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Impact of green bond issuance on company stock prices: A comparative study between emerging markets and advanced economies.

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TIIVISTELMÄ:

Tämä pro-gradu tutkielma tutkii yritysten vihreiden ns. ”green bond” joukkovelkakirjalainojen liikkeeseenlaskun vaikutuksia liikkeelle laskevan yhtiön osakekurssiin liikkeelle laskun julkistusajankohtana kahdessa eri kohderyhmässä. Kohderyhmät on jaoteltu listattuihin osakeyhtiöihin, jotka ovat laskeneet liikkeelle green bondeja Kansainvälisen valuuttarahaston (IMF) määrittelemissä kehittyneissä talouksissa ja kehittyvissä markkinoissa ja kehitysmaissa mukaan (*eng. Advanced Economies ja Emerging Markets and Developing Economies EMDEs).* Empiirinen analyysi suoritetaan tapahtumatutkimuksena, jossa tarkastellaan green bondien ilmoittamispäiviä tapahtumapäivinä. Joukkovelkakirjojen data saadaan Bloombergin fixed income -tietokannasta, ja tutkimuksessa tarkastellaan yhteensä 87: ntä joukkovelkakirjalainojen liikkeeseenlaskua kummassakin kohderyhmässä.

Empiirisen tutkimuksen tulokset osoittavat, että kehittyneiden talouksien yrityksillä on tapahtumaikkunassa hieman negatiivinen keskimääräinen kumulatiivinen poikkeama (CAR) keskiarvosta, kun taas kehittyvillä markkinoilla yritysten osakekurssit reagoivat keskimäärin neutraalisti, mutta hieman positiivisesti pidemmissä tapahtumaikkunoissa. Lisäksi aiempaan tutkimukseen nähden tulokset osoittavat, että kokeneemmilla, jo aikaisemmin vihreitä joukkovelkakirjalainoja liikkeeseen laskeneilla yrityksillä on positiivisempi osakekurssireaktio verrattuna ensimmäistä kertaa vihreitä joukkovelkakirjalainoja liikkeeseen laskeneisiin yrityksiin.

AVAINSANAT: Green Bonds, Cumulative Abnormal Returns, Sustainability, Stock performance, ESG

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ABSTRACT:
This research paper aims to investigate the effects of corporate green bond issuance on the issuer's stock price around the announcement of the event in two different samples. The two samples are specified according to the International Monetary Fund's specification of advanced economies and emerging markets and developing economies. Both sample groups include 87 green bond issuances by listed companies during the observation period. The empirical analysis is carried out as an event study with corporate green bond announcement dates as the event date. The bond data is derived from the Bloomberg fixed-income database and includes 87 bond issuances for each of the two samples.

I find that companies in advanced economies experience a slightly negative average CAR during the event window and their peers in emerging markets show an average CAR close to zero but slightly positive for the longer event windows. In addition, contradicting previous literature, matured issuers seem to have a more positive stock price reaction than first-time issuers of green bonds.

KEY WORDS: Green Bonds, Cumulative Abnormal Returns, Sustainability, Stock performance, ESG

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1 Introduction

1.1 Definition

Green bonds are financing instruments like traditional bonds issued by corporations, governments, or supranational organizations whose proceeds are predetermined to be directed to sustainable or “green” purposes (Flammer, 2021). The predetermined use of proceeds is often directed to certain sustainable projects, such as GM announcing a new green bond issuance of 2,25 billion USD in August 2022 proceeds from which were allocated exclusively to clean transportation (General Motors, 2023), or Apple issuing a total of 4,7 billion USD in green bonds to achieve its goal of making the company’s supply chain carbon neutral by 2030 (Apple, 2022). The bonds are verified by third parties as green, to conserve the integrity of the label and provide reliable data about the bonds. Such third parties include, for example, Bloomberg, CBI, S&P Global, and Moody’s. However, compliance with these definitions remains voluntary, which has created scepticism and worry about greenwashing, where the company uses the positive public perception gained from issuing green bonds to falsely create a sustainable picture of the company’s operations. In addition, different third parties might have different requirements for the certifications which could make it difficult to obtain comparable datasets of the bonds.

For this thesis, I use the Bloomberg fixed-income database and all the green bonds issued by corporations globally from 2014 until 2024 and aim to investigate the effects that issuing corporate green bonds has on the issuers stock price and the possible differences in companies based in advanced economies or in emerging markets and developing economies.

Issuing green bonds also has some additional costs that companies need to consider. The additional costs appear when attaining the required third-party verification as well as including additional reporting and tracking costs. Therefore, the question is, why do

companies issue green bonds instead of conventional bonds? Green bonds are issued to finance green projects, meaning the company must see added value when implementing these projects. For an investor to buy these bonds, e.g. finance the projects, they in turn must see some added value when compared to investing in traditional bonds.

Companies usually issue green bonds for a couple of reasons. They can experience a cheaper cost of capital or so-called “greenium” where the issued green bond has a lower yield to maturity than a similar conventional bond and therefore trades at a premium compared to its peers. This is a very popular field of research, however, there are still mixed findings from different researchers. Flammer (2021) finds that there is no difference between the pricing of green and conventional bonds on the market, meaning that the issuer is not experiencing any cheaper access to capital as they would otherwise. Salakhova & Pietsch (2022) find that the pricing of the green bond is more dependent on the credibility of the bond and its issuer. The authors define credible issuers as companies operating in the green sectors or banks included in the United Nations Environment Finance Initiative UNEP FI. They also point out that the pricing follows the ESG fund trends in a way that the greenium increases over time most likely due to growing climate concerns. This is in line with the findings of Kapraun et al. (2021) who analyze green bond pricing on both primary and secondary markets. They find that only corporate green bonds with significantly large issues or green bonds issued in euros by governments and supranational entities trade at a premium when compared to their traditional peers. This seems to be an implication of the “credibility” of the issuer and their respective bonds. In addition, the investors seem to view these issuers as having a greater impact on the green projects they are financing. Differences in the green labels are pointed out by the authors as they choose to only include bonds issued in EUR or USD due to investors viewing green bonds issued by countries with lower sustainability reputations as less credible if they are not issued in a major currency. This suggests that investors in advanced economies could value green bonds more than they would in the EMDEs which could also lead to a more significant positive reaction on the stock market. Fatica et al. (2021) in their research find a premium for green bonds issued by

supranational entities as well as corporations, however, they do not find any premium for green bonds issued by financial institutions which create the largest sample of corporate issuers globally. The authors explain this finding by investors not being able to clearly identify green bond issuances from the banks and different sustainable investment projects.

There is previous research showing that the stock price of the issuer reacts positively to the announcement of green bond issuance by the company. Krüger (2015), as well as Flammer (2013), point out that due to their relatively small size when compared to traditional bonds, the financial impact of green bonds is not often as significant as it is with their conventional counterparts. Therefore, it can be argued that for the stock price to have a significant reaction to the issue, the investors should value the positive signal sent from this commitment to sustainability, or the pricing of the bond in comparison to similar traditional bonds and therefore create shareholder value.

This research is based on two samples which are determined as *advanced economies* and *emerging markets and developing economies* by the International Monetary Fund. Each sample includes 87 green bond issuances derived from Bloomberg's fixed-income database from 2014 until January 2024. The two samples are created to be as comparable as possible by including the same number of first-time issuers, similar industry allocation, and similar size companies. Financial institutions and heavy industries represent a majority of both samples by the number and monetary amount of issues. Timing of the issues in advanced economies is more spread out than that of emerging markets as the market for green bonds has grown faster and earlier than in emerging markets, therefore, issues in emerging markets are more concentrated in the past four years. Referring to previous literature, the empirical analysis is carried out using an event study (Flammer (2021), Krüger (2015), and Tang & Zhang (2020)). In this analysis, I find that companies in emerging markets are experiencing slightly positive stock price reactions specifically during longer event windows whereas their peers in advanced economies are experiencing slightly negative reactions around the issuance.

Contradictory to previous literature, first-time issuers are showing more negative abnormal returns than companies who have previously issued green bonds.

