investor attention and short-term stock price reaction have been using direct measures of investor attention such as Google and Baidu search volume. Da et al. (2011), for example, noted that investors that search a specific firm's ticker on Google undoubtedly pay attention to the firm stock, hence eliminating any ambiguity that an increase in Google's search volume index is equivalent to an increase in investor attention.

In line with this, we used Google search volume as a proxy to measure the investor attention that firms receive before and after the issuance of green bonds. This proxy is believed to be a better proxy of investor attention as Google has become the largest source of freely available information for the public and it could be assumed that people would only actively google a specific keyword if they have an underlying interest in the subject (Bank et al, 2011). This measure also overcomes the shortcomings of other proxies such as the number of published newspaper articles, institutional holdings, analyst coverage, and advertising expenditures where no direct observation can be made between the proxies and investor attention.

The Google search volume for a specific query provided by Google Trends is not given in its absolute amount, but rather as an indexed number ranging from 0 to 100. This number reflects the relative interest of the specific topic after normalising the time and geographical effect (Rogers, 2016). Therefore, in this research, we observed the change in the interest for a specific company after the issuance of a green bond and compared it with the same reaction for conventional bonds. We observed this using OLS regression: we use the change in GSVI upon the issuance of a bond as the dependent variable and a dummy variable of 0 and 1 to show whether the bond issued was green. Mathematically, this is defined as:

$$\Delta GSVI_i = \alpha_i + green_i + \epsilon_i$$

where $\Delta GSVI_i$ is the difference in GSVI of firm i before and after the issuance of a bond. The GSVI before issuance is defined as the average GSVI during the period of five weeks to two weeks before the issuance. The GSVI after issuance is defined as the average GSVI during the period one week before and one week after the issuance.

5. Results and discussion

Consistent with our hypotheses, we found evidence of green bonds issuance effect on firm's cost of capital, specifically we have observed lower cost of debt through the existence of a green premium at issuance of green bonds. On the other hand, changes in firms' cost of equity were insignificant upon the issuance of green bonds. Nevertheless, the observed increase in investor attention following green bond issuance provides evidence that investors take into consideration the signalling of firms' commitment to sustainability.

5.1. Green premium

The results of our regressions 1) using OLS regression, 2) year-fixed effects, 3) year-month-fixed effects, and 4) firm-fixed effects are summarised in the below tables:

Table 4: Green premium regression results

	Dependent variable:			
	Yield_Spread			
	OLS (1)	Year FE (2)	Year-Month FE (3)	Firm FE (4)
Green1	-32.963***	-34.831***	-40.447***	-3.853
	(12.522)	(12.552)	(15.411)	(12.095)
Volatility	4.049***	4.204***	5.228***	-3.291
	(1.111)	(1.187)	(1.444)	(2.222)
HY1	239.490***	222.672***	132.861**	157.623***
	(48.722)	(48.949)	(54.599)	(46.513)
Maturity	2.376***	2.234***	2.058***	2.387***
	(0.597)	(0.595)	(0.641)	(0.496)
Issue_size	-0.122**	-0.110*	-0.055	-0.142***
	(0.058)	(0.058)	(0.066)	(0.045)
Leverage	-0.373	-0.470	-0.192	0.686
	(0.398)	(0.412)	(0.465)	(1.036)
Market_cap.	-71.599***	-72.534***	-62.496***	-22.857
	(6.553)	(6.750)	(8.517)	(17.309)
Constant	820.767***			
	(83.805)			
Observations	246	246	246	246
R2	0.526	0.524	0.486	0.201
Adjusted R2	0.512	0.495	0.255	-0.014
Residual Std. Error	93.650	36.313	22.808	6.931
Degrees of freedom	238	7; 231	7; 169	7; 193
F Statistic	37.7	36.3	22.8	6.9
P-value	< 2.2e-16	< 2.2e-16	< 2.22e-16	2.3083e-07
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 5: Green premium results with heteroskedasticity-robust errors

