

The Effect of the European Corporate Green Bonds on Environmental Pollution

Bachelor Thesis for Obtaining the Degree

Bachelor of Science

International Management

Submitted to Sebastian Vlasich

Gregor Potisk

1721032

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Affidavit

I hereby affirm that this Bachelor's Thesis represents my own written work and that I have used no sources and aids other than those indicated. All passages quoted from publications or paraphrased from these sources are properly cited and attributed.

The thesis was not submitted in the same or in a substantially similar version, not even partially, to another examination board and was not published elsewhere.

1st June 2020

Date

Abstract

This thesis aims to evaluate the connection and effects of the corporate green bonds that are currently active in the European Union and environmental pollution. Throughout the research, I will analyze the European financial industry, primarily corporations, and their contribution to sustainable environmental projects. The findings will be later connected to various so-called pollutants which are the main components of how we measure the pollution and its effect on the environment. The pollutants which will be taken into the account are air, water, light, and noise. I created strong objectives regarding the research study and connected myself to the companies which frequently operate with operations connected to the topic of my research. I was interested to determine the effect which the corporations have on environmental pollution and climate change and further finding the various methods implemented that are most useful in this connection. The sample size of the research study encompassed 10 participants. Based on the study, it was identified that ...

In the findings of the study, the researcher was able to answer all of the hypothesis therefore the research was a success. With the help of the primary and secondary data that was used during this research paper, the author was able to gather relevant information that served in the findings section of the paper. The paper can be seen as a success however the researcher still finds the possibilities for further work and explains them in the conclusion section of the paper.

Keywords: Green Bonds, European Corporations, Climate Bonds, Environmental Pollution, Pollutants.

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1 Introduction

1.1. Background of the Study

Environmental pollution is an important aspect of life that affects all human beings and animals in the world. According to Jordan, A., Huitema, D., Van Asselt, H., Rayner, T. and Berkhout, F. (2010, p. 15) climate change will likely be one of the main concerns which the scientists and government will need to face in the following decades, however, the distinction needs to be drawn between the so-called governance and government as the current governing in Europe also includes the private sector which includes various corporations.

There are more than a handful of factors that are responsible for the rapidly increased danger of environmental pollution most of them coming from the growing monetary output and population expansion. Such actions are endangering our natural ecosystems and present and increasing threat to our extinction (Flaherty, M., Gevorkyan, A., Radpour, S., & Semmler, W. 2017, p. 3). In order to successfully respond to the dangers of environmental pollution, there must be an international understanding of the issues which are then taken on by effective and efficient strategies (Stern, Nicholas. 2008, p. 26).

In recent years there has been a substantial amount of talk about so-called corporate green bonds that are under the environmental favorable project. Since the development of corporate green bonds and its implementation in companies is still in the early stages, it is hard to say if various institutions would benefit from them (Flammer, C. 2018, p. 2). However, from the view of the government, green bonds have been proven to be one of the most effective sustainable investments. Furthermore, they are shown to be even more financially beneficial than non-green ones (Gianfrate, G., & Peri, M. 2019, p. 1).

For the institutional investors, it is of vital importance to understand the movements of green bonds and financial structure, as this helps to accelerate environmentally affectionate portfolios. Green bonds are strongly linked to the financial markets, however, they can be acquired through various discounts that are built to support this type of purchase (Reboredo, J. C. 2018, p. 3).

In addition to natural impact, green bonds also help with social welfare. The main issue that is presented and should be solved in the next decade is the question of the cost that the first time issuers experience. In addition to that, all of the bonds that have the environmental component need to be certified by third parties which are presented by independent organizations that are responsible for the review of the entire process. Another important aspect is the stock liquidity which is proven to be increased after the issuance of the green bonds (Tang, D. Y., & Zhang, Y. 2018, p. 1). The goal of the research study is presented around the study objectives. To answer the main question of the research paper all of these individual objectives need to be looked into in detail, as they provide better insight.