1.2 Historical background

During the past few decades, green initiatives and consequently environmental investments have become more and more prominent across governments, corporations, and supranational organisations. Reducing emissions and the use of environmentally harmful or scarce resources has become a key part of companies' values and goals in support of the 2015 Paris climate agreement where 195 countries made a commitment to reduce greenhouse gas emissions in a way that global warming could be stopped to 1,5 degrees when compared to pre-industrial levels. ESG and CSR has also been regarded as an act of mitigating potential market and firm-specific - whether operational or reputational but still potentially damaging - risks. This has led to a rapid grow of the green bond market and companies and governments are investing and granting funding for various green projects globally.

The green bond market has seen a constant strong rise through the past two decades. There has been extensive discussion and increasing amounts of attention and research in the past years about green bonds. Before the first corporate green bond was issued in 2013 by Vasakronan in Sweden, the market was composed mainly of supranational organisations and the first green bond called the "Climate Awareness Bond" was issued by the European Investment Bank in 2007 (Kapraun et al. 2021). Since the first corporate green bond, the market has seen a steady average annual growth of 95% (Climate Bonds Initiative, 2024). These days many companies are issuing bonds specifically designed with green or otherwise sustainable purposes in mind. In 2020, a cumulative amount of 1 trillion USD of global issuance was surpassed, and the trend seems to be only increasing as the CBI reports that until the end of January 2024, the amount had reached over 2,8 trillion USD. The CBI is an international organization whose goal is to increase

the amount of global capital directed to fight climate change. They also provide third-party certification and market data for green bonds.

Before corporate green bonds, they have been issued by supranational entities such as the European Investment Bank, whose motives are mostly focused on battling climate change and general ESG issues. For corporations, however, the number one priority is to increase shareholder value. Therefore, researchers have been curious to find out whether the issuance of corporate green bonds benefits the shareholders or is purely an act of environmentalism and responsibility. Multiple studies have focused on the pricing of the bonds and the effects on the financial performance of a company while some studies are focusing on the direct effects on the stock price of a company as well. As a relatively new topic where the market is constantly developing and changing, old research is quickly being complemented by new research and the demand for additional research is very high.

1.3 Importance of the study

The comparative nature of this thesis is what sets it apart from previous research. As mentioned, there is existing literature about the effects of green bond issuance on stock prices however, there are two main reasons why this research is important. First, the green bond market is still relatively young as the first corporate green bonds were issued in 2014 and is experiencing a rapidly increasing demand which means that significant changes are happening every year, making more room for future research. Second, there is no previous literature specifically comparing the issuance and its stock price reactions between advanced economies and emerging markets. Flammer (2021) creates a dataset that includes bond issues until 2018 and is investigating green bonds and their effects in general, similar to Cioli et al (2021) therefore not including the significant amount of green bonds issued in the 2020s. In addition, most previous research as well as international organisations only use the terms developing countries and developed countries as a way of separating these two economic areas from each other. This

classification separates countries whose standard of living, income, and economic and industrial development remain less than average. The definition does not include the diversity and dynamic environments of the countries which is why I will use the International Monetary Fund's definition of Advanced Economies and Emerging Markets and Developing Economies (later EMDE). This definition includes factors such as infrastructure and institutional development, financial markets, and industrialization. This research paper will focus on the differences between advanced economies and EMDEs. There are several reasons for this comparison. The amount of issuance between these two economically different areas is very distinct. According to CBI, the total issuance of green bonds at the end of 2022 was 2,1 trillion USD of which 79,3% and 20,7% were issued in advanced economies and EMDEs respectively.

Reasons to explain this rather significant gap in the issuance of green bonds are plentiful, the most prominent being regulations. Europe and North America, where most of the advanced economies are located, have a lot longer history with environmental regulation and investments compared to their peers in emerging markets. In addition, the size and number of companies play a significant role. According to Companies Market Cap (2024), in January 2024 there is only one company in the top 30 largest companies in the world by market cap that is not from an advanced economy. It is obvious that these companies, on average, issue larger bonds, whether green or conventional.

In addition, it is important to focus on the pricing of the bonds, which is the most important factor when considering bond issuance and their characteristics. As Fatica et al. (2021) interestingly find in their study published in the Journal of Financial Stability, there are differences in the yield gap depending on the industry and the reputation of the issuer. They find a premium for green bonds issued, however, not for financial institutions, which make up most of the issuers. There are some mixed previous results on the topic and this study aims to shed light on the subject of corporate green bond issuance and its effects on the stock market. I expect this premium along with the

positive reputation associated with green bonds to have a stronger effect in advanced economies than their counterparts in EMDEs.

1.4 Objectives

The objective of this research is to find whether the issuance of green bonds has a different effect on the stock price of a company in an emerging market country compared to its peers in an advanced economy. The argument as to why there would be a difference is based on the bond pricing and the investors' view on the credibility of the issuer. The greenium, as discussed, has been found to be present in some green bonds meaning the issuer is experiencing a lower cost of capital for issuing green rather than traditional bonds. The other factor possibly affecting the stock price of an issuer is the positive signal received be the investors for investing into green and sustainable projects which will showcase the company's long-term commitment in fighting climate change. As there is no universal standard for certifying green bonds, it is reasonable to assume that there are differences across countries and currencies for what the bonds actually contain. As Kapraun et al. (2021) point out, investors view bonds issued in sustainably less responsible countries (often EMDEs) or not in major currencies such as EUR and USD, less credible, leading to lower greeniums which could in turn lead to a lower positive stock price reaction. Therefore, my hypothesis is as follows:

H1: Companies issuing green bonds in advanced economies experience a more significant positive reaction to the issuance than their peers in emerging markets and advanced economies.

1.5 Outline of the Study

This thesis will be structured as follows. The first chapter includes an introduction to the topic of green bonds via the history, relevant definitions, and reasons behind the issuance of green bonds. The second chapter includes a literature review of the study. In this part, several relevant previous research papers on the topic are presented and analysed to show how the researchers have approached the topic, what data they have used, how they carried out their analysis, and what they have found. Chapter three includes the empirical part of the study. This chapter presents, discusses, and justifies the data and methodologies used and goes into detail on how the empirical analysis is conducted. Chapter four includes a presentation of the results found in the empirical analysis and how they can be interpreted. Chapter five includes a comprehensive discussion of the research carried out, its results, and further comparison to previous research as well as suggestions for how to approach the topic further in future research.

2 Literature Review

In this literature review, I will present and discuss various articles published on the topic of green bonds, their pricing, and their effects on the stock price of the issuer during the last 10 years including some fundamental financial or economic research relevant to this thesis. The articles chosen are scientific articles published on the CNRS or AJG journal list and include qualitative or quantitative empirical research. This review will provide my research with a comprehensive background on the topic, expose the gap in previous research, and the research methods used before, justifying the methods used in this research as well.

There is no previous literature directly answering my research question which is why there is a gap for this thesis. However, most of the previous research supports the fact that green bond issuance does affect the stock price of the issuer positively around the announcement date, although the reasons leading to this effect remain up for discussion. The comparative nature of my research is what separates it from the previous papers. There are previous studies investigating the effects in specified geographical areas but none of them is bringing them together and directly comparing the emerging markets and advanced economies. A major part of previous research focuses on the pricing of green bonds, which is relevant for this thesis as well, and will be covered in this review. There is debate as some studies find that green bonds allow for a lower cost of capital for the issuer, however, this would contradict the theory that no investors would choose to invest in green bonds if they did not get at least the same yield as from conventional bonds. This is still interesting as the reasons behind green bond issuances are important to understand.

Cioli et al. (2021) research the effects of green bond issuance on publicly traded companies' stock prices and find that CAR is significant and positive but only for the event periods [-1;0], [-2, 1], and [-1, 1] around the announcement date, therefore

confirming the hypothesis that green bond issuances positively affect stock prices around the announcement date. Their dataset includes 1545 companies globally of which 414 are publicly listed that issued green bonds between 2013 and 2019 and is extracted from the Bloomberg fixed income database. In addition, the announcement date, currency, amount issued, coupon, maturity, and credit rating are included in the dataset. More than one tranche of bonds issued by the same company on the same day is regarded as one bond in this research. Green bonds also appear to have on average, a lower coupon rate, as well as a better credit rating leading to the conclusion that they are conceived by investors as safer instruments than conventional bonds. The industry where green bonds are most popular is banking along with industries that are heavily affected by the environment such as energy, transportation, and utilities. This is in line with previous literature. Considering the countries of the issuers, China has by far the highest amount of green bonds issued. The only other emerging market in the top 10 issuers is India. This is an interesting statistic to compare to this thesis and see the development during the past five years.