	Dependent variable:			
	OLS (1)	Year FE (2)	Year-Month FE (3)	Firm FE (4)
Green1	-32.963***	-34.831**	-40.447*	-3.853
	(11.607)	(15.696)	(22.414)	(8.240)
Volatility	4.049***	4.204***	5.228***	-3.291*
	(1.426)	(1.605)	(1.283)	(1.737)
HighYield1	239.490***	222.672***	132.861	157.623***
	(56.429)	(77.846)	(82.386)	(47.720)
Maturity	2.376***	2.234***	2.058***	2.387***
	(0.489)	(0.475)	(0.332)	(0.254)
Issue_size	-0.122**	-0.110**	-0.055	-0.142***
	(0.052)	(0.054)	(0.059)	(0.041)
Leverage	-0.373	-0.470	-0.192	0.686
	(0.414)	(0.557)	(0.621)	(0.877)
Market_cap.	-71.599***	-72.534***	-62.496***	-22.857
	(7.851)	(8.648)	(10.540)	(16.234)
Constant	820.767***			
	(91.716)			
Note:				*p<0.1; **p<0.05; ***p<0.01

The first three results indicate a green premium in the range of 33.0 and 40.4 basis points. The results are closest to that of Wang et al.'s (2019) research where the observed green premium in the primary market was 34 basis points. The pricing benefit of 33.0 - 44.4 basis points is a big pricing benefit for Swedish firms even after deducting the complimentary costs of green bond certification which is approximately 0.3-0.6 basis points (Hachenberg and Schiereck, 2018). This suggests that companies and thus, shareholders significantly benefit from issuing green bonds instead of conventional ones. The results are significant after controlling for bond and firm characteristics and taking into consideration time-fixed effects see regression 1), 2), and 3). Using heteroskedasticity-robust errors, the green dummy is significant at a 1% level using OLS, at a 5% level after taking into consideration year-fixed effects, and at a 10% level after year-month-fixed effects. Although the year-month-fixed effects are not as significant, there are not many issuances that happened in both the same year and month to compare.

When controlling for firm-fixed effects, there is no significant green premium observed. That might not be a surprising result as this method effectively compares the green bonds to non-green bonds for the nine companies that have issued both. Hence, while we cannot establish a green premium in this tightest specification, we cannot conclusively rule out the existence of a green premium either. For example, the biggest green bond issuer in terms of the number of issuances, Fabege, has only issued green bonds for which within-firm comparisons are not possible. It would have been interesting to examine whether the insignificant results are due to the "green halo effect" (Hale, 2018; Partridge and Medda ,2019) which would indicate that after the first green issuance the yield spread of conventional bonds ceteris paribus would also decrease. However, there are again only nine companies in our dataset that issued both green and non-green bonds, which is too few to draw significant conclusions.

A positive green premium detected in the first three regression could reinforce the belief that some investors are willing to trade off some of the returns in order to invest in green assets. Swedish society, and within that investors are considered to care more about environmental issues than other countries (Torvanger et al., 2021) that could drive down the yield spread more. In general, green bonds have some characteristics that might make them favourable in comparison to conventional bonds such as their more thorough and externally verified reports about the use of proceeds. This can increase transparency for investors which in turn can increase the value of these bonds.

However, we did not find a green premium with the strictest specification (firm-fixed effects). As discussed in the literature review, high demand could put downward pressure on the yield spread of green bonds too. However, corporate green bonds already have a 20% share within the Swedish corporate bond market (Pareto Asset Management, 2020) which could indicate that at a mature green bond market such as the one in Sweden, green premium becomes insignificant. In case of a still existing supply-demand mismatch, Swedish investors with a green mandate or green preferences constitute an even higher demand.

As real estate has a big dominance in the Swedish corporate green bond market, it would be also useful to examine the real estate sector and the biggest green issuer companies to better understand the size of the green premium in Sweden.

5.2. Stock price reaction

The event study results are reported in Table 8 and Table 9 below. The tables report the average cumulative abnormal returns (CAR) as a percentage return. The event study is run on five different event windows to consider the possibility of information leak prior to issuance and delay in stock reaction after the bonds issuance in different time periods.