The authors have the same hypothesis as most other previous literature expecting that the stock prices react positively to the announcement of green bond issuance by the company. The reaction is measured by CAR over the event period and assumed to significantly differ from zero. Another hypothesis made by the authors is that for seasoned issues (not first-time green bond issuers) the reaction is not significant since the public is already aware of the efforts and investments made to environmental and sustainable projects. The research uses an event study methodology along with most other previous literature on the topic. Along with historical stock price data, market data from several different stock markets are used. The authors use an event window of [-20; +20] days around the announcement and an estimation period of [-220; -21] days to estimate the Beta and Alpha for each stock to be able to calculate the expected return and therefore the cumulative abnormal return. The expected return is calculated by using the Capital Asset Pricing Model. The authors explain this phenomenon by newly created growth opportunities around environmentally responsible projects and this

projecting a positive image for the investors. The topic is econometrically very closely related to this thesis with the comparative nature and a new more up-to-date dataset as a difference, which is why this study acts as an important background for my research.

Flammer (2021) studies corporate green bond issuance and their impacts on the stock price of the issuer, their environmental performance, and the ownership structure of the company. The analysis is carried out with an event study methodology, and finds that the stock price of the issuer experiences a CAR of 0,49% during the period around the announcement. She uses a dataset derived from Bloomberg's fixed-income database and includes green bonds issued by all the public and private companies from 2013 until 2018. This is in line with the study published in the Journal of Financial Economics by Krüger (2015) about how corporate social responsibility (CSR) impacts shareholder wealth. Flammer's research mentions that corporate green bonds are more prevalent in industries that are heavily affected by climate and that they have been most popular in China, the US, and Europe. First, Flammer examines how the stock price of the issuer is affected by the announcement and finds that it leads to a higher CAR, especially for first-time issuers and for bonds verified by third parties. Second, she compares the environmental performance of similar companies where only one of the two is issuing green bonds and finds that the company issuing green bonds experiences an increase in their environmental rating as well as a reduction in CO2 emissions post-issuance. In addition, Flammer (2021) examines the effects of green bond issuance on equity ownership. The result is that issuers experience an increase in long-term investors as well as green investors due to the strong signal of committing to environmental challenges.

In their study, published in the Journal of Corporate Finance, Tang & Zhang (2020) examine if shareholders are benefitting from the company's issuance of green bonds. The researchers find that there is a CAR of 1,4% for the 21-day event window and that the CAR is more prominent for first-time issuers of green bonds, which is consistent with most previous literature and implies that green bond issuance can create short-term

shareholder value. The authors study the stock market returns related to the announcement of the issuance of green bonds from 28 countries between 2007-2017, the dataset being much older when compared to this thesis. The motivation behind the study is to find if issuing green bonds is increasing shareholder value, as it can be very costly, especially for first-time issuers and there is not much previous research about the topic. Costs related to the issuance can be significantly higher compared to traditional bonds due to certification, reporting, and due diligence for example.

Tang & Zhang point out that there is no official definition of a green bond and therefore, use data from the CBI (Climate Bonds Initiative) and Bloomberg to compile a thorough and comprehensive dataset. The analysis is carried out as an event study where the announcement date of the bond acts as the event, and the event window is [-10; +10] days of the event which is a similar approach to this thesis and supports the use of an event study. They present three possible causes for this increased shareholder value. The first one is called the “financing cost”. There are multiple regulations and mandates for large investment funds to include green instruments in their portfolio therefore increasing the prices of the bonds more relative to conventional bonds and enabling a lower cost of capital for the issuer. This, in turn, is perceived as positive by the shareholders and thus increases the stock price. The second one is called “investor attention” and is repeatedly mentioned in several other studies as well. The increased positive attention created by the announcement, especially for first-time issuers is what could be driving the stock price upwards. There are studies also debating whether the issuer’s industry and size affect the reaction and how much. For example, companies operating in environmentally affected industries such as energy, as well as larger companies, could experience a more significant reaction to the issuance. The third argument is called “firm fundamental”. It indicates that green bonds are a signal for the investors of the company’s commitment to sustainability which could help them to survive unexpected situations and show the investors that they are prepared in the long run.

Tang & Zhang dismiss the financing cost argument by pointing out that there is a difference of 6,94 basis points in the yield spread of bonds issued by similar firms, however, when comparing to bonds issued by the same company in the same year, they find that there is virtually no difference in the bond pricing. They also find that institutional ownership of the companies experiences an increase of 7,9% which is mostly explained by the addition of large pension funds. This in turn supports the financing cost and investor attention argument. On the other hand, it is also mentioned that hedge funds are decreasing their ownership of the issuers' stock around the announcement. The most supported argument by the authors is the investor attention argument. They find that stock turnover, as well as Google searches, experienced a significant increase during the announcement. The firm fundamental argument is not supported as strongly by this finding as the investors are quickly realizing their returns, hence the high turnover. This study is one of the recent papers that is very close to this thesis and therefore increasingly relevant.

Kapraun et al. (2021) analyse on the pricing of green bonds and research if there is a premium for issued green bonds compared to traditional bonds. They focus on "green credibility" meaning how the investors view the bond and its issuer. In their research the authors find that not all green bonds trade at a premium but mostly bonds issued in euros by governments, supranational organisations, and corporates with very large issue sizes. The conclusion made by the authors is that the investors view that these bonds will have an actual impact on the sustainability of the organisation's operations or national or international projects and are therefore more credible. The authors point out the importance of third-party provided green labels or the bond being listed in a dedicated green bond segment on an exchange for corporate issues, which are more likely to investors paying a premium on the bond. The authors point out the importance of the verification, however, mention that not all verifications have the same standards. Bonds not issued in major currencies such as EUR and USD, are according to the authors, viewed less credible and do not trade at a premium when compared to traditional bonds. Bachelet et al. (2019) also mention that the characteristics of the bond strongly depend

on the issuer and find that the issuers reputation and third-party verification of the green bond play a crucial role in the liquidity, pricing, and volatility of the bond. On contrast to Kapraun et al., Larcker & Watts (2020) and Hachenberg & Schiereck (2018) in their research find that there is no significant premium when comparing the yields of green and conventional bonds.

Zerbib (2019) shows that investors do not value environmental factors significantly and that green bonds have a yield of only 2 basis points lower than that of conventional bonds. In line with findings from Bachelet et al. (2019), Kapraun et al. (2021), Zerbib also finds that the bond yield is mainly dependent on the credit rating and the type of the issuer. The research shows that the premium is more significant for financial and low-rated bonds and brings forward the point that the issuers can expand their bondholder base for these assets via green bonds. The observation period spans from July 2013 to December 2017 and the research is carried out as a matching method.

Krüger (2015), in his article published in the Journal of Financial Economics, researches the effects of corporate social responsibility (CSR) on the stock price of a company. The motivation behind the research is to examine whether the theory behind companies only prioritizing profits to increase shareholder value is true. Meaning, do external factors such as stakeholder relations affect the share price, and should more investments be directed towards this. This study is not directly related to the topic of environmental responsibility or green bonds, however, is important to this thesis as it provides a background on how shareholders react to these kinds of efforts on increasing corporate responsibility whether social or environmental. Most of the previous research before Krüger (2015) has been focusing on the financial performance rather than the shareholder value of a company. In addition, the previous literature has not been conclusive in its results as various studies have yielded different results. Nine years ago, the market was not as saturated with the inclusion of social or environmental responsibility as it is today, and the dataset of Krüger's study is very different from what it is today, which is why it is expected to differ from more recent results.

Krüger presents two different views from previous literature about the effects of CSR investments. According to the agency-problem view, managers inside the company would invest in CSR to gain positive goodwill from stakeholders without any economic profit, rather cost, to the company. This would mean that there is a negative correlation between CSR and shareholder value. On the other hand, a more supported view, is that CSR is an investment that creates value and is described as “doing well by doing good”.

The data for the research is from Kinder Lydenberg and Domini Research and Analytics (KLD) and is used in an event study formation. The data set includes 2116 corporate events which indicate either negative or positive CSR news regarding the company and its stakeholders. Krüger finds that investors react very negatively to negative CSR news, especially to news regarding the environment. In addition, the author finds that during the 21-day event period, the median cost of negative news is approximately 76 million USD. This supports the theory behind shareholder value being affected by environmental investments. On the other hand, Krüger also finds that investors react slightly negatively to positive news about CSR, as is with negative news, the most pronounced effect when regarding environmental actions. This contradicts the theory that investing in sustainability would create shareholder value. The author concludes that the impact of the positive events is significantly dependent on the motivation behind the act, meaning that companies with previous CSR issues, experience a much lower positive impact around the announcement compared to companies with no previous issues as the investors are not doubting the motive behind the new policies.

3 Data and methodology

3.1 Bond data

Based on previous literature on the topic, I have chosen to carry out an event study to analyze the reaction of stock prices around the announcement of green bond issuance. Due to the comparative nature of the study, I have two samples of data: issuers located in advanced economies, and issuers located in emerging markets. The country definition is based on the International Monetary Fund's most up-to-date list of Advanced Economies and Emerging and Developing Economies (EMDEs). The time period begins with the earliest issued corporate green bonds in the Bloomberg fixed income database, which is 2014, and the latest bonds issued in January 2024 which is the time of extraction of the bond data for this research. The reason for possible differences to previous research is that the definitions of green bonds have changed, and it also depends on the third-party verification parameters which are specific for each research. The dataset used is a panel dataset as the focus is on observing trends and changes over time.

I have extracted all the green bonds issued by publicly listed companies (matured and non-matured) that are marked as "green" by Bloomberg. Therefore, Bloomberg is also my third-party verification of the "greenness" of the bond as there are many different classifications. In the bond data, there is also included important information such as announcement date (event date), amount issued, country of origin, and issuer industry. I have also specified first-time issuers and seasoned issuers separately. This data will be analysed separately as well to point out different characteristics for comparison.

From Bloomberg fixed-income database I have extracted 251 green bonds issued by companies in emerging markets and developing economies. Out of these 87 bonds are issued by publicly listed companies, which have stock and market data available. Due to unavailable or insufficient stock or market data, the rest are dropped from the analysis.

For the advanced economies sample I have extracted 1463 green bonds out of which I have created a sample following the characteristics of the EDMEs sample as closely as possible to control for any company-specific effects in the data also including 87 issues. These characteristics include the number of first issues, company industry, and total assets.

Issuer Country	Total amt. Issued millions USD	Percentage of sample	Number of issues	First issuances	Avg. Coupon %
CHINA	$5 580,59	53,88 %	51	38	3,06
POLAND	$1 439,16	13,89 %	4	3	5,77
CHILE	$1 184,80	11,44 %	4	3	2,07
HUNGARY	$789,47	7,62 %	1	1	5,50
BRAZIL	$599,45	5,79 %	3	2	3,25
MEXICO	$545,30	5,26 %	1	1	9,13
INDIA	$107,37	1,04 %	5	4	7,56
SOUTH AFRICA	$61,90	0,60 %	16	7	9,81
BERMUDA	$50,00	0,48 %	1	1	4,85
INDONESIA	$0,06	0,00 %	1	1	9,50
Grand Total	**$10 358,11**	**100,00 %**	**87**	**61**	**4,84**

Table 1: Issuer Country EMDEs

Table 1 presents the origin country of the issuer for the sample of EMDEs according to the total monetary amount of corporate green bonds issued (matured and non-matured) during the observation period, converted into USD using the spot exchange price for the time of issuance. It also includes the number of issues from each country, the number of first issuances, and the average coupon rate in the primary market. For the sample, it is clear that China is the largest issuer country and amounts to 53,9% of the total monetary amount of issues for the sample. From European countries, Poland and Hungary are the most relevant ones, and South American countries such as Brazil, Chile, and Mexico have the most corporate green bonds issued. Other countries include small issues from Indonesia, India, South Africa, and Bermuda. The average coupon for a corporate green bond in the sample is 4,84% and the amount of first issuances is 70,1%.

Most previous studies have also shown that China and Chinese companies are by far the most prominent when it comes to the volume of green bond issues in emerging markets and developing economies. Fatica et al. (2021) point out that China, Hong Kong, and

Singapore for example, have implemented incentives for corporations to support the development of the green bond market locally. This shows very clearly that the countries see clear benefits in issuing green bonds and China has been the largest issuer country in this sample for a long time.

Issuer industry	Total amt. Issued millions USD	Percentage of sample	Number of issues	First issuances	Avg. Coupon %
BANK	$5 601,96	54,08 %	33	24	4,34
INDUSTRIAL	$2 905,62	28,05 %	20	16	3,67
UTILITY - ELEC	$908,35	8,77 %	10	6	4,08
FINANCIAL	$873,68	8,43 %	22	13	7,14
TRANS - NON RAIL	$68,50	0,66 %	2	2	3,34
Grand Total	**$10 358,11**	**100,00 %**	**87**	**61**	**4,84**

Table 2: Issuer Industry EMDEs

From Table 2, it is clear that banks and financial institutions create the majority of the corporate green bond market and in total amount to 62,5% of the issues for the sample. In addition, industries that are highly affected by environmental changes and where the environment plays an important role in the company's operations make up a significant portion of the green bond market. These include transport, utilities, energy, and other industrial sectors which create the resulting 37,5% share. This is in line with the findings of Cioli et al. (2021) whose results showed that banks amount to 41,6% of total green bond issues in their sample and following them was industrials and utilities as the second and third largest sectors.

Issuer Country	Total amt. Issued millions USD	Percentage of sample	Number of issues	First issuances	Avg. Coupon %
FRANCE	$ 11 564,62	19,97 %	15	8	2,09
UNITED STATES	$ 10 132,50	17,49 %	8	5	3,76
GERMANY	$ 10 029,67	17,32 %	11	8	1,55
BRITAIN	$ 7 626,65	13,17 %	9	7	2,41
NETHERLANDS	$ 4 153,85	7,17 %	4	3	2,19
ITALY	$ 4 144,39	7,15 %	5	3	3,48
FINLAND	$ 2 137,68	3,69 %	3	2	0,58
AUSTRIA	$ 1 925,72	3,32 %	3	2	0,92
JAPAN	$ 1 805,83	3,12 %	3	3	3,35
DENMARK	$ 1 496,87	2,58 %	3	2	4,62
CANADA	$ 1 338,32	2,31 %	2	1	0,70
AUSTRALIA	$ 1 129,57	1,95 %	1	1	2,13
NORWAY	$ 249,10	0,43 %	4	4	5,67
BELGIUM	$ 94,02	0,16 %	1	1	3,50
SWEDEN	$ 93,40	0,16 %	6	4	4,96
SOUTH KOREA	$ 1,40	0,00 %	9	8	2,59
Grand Total	**$57 923,58**	**100,00 %**	**87**	**62**	**2,73**

Table 3: Issuer Country Advanced Economies

Table 3 presents the origin country of the issuing company in the advanced economies sample. Included are also total monetary amount issued converted to USD using the spot rate of the date of issuance, the number of issues (several tranches issued in one day by the same company are treated as one), the number of first issuances, and the average coupon in the country similar to Table 1. France, the United States, Germany, and the United Kingdom account for 68 % of the total sample and are the largest issuers of green bonds globally. The average coupon is much lower at 2,73 % when compared to the EMDEs sample at 4,84 %. Notably, companies in South Korea have monetarily very small issues when compared to other countries in the sample and account to less than 1 % of the entire sample even with 9 issues. The total amount of bonds issued in the sample is 57,9 billion USD and is over 5,5 times the monetary amount of green bonds in the EDMEs sample at 10,4 billion USD.

Issuer Industry	Total amt. Issued millions USD	Percentage of sample	Number of issues	First issuances	Avg. Coupon %
BANK	$22 004,35	37,99 %	25	17	2,34
INDUSTRIAL	$16 635,43	28,72 %	35	29	2,95
UTILITY - ELEC	$10 192,13	17,60 %	10	5	1,86
FINANCIAL	$7 367,97	12,72 %	15	9	3,48
TELEPHONE	$884,63	1,53 %	1	1	0,90
TRANS - RAIL	$839,07	1,45 %	1	1	4,11
Grand Total	**$ 57 923,58**	**100,00 %**	**87**	**62**	**2,73**

Table 4: Issuer Industry Advanced Economies

Similar to the sample of EMDEs, the industries issuing the most amount of green bonds in the advanced economies are banks even though the share of banks is 19 percentage points lower than it is for the EMDEs, they still amount for 38 % of the entire sample. As mentioned, heavy industries such as energy and construction are heavily affected by climate action and regulations and are often one of the most prominent issuers of green bonds. The share of industrial is virtually the same for advanced economies and EMDEs at 28 %. Utilities are much higher for advanced economies and financial institutions are also issuing slightly more in the advanced economies than their peers in EMDEs.