Table 6: Event study results

	CAR		Std. Error	
Event window	Green (n=123)	Conventional (n=179)	Green (n=123)	Conventional (n=179)
[-20 , -11]	-0.11	0.26	0.41	0.50
[-10 , -6]	0.30	0.17	0.33	0.31
[-10 , 10]	0.71	-0.43	0.66	0.57
[-5 , 10]	0.41	-0.60	0.55	0.50
[-11 , 20]	0.47	-0.14	0.40	0.50

The first event study looks at the stock reaction of both green and conventional bonds to understand the effect of issuing green bonds on stock price and the magnitude of such difference compared to issuing conventional bonds. As reported above, there is a clear pattern of green bonds having a higher CAR than conventional bonds. Furthermore, in line with previous research, green bonds have shown positive CAR while conventional bonds show negative CAR (e.g. Tang & Zang, 2020; Ammann et al., 2006). This result implies that while the issuance of debt security might be detrimental to shareholders, the green label effect of green bonds has a positive effect that benefits the shareholders. However, the above results are statistically not significant for any of the event windows, which means that the positive green bonds CAR might just be a pure chance.

To further study these results, the green bonds sample has been divided into first issuance and subsequent issuance as previous studies have noted that only subsequent green bond issuances do not result in stock price reaction. Flammer (2021) argues that the stock price reaction to the first green bond issuance should already take into account the company's full commitment to sustainability. Therefore, subsequent issuances of green bonds does not infer new information on a firm's sustainability commitment and only reinforces an already known information of the company. This argument also supports the "green halo" effect which argues

that a company would only have to issue a green bond once in order to benefit from a lower cost of debt on its following issuances. Consequently, no stock reaction is expected from subsequent green bond issuances. However, the below results show no statistically significant result for neither the first nor for subsequent issuances.

Table 7: First vs. subsequent issuance results

	CAR		Std. Error	
Event window	First issue (n=25)	Subsequent issue (n=98)	First issue (n=25)	Subsequent issue (n=98)
[-20 , -11]	1.26	-0.51	0.91	0.45
[-10 , -6]	0.54	0.24	0.90	0.34
[-10 , 10]	0.32	0.83	1.72	0.69
[-5 , 10]	-0.22	0.59	1.47	0.56
[-11 , 20]	0.10	0.59	0.83	0.45

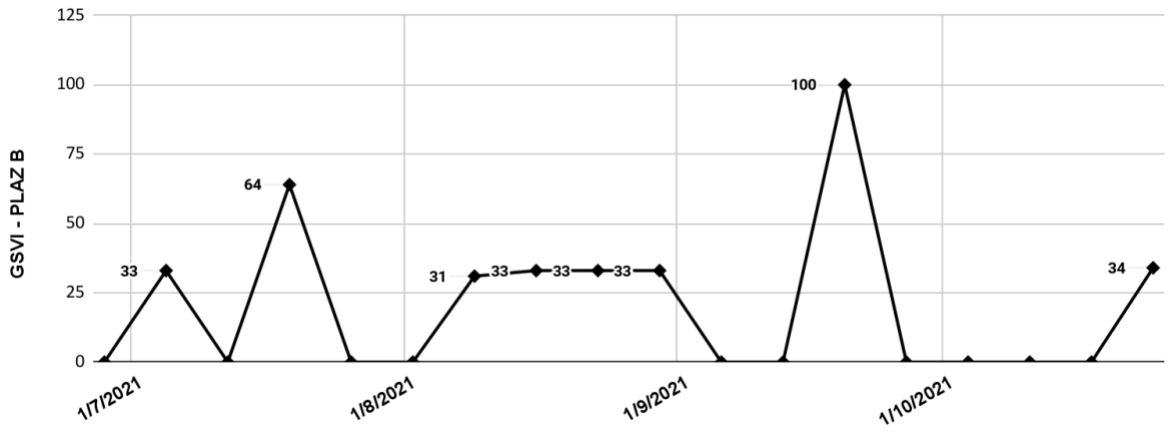
These findings are intriguing as this means that the issuance of green bonds has no impact on the firm's stock price even though most of the previous research has shown positive stock price reaction upon the release of positive sustainability news (e.g. Flammer, 2015; Ziegler et al., 2007). The results could mean that 1) the information conveyed by a green bond issuance is not significantly different from the information conveyed by a conventional bond issuance for investors. In that case, we believe that investor attention for these two events should not be significantly different either. Another possible explanation could be that 2) investors do value the green bond issuance differently but they have already priced the "green label" effect into the firm's stock price even prior to the first issuance of green bonds. In order to investigate the former, we looked into firms' level of investor attention upon issuance of green bonds and compared it to the issuance of conventional bonds as a control.