3.2 Stock data

For the stock data, I use Yahoo Finance to manually extract the stock prices for each trading day for the event, buffer, and estimation period for each issuance. In addition, from Yahoo Finance, I extract the market data for each stock index from the respective markets the stock is listed to calculate the normal returns for each stock. This will consider identical dates as the stock data. To adjust for possible dividends and stock splits, I use only adjusted closing prices for each stock and market index.

The stock data is exported into Excel and each issuance includes variables which are daily adjusted close price of the stock, daily adjusted market close price for its respective market or index, the date of the issuance, and country and company identificator. The research includes two samples each containing 87 issues. One sample can include also multiple issues by one company, and several issues by one company on the same day are treated as one issuance. As there are significantly fewer bonds listed in emerging markets, the data gathering starts with EMDEs, and then from the bonds listed in the advanced economies, a sample as closely similar as possible is created to ensure comparability. This is done by categorizing the companies by market cap, total assets, and issuer industry and finding the most suitable peers for each sample.

3.3 Econometric strategy

Following previous literature such as Cioli et al. (2021), Tang & Zhang (2020), Flammer (2021), and Krüger (2015) I have chosen to do an event study to analyse the short-term effects on shareholder value generated by the issuance of green bonds. Event study is the best choice due to its temporal precision on specific events when establishing causality. It is also efficient and easy to measure abnormal returns based on the market model in the specified event window. Due to this, the exact date of the events is important, and it will be also included in the Bloomberg bond data. The econometric setup of the study is based on the research by Flammer (2021), Cioli et al (2021), and Krüger (2015) and the event date being 0, the event windows for this study are [-10; 10], [-9; 9], … [-1; 1] days around the event date to include any anticipation ten days prior to the announcement as well as a possible run up of prices ten days after the announcement. The shorter event windows are included to register any differences in the CAR closer to the announcement date such as with Cioli et al (2021) and the longer windows thus receiving a more accurate view of the results. Included is also a 30-day buffer period to control for the possible "noise" around the announcement which is set at [-41; -11]. The estimation window is used to calculate the alpha and beta for the stock and the market model calculations and should be long enough to be able to accurately estimate normal returns for the stock. For this study, I use an estimation window of 200 days which is therefore set at [-242, -42]. In comparison, Krüger (2015) uses an estimation window of 250 days including a buffer of 50 days before the event and Flammer (2021) uses a 200-day estimation period without a buffer period.

To estimate the effect of green bond issuance to stock market returns I use the event study methodology through the market model. The analysis will arrive at Cumulative Abnormal Returns (CAR) for each issuance. After the data is imported from Bloomberg's fixed-income database, the data is sorted using Excel. From Yahoo Finance, the stock and market data are imported for the respective dates of each stock and sorted into a specific

order. The event study is carried out using STATA software. The following independent variables are created for the calculation: “event_id”, “company_id”, “date”, “eventdate”, “adjclose”, and “mktclose”, “country_id”, which describe the individual event and company indicator, date of daily stock close prices, announcement date, the daily adjusted close price for the stock, daily market close price, and the origin country of the issuer respectively.

The main dependent variable is the cumulative abnormal return (CAR) on which the results are compared between the two samples. To control for skewness, control variables such as issuer industry and market capitalization are introduced. As explained by Armitage (1995), often the best practice is to standardize the market model’s abnormal returns with the standard errors and use the t-test, which is what is done for this analysis to measure the statistical significance of the results. In addition, outlier corrections are included to control for radical values which can create inaccurate results.

After the stock data is sorted in Excel and imported to STATA, I specify the event window, estimation window, and buffer period in STATA. I generate daily returns for each stock and market and then calculate normal returns for each stock from the estimation period. After the normal returns are calculated I can find abnormal returns with the following formula:

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

Figure 1: Abnormal Returns Formula

Where,

$AR_{i,t}$ = Abnormal Returns for security *i*, at time *t.*

$R_{i,t}$ = Realised returns for security *i*, at time *t.*

$E(R_{i,t}) =$ Expected returns for security i, at time t.

The CAR for each event window is calculated when adding up the all the daily abnormal returns for each event window. After arriving at the CAR for each stock, I continue to generate a p-value for each observed result to estimate whether the average value of distribution is statistically different from zero. The null hypothesis tested is that CAR = 0.

4 Results

In the empirical analysis I create 10 different event windows for the analysis which are [-1; 1], [-2; 2], … [-10; 10] days from the event date to better examine the effects of the green bond issuance on the stock price of the issuer. For each event window the average CAR or *CAAR (Cumulative Average Abnormal Return)*, standard error, standard deviation, and the p-value have been calculated to interpret the results. Comparisons between first-time and matured issuers are done as well as issues from companies in different countries to find any possible differences between geographic areas or contributions from specific countries to the results and find if there is a difference in results between the first issuance and the following. I investigate possible relationships between different factors and characteristics of the samples to test the hypothesis. To support my hypothesis, I should find a higher positive average CAR from the advanced economies sample than the EMDE while being statistically significant.

In line with previous research, the following robustness checks are done to ensure data quality and to strengthen the results. I have removed outliers from the data and done robustness checks on STATA which have reduced the effects of extreme values to make the analysis more reliable and comparable to previous literature. The outlier correction is done by removing CAR values below the 5^{th} percentile and values above the 95^{th} percentile from the dataset. I also calculate the median to ensure that the average CAR is not affected by individual radical values and therefore can be used for this analysis.

4.1 CAR

Event Window	AE	Std error	Std Deviation	p-value	EMDE	Std error	Std Deviation	p-value
CAR [-1; 1]	-0,48 %	0,17 %	2,66 %	0,006	-0,45 %	0,23 %	3,61 %	0,057
CAR [-2; 2]	-1,03 %	0,16 %	3,29 %	0,014	-0,18 %	0,18 %	3,64 %	0,328
CAR [-3; 3]	-1,37 %	0,17 %	4,02 %	0,017	-0,01 %	0,16 %	3,84 %	0,954
CAR [-4; 4]	-0,97 %	0,16 %	4,19 %	0,013	0,05 %	0,17 %	4,56 %	0,783
CAR [-5; 5]	-1,01 %	0,15 %	4,58 %	0,013	0,02 %	0,17 %	5,08 %	0,902
CAR [-6 ;6]	-1,39 %	0,15 %	4,83 %	0,017	-0,29 %	0,18 %	5,87 %	0,208
CAR [-7; 7]	-1,39 %	0,16 %	5,37 %	0,017	0,36 %	0,18 %	6,15 %	0,042
CAR [-8; 8]	-1,27 %	0,15 %	5,49 %	0,016	0,58 %	0,17 %	6,90 %	0,000
CAR [-9; 9]	-1,65 %	0,15 %	5,83 %	0,019	0,64 %	0,15 %	5,99 %	0,000
CAR [-10; 10]	-1,87 %	0,16 %	6,49 %	0,022	0,96 %	0,16 %	6,57 %	0,000

Table 5: CAR Results

Table 5 depicts the two samples and the average CAR (Advanced Economies on the left and EMDEs on the right) for each of the 10 event windows as well as the standard error, standard deviation, and p-value to determine the statistical significance of the results. Both samples appear to have mostly negative CAARs for the shorter periods and for the shortest 3-day event window the CARs are virtually the same with -0,48 % and -0,45 % for the advanced economies and EMDEs respectively. The EMDEs sample does not show statistically significant values through event windows from [-2; 2] to [-6; 6], however, shows that the CAAR is growing the longer the event window is. The CAAR from the window [-7; 7] through [-10; 10], while very small, is positive and statistically significant at a 5% level. Therefore, if can be concluded that for the emerging markets sample, the CAR is slightly negative close to the event date and growing slightly positive when extending the event window further away from the event.

The opposite is happening in the advanced economies sample. While there is virtually no difference in the CAAR for the 3-day event window between the two samples, the CAARs of the advanced economies are growing more negative the longer the event window chosen, leading to a difference of 2,83 percentage points between the samples in the 21-day event window. The median CAR for the sample of advanced economies is -1,16 % which is close to the average of the CAARs (-1,24 %) and indicates that there are not a few radical values driving the average CAR to one direction or another. After outlier corrections and robustness checks it can be said that for this sample, the CAR is slightly

negative and significant at 5 % around green bond issuance throughout the 21-day event window.

This finding opposes my hypothesis of companies in advanced economies having a higher average CAR around the announcement of green bond issuance than their peers in emerging markets. In addition, while being very small, the negative CARs in general contradict the results of Cioli et al. (2021) who found the highest positive abnormal returns to be closer to the event date [-1; 0] and lower CARs for the longer event windows. Similarly, Flammer (2021), and Tang & Zhang (2021) find a slightly positive CAR around the event date. For my sample, there is not a significant difference in standard error between event windows and standard deviation is positively related to the length of the event window which can be expected as there is more time for variation in the sample. Overall, the CARs are very small but interestingly the shorter windows are consistently negative. The median for the sample of EMDEs is 0,1% which is close to the average CAR and gives confidence in interpreting the results without the effects of extreme values. To further understand the results, I will separately investigate certain characteristics more in-depth to find out what is mainly causing the results.

4.2 First-time and matured issuer comparison

	Advanced Economies				EMDEs			
	First Issuance	p-value	Matured issuer	p-value	First Issuance	p-value	Matured issuer	p-value
CAR [-1; 1]	-0,59 %	0,004	0,29 %	0,296	-0,73 %	0,002	0,14 %	0,786
CAR [-2; 2]	-1,20 %	0,016	-0,24 %	0,359	-0,39 %	0,049	0,27 %	0,471
CAR [-3; 3]	-1,45 %	0,019	-0,72 %	0,021	-0,14 %	0,449	0,26 %	0,426
CAR [-4; 4]	-0,90 %	0,013	-0,31 %	0,250	-0,33 %	0,082	0,82 %	0,017
CAR [-5; 5]	-0,91 %	0,013	-0,65 %	0,007	-0,12 %	0,541	0,32 %	0,298
CAR [-6 ;6]	-1,23 %	0,017	-1,05 %	0,014	-0,34 %	0,131	0,01 %	0,965
CAR [-7; 7]	-1,17 %	0,016	-1,04 %	0,015	-0,04 %	0,983	1,12 %	0,001
CAR [-8; 8]	-0,72 %	0,011	-1,01 %	0,014	0,23 %	0,187	1,31 %	0,001
CAR [-9; 9]	-1,00 %	0,013	-1,33 %	0,017	0,37 %	0,023	1,20 %	0,000
CAR [-10; 10]	-1,52 %	0,019	-0,77 %	0,001	0,73 %	0,000	1,42 %	0,000

Table 6: CAR First issuance and Matured issuer

In Table 7 I have presented the CAAR for each event window for first-time issuers and matured issuers from both samples. The results show that in this dataset, there is a clear difference between companies issuing green bonds for the first time and companies who have previously issued green bonds and that the matured issuers are experiencing on average a higher CAAR than first-time issuers and based on previous literature, the result is not what is expected. In the advanced economies sample, matured issuers are still experiencing negative CAARs, however, less negative than those of the first-time issuers. The only event window where the first-time issuers have a higher CAAR is [-9; 9] however still negative and the difference is very small. In general, the results follow the results shown in Table 6 where the longer the event window is, the lower the CAAR appears to be. The 3-day event window appears to show slightly positive CAAR for the matured issuers in advanced economies, however, not statistically significant. Overall, the CARs are very small, and the differences are not significant, but a clear trend is observed as the CAAR grows more negative along with the length of the event window.

In the EMDE sample, a clear difference between the results of firs-time issuers and matured issuers is observed. The matured issuers are experiencing positive and significant CAAR for the four longest event windows with the highest being 1,42 % for the [-10; 10] window. In addition, event window [-4; 4] shows positive and statistically significant CAAR of 0,82 % at the 5 % level. Similar to the advanced economies, the results of the EMDEs follow the results shown in Table 6, where the CAAR is more positive and significant for the longer event windows. For first-time issuers, the CAR is negative until the event window [-7; 7] while for matured issuers the CAR is positive throughout the sample. However, the results for matured issuers are not statistically significant for windows [-1; 1], [-2; 2], [-3; 3], [-5; 5], and [-7; 7]. For first-time issuers, the CAR is very close to zero and seems to be statistically significant around the event date as well as in the longest windows. These findings contradict previous research such as Cioli et al (2021), Flammer (2021), and Tang & Zhang (2020) who all find that the positive stock price reaction is more prominent for the first time than for matured issuers, which is related to the signalling effect where a company is expected to have send a more

effective positive signal to the investors the first time they announce the issuance of green bonds rather than during following issues when the investors have already taken this information into account.

These results are unusual when compared to previous literature on the subject, and economic theory according to which investors appreciate ESG and CSR and that corporate green bond issuances often result in positive stock price reactions. However, the results should be further investigated to determine the cause and the possible characteristics of the dataset of this study. After robustness checks and outlier corrections the strength of the econometric strategy and its results can be trusted and therefore, the data is investigated in more depth from different points of view to determine where these results stem from. I will separate the dataset into country specific data to see which geographical areas are contributing to the data and how.

4.3 Country comparison

BY COUNTRY		
EMDE	**CAAR [-10, 10]**	**Std. Deviation**
Brazil	-2,52 %	0,20 %
Chile	1,57 %	5,45 %
China	-0,51 %	0,51 %
Hungary	-9,83 %	0,20 %
Indonesia	-7,83 %	0,10 %
India	0,30 %	6,30 %
Mexico	12,15 %	0,30 %
Poland	-1,01 %	7,04 %
Souht Africa	1,78 %	6,71 %

Table 7: CAR by Country EMDEs

In Table 8, I have separated the CAAR for the 21-day event window for each country of the EMDE sample separately. It shows significant differences between countries in the

sample the highest being Mexico (12,15%) and lowest Hungary (-9,83%) with a difference of 21,98 percentage points. The EMDE sample is expected to have more variance than the advanced economies sample, due to the characteristics of the stock market and the companies in developing economies such as Kapraun et al (2021) describe. They often have less “green credibility” and the news of green bond issuances can be received in vastly different ways.

Important insight about the data is that four countries have contributed less than three issuances in the sample one of which is Mexico (CAR of 12,15%) whereas China has 51 issuances and represents the vast majority of the sample by number of issues as well as monetary amount. It is therefore important to mention that the sample of EMDEs represents mostly the green bond issuances of Chinese companies and that the market for green bonds in other developing economies is drastically smaller to the one in European and North American advanced economies, also shown in the distribution of the values in the table. South Africa has the second largest amount of green bonds issued in the sample and is showing a CAAR of 1,78% for the 21-day event window much higher than that of China. Poland and Chile with the second and third highest monetary amount issued are showing a CAAR of -1,01 % and 1,57 % respectively.

BY COUNTRY		
AEs	**CAAR [-10, 10]**	**Std. Deviation**
Austria	-0,19 %	3,01 %
Belgium	**1,99 %**	**0,10 %**
Canada	-0,41 %	3,40 %
Germany	-3,32 %	5,46 %
Denmark	-3,85 %	4,38 %
Finland	-2,79 %	6,15 %
France	-3,50 %	7,06 %
Italy	**3,20 %**	**5,71 %**
Japan	**0,46 %**	**4,96 %**
South Korea	-2,93 %	3,61 %
Netherlands	**4,71 %**	**4,36 %**
Norway	-1,09 %	4,16 %
Sweden	-0,42 %	5,28 %
United Kingdom	-0,11 %	5,43 %
United States	-2,10 %	5,49 %

Table 8: CAR by country Advanced Economies

To understand the results a dive deeper into the characteristics of the data and different samples is required. Figure 5 depicts the average CAAR for the [-10, 10] event window for each country in the advanced economies sample. The sample of advanced economies is much more evenly spread out and France with the highest monetary amount of issues contributes under 20 % of the sample. There are four countries whose issuances are positive out of the 15 included in the total sample. Belgium, Italy, Japan, and the Netherlands have a CAAR of 1,99%, 3,20%, 0,46%, and 4,71% respectively. Important to note that Belgium only has one issue in the dataset while the other three countries' issues are: Italy (5), the Netherlands (4), and Japan (3) issues thus not contributing for a very thorough country specific sample. When including only these four countries the average CAR for the 21-day event period is 2,94% however, as mentioned, the sample of the four countries' issuances is very small, not much can be deducted from this finding. The lowest CAARs are found in Germany, Denmark, and France while France and Germany are also the two biggest issuers in the sample by number of issues, therefore affecting the average CAR of the total sample.