5.2.1. Investor attention

In this section we seek to find evidence that investors do take into consideration the valuable information conveyed by green bond issuance on their asset pricing. By comparing the increase in Google Search Volume Index (GSVI) before and after the issuance of both green and conventional bonds, we show that green bonds issuance gives valuable information on a firm's sustainability commitment as there's a significant increase in investor attention upon the issuance of green bonds while the same does not hold true for conventional bonds.

Our Google Search Volume Index (GSVI) samples consist of 168 bond issuances (69 green and 99 conventional bonds). The sample period is from 5 weeks before to 1 week after the issuance of bonds. The sample is then categorised into two time periods, before issuance (5 weeks to 2 weeks before issuance) and after issuance (1 week before to 1 week after issuance).

Figure 6: Google Search Volume Index of PLAZ B



Upon the issuance of green bonds, an increase in GSVI is expected as environmentally-conscious investors would show increased interest in the issuing firm's sustainability effort. The above figure showed a clear example of how Platzer Fastigheter reached its peak Google search activity upon the issuance of a green bond on 20 September 2021 when it reached an index of 100. The below table summarises the average changes in GSVI upon the issuance of both green and conventional bonds in our sample.

To understand the true effect of issuing a green bond on investor attention, we ran an OLS regression where we see how the dummy variable *green* affects the dependent variable *ΔGSVI* upon the issuance of a green bond. We found that issuing a green bond increases the issuers' GSVI by 6.97 points which implies an increased interest in the companies that issue green bonds compared to the ones issuing conventional bonds. This result is statistically significant at a 99% confidence level which implies that the issuance of green bonds attracts more attention for the issuing firms.

Table 8: Investor attention regression results

	Dependent variable:
	diff
	Change in GSVI
green	6.970***
	(2.315)
Constant	-3.383**
	(1.458)
Observations	179
R2	0.049
Adjusted R2	0.043
Residual Std. Error	15.152 (df = 177)
F Statistic	9.064*** (df = 1; 177)
Note:	*p<0.1; **p<0.05; ***p<0.01

Moreover, the significant increase in GSVI also implies that investors actively seek information regarding a firm's sustainability effort and the issuance of green bonds is credible information that investors could use to differentiate sustainable companies from non-sustainable companies. In conclusion, this finding suggests that the lack of stock price reaction upon the issuance of green bonds was not due to investors not taking into account the information conveyed by the issuance of green bonds.

The insignificant stock price reaction is also unexpected in relation to the increased investor attention that was observed during the period following the issuance of green bonds. This result is interesting as it contradicts Merton's theory of Investor Recognition (1987) and other empirical studies that argue an increase in investor attention should be followed by an increase in stock return. However, the key behavioural assumption in this theory is that investors only trade and invest in companies that they are well acquainted with. Therefore, Lehavy and Sloan (2005) argue that investor attention has a more prominent effect on stock return for relatively less-known companies and less so in already well-known companies. In the case of this study, the majority of the samples come from some of the biggest and most well-known property companies in Sweden (Fabege, Atrium Ljungberg etc.) which might explain the lack of effect of the increase in investor attention on the stock price.