4.4 CAR date dispersion

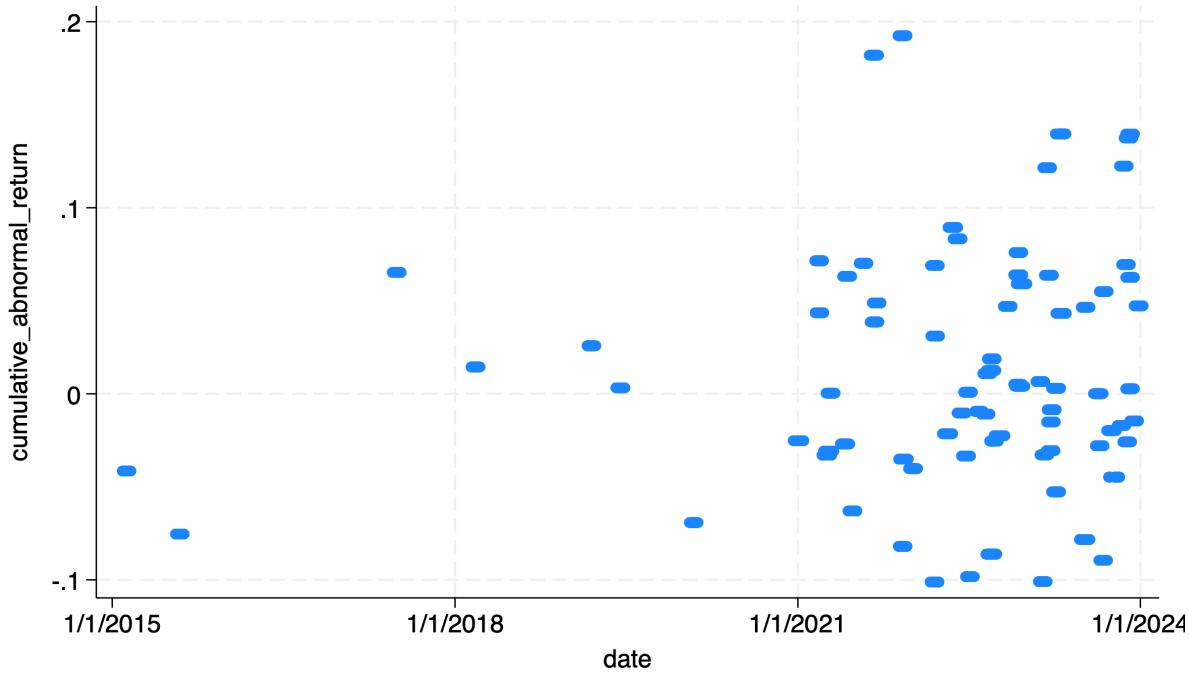

Figure 2: Scatter plot EDMEs

Figure 2 is a scatter plot that shows each CAR for the sample of emerging markets and the date of the issuance. From the plot it can be pointed out that a significant majority of the green bonds in the sample are issued between 2021 and 2024 the first one being in 2015. This is an important quality of the data to display as previous research papers all have different datasets and because the green bond market is growing fast, especially in emerging markets relative to advanced economies, the dataset is heavily focused on the past three years. In comparison, the dataset of Cioli et al. (2021), which was the largest to date, included green bonds only until 2019, whereas Tang & Zhang (2020) include bonds only until 2017. The number of issues in the past three years makes this research and others published in the coming years, increasingly important. As discussed,

significant variability of the credibility of the issuer is observed in emerging markets which becomes even more important with the growing amount of green bonds issued.

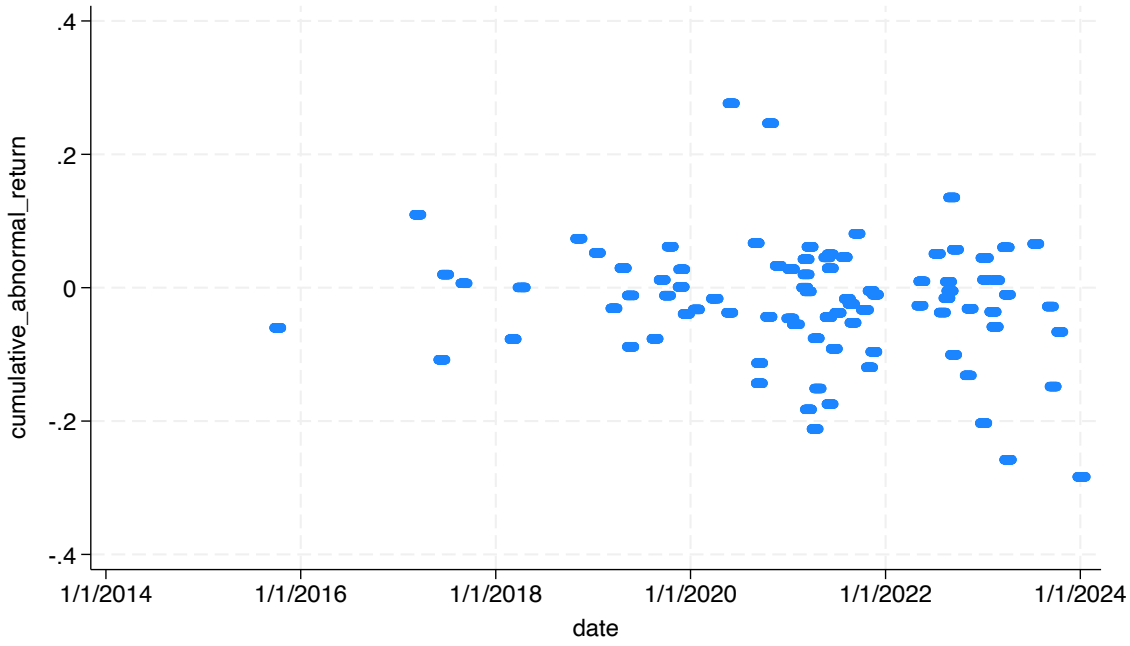

Figure 3: Scatter Plot Advanced Economies

A difference in the date dispersion of the bond issuances can be observed between the two samples. Figure 3 depicts each issuance of the advanced economies sample, and the issues are significantly more spread out over time. It seems that at least for this sample, companies in advanced economies started issuing green bonds significantly more around 2019, when the same could not be said for their peers in advanced economies before 2021. This shows how the growth of green investments in emerging markets is slightly behind the trend in advanced economies and is also shown by the total amount of bonds found in the Bloomberg database. This could affect the observed CARs and their variance and highlights the importance of investigating ESG investing in emerging markets more thoroughly in the near future as it becomes a more prominent topic.

5 Conclusions

Climate change remains an existential threat to our planet, its people, nature, and businesses. It is a well-known fact that with our current trajectory, we will not achieve the goal of remaining under 1,5 degrees according to the Paris Agreement. Therefore, it can be expected that governments and corporations will continue investing in green and sustainable projects in increasing amounts in years to come. The green bond market has almost doubled year on year since the first corporate green bonds were issued over a decade ago and is expected to grow in the near future as well. Corporations and green bonds play an important role in sustainability and preserving the planet and its resources, however, businesses need to be profitable at the same time.

There are mixed results from previous research on green bonds and their characteristics and effects on the economy. As the market is still quite young and growing rapidly, new topics and research are expected to emerge. As discussed, the motive for businesses to issue green bonds instead of conventional bonds is often not clear but assumed to be affiliated with some form of profitability for the business or its shareholders. The main areas of research therefore are the pricing of the bonds and the impact of the issuance on the stock price of the issuer. If green bonds traded at a premium, or so-called “greenium”, meaning that the company would be able to attain a lower cost of capital as compared to traditional financing methods, they would be incentivized to issue green bonds, especially when the green label is still not standardized universally, and the integrity of the label is not guaranteed. Previous literature analysing the pricing of green bonds has yielded mixed results where some researchers find there to be a lower yield to maturity for green bonds when compared to their traditional peers whereas some find no premium whatsoever.

The other popular topic of research is closely related to this thesis and is analysing the effects of green bond issuance on shareholder value through abnormal returns around

the announcement of the issuance. As was the case with the pricing of the bonds, different results about the share price reaction have been released by researchers about positive or negative abnormal returns. However, most previous literature has found a mutual conclusion that the announcement of green bond issuance generates a positive stock price reaction around the announcement date, especially for first-time issuers. This is explained by the signalling effect where the issuers show a long-term commitment to sustainability through investing in green projects and mitigating climate risk for the business and its stakeholders.

In this thesis, I find that the sample of advanced economies not only, generated negative CARs through the entire 21-day event window but was also outperformed by the results from the sample of emerging markets and developing economies. The average CAR for advanced economies in the 21-day event window was -1,87 % whereas the average CAR for the EMDEs was 0,96 %. In the advanced economies sample the CARs were growing more negative the longer the event window, and contrary to previous research, in the EMDEs sample, the average CAR was found the lowest for the shorter windows and highest for the longer windows. The results oppose my hypothesis and therefore according to this research, it cannot be said that companies issuing green bonds in advanced economies would have a more positive reaction to the announcement of the issuance than their peers in emerging markets. This finding contradicts the research of Flammer (2021), Cioli et al. (2021), and Krüger (2015) who find that companies' stock prices react slightly positively to green bond issuances and that investors in general appreciate sustainable signals from companies. The main reason explaining this difference is most likely embedded in the dataset. As there are so few publicly listed companies issuing green bonds in emerging markets, the sample is still quite small and consists mostly of green bonds issued by Chinese companies. When the dataset of advanced economies is created according to this, both samples experience the effects of this. The variety of bonds and their issuers in emerging markets is also very high, possibly leading to mixed results and difficult interpretation of the data and the results of the analysis.

In addition, I research the difference in the abnormal return between first-time issuers and matured issuers and find that for this dataset, the matured issuers are on average posting higher positive abnormal returns than companies issuing green bonds for the first time. Most of the issues (71 %) in the dataset are first-time issues and this can create some skewness in the analysis. This is an unexpected result and is contradicting most previous research on the topic when Cioli et al. (2021), Flammer (2021), and Tang & Zhang (2020) all find that there is a higher positive reaction for first-time issuers than matured issuers. There is an opportunity for future research to go more in-depth about the differences between first-time issuers and matured issuers in the corporate green bond market.

When analysing country-specific data across the two samples, I found that there are some notable differences between the CARs from different countries. In developing economies, the green bond market is far from the size of the one in advanced economies, and therefore China accounts for most of the issuances in the EMDE sample. China generated a CAAR of -0,51 % which is close to the average of the sample. A significant variance between countries for the sample was found while the highest CAAR was in Mexico at 12,15 % and the lowest in Hungary at -9,83 %. The sample of advanced economies was much more consistent while some variation was found. Four countries (Belgium, Italy, Japan, the Netherlands) showed a positive average CAR with values of 1,99 %, 3,20 %, 0,46%, and 4,71 % respectively. Countries with the most issuances in the sample such as France, Germany, and the United States showed a significant negative CAAR for the 21-day event window.

The importance of the study lies in its comparative nature and seeks to find if there are certain characteristics and differences in green bond issuance and stock price reaction between geographical areas, and especially areas whose economies are in a very different state of development. Besides, the results being contradictory to previous literature and not supporting the hypothesis of this thesis, they can shed some light on

different aspects of the green bond market globally. In addition, as the market is continuously growing at a fast pace, there is expected to be differences in research and findings, through developing datasets, changes in the classification of green bonds, and different econometric models used. The area of green bonds is especially variable since there is no universal definition or standard for the classification. For this research, I have used the Bloomberg fixed-income database's verification.

Investors' valuation of sustainability and ESG factors has been researched for the past two decades and some of the important previous literature on the topic influencing this thesis include Tang & Zhang (2020), Kapraun et al. (2021), Flammer (2021), Zerbib (2019), Krüger (2015), and Cioli et al. (2021). The pricing of green bonds is not a topic researched in this thesis, however, previous literature such as Kapraun et al. (2021), and Zerbib (2019) provide a theory for the hypothesis and importance of this thesis. Cioli et al. (2021) directly investigate the effects of green bond issuance on the stock price and find opposite results to my research. Krüger (2015) analyses different CSR events and the investors' reaction to these and finds that investors appreciate positive sustainability news and react very negatively to negative news. This thesis focuses only on the green bond announcement and does not regard any possible negative CSR-related news. In general, the results of this thesis are contradictory to most previous literature on the topic, however, no previous research directly addresses the differences between economic areas, especially advanced economies and emerging markets, which speaks for the originality of this research.

Possible limitations for this study are mostly concerning the sample size and quality. As there are much less green bonds issued in the emerging markets and the weight of China in the sample is so significant, it could be beneficial to be able to include more issuances from different countries and more issues in total to generate a larger sample. As discussed, there is also significant variation in the pricing of the bonds in emerging markets as well as in the resulting CARs from the issuance. Similar to the findings of

Kapraun et al. (2021) this could be a result of the low credibility of greenness in emerging markets and create the observed distortion in the dataset.

The implementation of the event study in this research is fitting and is carried out similar to previous research, which point out that an event study is the most suitable way to carry out an empirical analysis on a dataset like the one in this thesis. If continued more in-depth, observed over a longer period of time, and obtained a larger dataset, this research could prove of practical importance for future researchers, policymakers, or other stakeholders in the field of green bonds, sustainability, and ESG investing.

5.1 Possibilities for further research

The findings of this thesis are contradicting many of the previous research papers on the topic, which could be due to the quickly changing green bond market, differences in datasets, and differences in green bond certifications and definitions. With a market growing and changing as rapidly as the green bond market, new relevant research is surfacing continuously from researchers around the world contributing to the field and literature. As the market grows, the definitions and characteristics of green bonds can change and every time a new study is carried out, the dataset will be different due to the fact of newly issued bonds in the dataset. This thesis includes green bonds issued in 2014 to January 2024, while for example, the study published by Cioli et al. (2021) included a dataset from 2013-2019, which was the largest dataset at the time. Investors, and public perception about ESG and green bonds could also develop, and these investments could be perceived significantly differently in the coming years as research and new coverage, including social media, continues to process the information about ESG.

Changes in regulations by governments, and supranational organisations such as the European Investment Bank and the European Union could also have a major impact on green bond pricing, issuance, and investors' perceptions. This would be likely to especially affect industries which have a heavy environmental responsibility or are heavily affected by climate change, such as energy, transport, and other heavy industries. Details about industries and their investments in green projects could be studied through profitability, ESG ratings, and shareholder value.

Green bonds' effect on long-term shareholder value is not covered in research as much as short-term performance similar to this thesis. Most research concentrate on a short (often 10-20 days) event window to determine the abnormal returns for that period, which is very efficient when examining a singular event's immediate effects on the respective company's stock price. However, from an investors' point of view, a long-term approach to creating value could prove more informative and provide us with an increased understanding of the profitability of these green investments. This will, however, create an increased challenge of controlling for possible other factors affecting shareholder value and it will be difficult to separate the effects of the ESG investments from other business characteristics affecting performance. A possible approach to this topic would be to investigate whether the initial reaction (positive or negative) persists or evolves over time and measure it with usual company valuation or performance analysis methods.

Some previous studies have focused on comparing traditional bonds directly with green bonds, which has included comparing the pricing, liquidity, number of institutional owners, or the effects on the stock price for example. This kind of approach could be further processed to include country-specific data and comparisons between geographical areas or to analyse how they might be different in advanced economies and emerging markets. The implementation of this kind of study could be by comparing a green bond to an otherwise identical conventional counterpart. The possible challenge faced with this kind of approach could stem from the lack and relatively small size when

compared to their peers in advanced economies, of corporate green bonds issued in the emerging markets as found in this thesis.

The actual impact of the investments where these green bonds contribute is another possible field of research. This kind of research could analyse the effects of green bond issuance on corporate ESG ratings, carbon footprint, or effects on biodiversity for example. The impact of green bond issuance on the company stock price can also be further developed by introducing the impact of the company ESG rating and how it may affect the resulting possible abnormal returns. Especially, with varying definitions of green bonds and scepticism about greenwashing, analysing the real effects of green investments, not only by companies but also by governments and supranational organisations, is an important field of research currently and in the near future when we strive for reaching the objectives agreed upon in the Paris Agreement.

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