The above finding would support the notion that green bond issuer companies have been already considered sustainable by investors even before the first issuance. For example, the biggest green bond issuer, Fabege, had already been awarded in 2012 with the European Green Building Award prior to the green bond framework (Fabege, 2012). This in turn might mean that the financial benefit of being green and being able to issue green bonds has been already incorporated into the stock price. Thus, the green bond issuance might have not changed the image of the company that has already proved its commitment to sustainability.

Notwithstanding the lack of effect on stock price and cost of equity, the clear evidence of an increase in investor attention supports the signalling argument for issuing green bonds. As Flammer (2021) argues, one of the rationales for issuing a green bond is the signalling effect that it plays to reduce the asymmetry of information in regard to the company's commitment to sustainability. The above results imply that investors actively seek the information conveyed by the issuance of corporate green bonds. This behaviour may be motivated by the need of investors to differentiate green companies from the rest as sustainability has been shown to be positively related with a firm's financial performance (McGuire et al., 1998) or simply driven by investors' preference for sustainable companies.

6. Conclusions

In this thesis we seeked to understand the benefit of issuing green bonds to the company and its shareholders by looking at its impact on cost of capital through 1) green premium at issuance and 2) a positive stock price reaction upon the issuance of green bonds in Sweden.

In line with our initial hypothesis, our results show a significant pricing benefit of 33.0 - 44.4 basis points for corporate green bond issuers after controlling for the most important firm- and bond characteristics and after taking into consideration time-fixed effects. This shows that it is financially beneficial for companies to issue green bonds instead of issuing conventional bonds from a cost of debt perspective. The results also suggest that environmental issues and commitment to sustainability are factors that investors take into consideration in their required rate of return.

On the other hand, we could not observe a significant green premium with the tightest specification which compares yield spreads within each firm. Nevertheless, as the number of firms in our sample were not high enough, we cannot dismiss the existence of green premium. The insignificant results could be more likely explained by the green halo effect according to which the first green bond issuance can affect the overall cost of debt of the company, regardless of the type of the issued bond afterwards. Furthermore, it is possible that not only the event of green bond issuance but a different showcase of sustainable behaviour might have affected the cost of debt of the firm prior to the first green bond issuance.

Regarding cost of equity, we found no statistically significant stock price reaction upon the issuance of green bonds. This would suggest that green bond issuance does not add additional value to the company in the eyes of equity investors. Nevertheless, the findings could also imply that the market has already considered the issuing companies as green and hence had already reflected the sustainability factor into the stock price even before their first green bond issuance. We check whether the information value regarding green bond issuances is the same as that of conventional bonds. Our study has found that there is a significant increase in investor attention upon the issuance of green bonds as measured by an increase in a company's Google search index volume (GSVI). This result is significantly different from companies that issue conventional bonds which do not have a positive effect on its GSVI which suggests that investors care more about firms that issue green bonds which is an attention-grabbing event.

The lack of positive stock reaction could be also explained by the relatively well-known companies that made up the majority of the sample which reduces the effect of investor attention.

Our results were limited by a relatively small sample size and incomplete data for some issuances. Furthermore, we have also noted that there are multiple green bonds that were issued by the same firm during the same year which might affect the result of the event study analysis. Due to the dominance of the real estate sector in the Swedish corporate bond market, specific characteristics of the real estate firms could be more thoroughly in order to better explain the results on green premium and stock price reaction. For example, the number of certified green buildings might be a control factor in the green premium analysis while any announcement of new green building constructions could affect the estimation period during the stock price reaction analyses.

Our study contributes to the understanding of benefits and incentives for issuing green bonds as we show that firms gain from the significant yield spread at the issuance of green bonds compared to similar companies issuing conventional bonds. Furthermore, we also show support for issuing green bonds by showing that investors do actively search for green bond information. As our study was focused strictly on the effect of green bonds on the immediate stock price and green premium at issuance, we believe further research on the broader and longer term impact (e.g., firm's overall cost of debt on the secondary market) on cost of capital would be an interesting continuation of this research.

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