1.1.1 Research Objectives

The paper has significant importance as it focuses on the topic which will be widely implemented in various organizations during the next decade. The findings of the study could be used as proof of whether or not green bonds are helpful in the fight for the environment. Furthermore, the paper will focus on the understanding of the pros and cons that the individual business will have after they implement green bonds into their portfolio in terms of lower taxes and other benefits.

It is also of importance to present the results so that the reader gets the general idea of all the positives and negatives that green bonds bring in both individual organizations and government settings. To make the thesis relevant and useful, the following research central questions are presented:

To which extent do European Green Bonds help with the issue of environmental pollution?

In doing so the study objectives of the research are:

- Examine different types of Green Bonds which are currently used on the market.
- Determine the extent to which Green Bonds are already in use in the European corporate organizations.
- Examine different types of environmental pollutions and how they affect the environment.
- Determine the extent to which different types of pollutants affect the environment.
- Evaluate how European green bonds help in terms of lowering the pollutants.

1.1.2 Limitations of Research

As in any research, we have both strong objectives and leverages, but also various limitations. To understand the limitations of the study we must first look into the scientific method that will be used to gather the data. It was decided that to make this study successful, a qualitative research method will be implemented. The reason for that is the convenience of gathering the data, as it is difficult to find a large group of people that are experienced in the field of green bonds enough to give objective and relevant feedback.

Therefore the idea is to find the experienced people in the field of green bonds and environmental pollution and collect their opinions about the topic. The primary limitation, however, remains that not enough people will give feedback to the questions. It is of interest to the paper to interview at least 10 professionals on the field, however, the research will be limited to Slovenia and only one company, therefore, it would not contain the opinions of people across the whole of Europe. That might be a limitation as the paper will not have an objective comparison on how various professionals through the industry understand and experience this topic and its questions.

1.1.3 Structure of the Thesis

The research paper is separated into individual sections. Starting with the introduction which gives the general overview of the study in terms of objectives, questions, and limitations. Secondly, the literature review helps to connect the existing knowledge to the current study, which should be useful to have a strong foundation and understanding of what needs to be researched. Hypothesis development is the third part of the research paper where the three main hypotheses of the paper are written. Following the hypothesis development methodology is written, it aims to explain the research design of the study in greater detail as well as the strategy. The fifth main part of the paper presents the results or findings of the study here both primary and secondary data are put together and explained through various graphs. Lastly conclusion of the paper including the ideas for further research are written, also the bibliography and appendices are shown.

2. Literature review

This part of the paper is intended to identify the books and articles that are relevant to the research study. The section describes the important descriptions of green bonds, European corporations, environmental pollution, and government policymakers. For the researcher and the reader, it is important to understand the basic terminology of the relevant subjects to continue with the research interpretation and results. Another important aspect of the literature review is its research approach that will be presented. To make the literature review useful it is important to collect all of the current knowledge that is already written about the topic of green bonds and environmental pollution. All of the literature is also listed at the very end of this research paper under the bibliography.

2.1 How to implement green bonds, European Corporations, Pollutants, Climate bonds, European Government policymakers

2.1.1 Bonds

To put it simply, a bond can be looked at as a loan that is established between the individual investor and borrower which is usually a large corporation but also government. Because the borrower requires frequent capital the issues are taking place regularly and can be arranged for short periods that being a couple of days, but also longer such as 40-year bonds. Each issue of the bond to the market is very complicated. Since bonds are not sold directly to the public because of their size, they are usually issued by the third party otherwise known as the underwriter. Because of such trade, lawyers are always involved, furthermore, the terms need to comply with the Securities and Exchange Commission (Thau, A. 2011, p. 4).

The difference between the bonds and stocks is that bonds do not have a platform such as stock exchange to make transactions. Mostly they are being sold to institutional buyers that can afford larger purchases. Such investors are banks, bond dealers, and larger funds. Such organizations need to be considered primary dealers as this allows them to get the elite deals and make a purchase directly from the Federal Reserve. It is also important to understand the size of the bond market, which is in comparison to the stock market several times larger. The size of the bond market is large because of the large institutional investors that invest in it sums that are hard to comprehend for individual investors (Thau, A. 2011, p. 8).

2.1.1.1 Green Bonds

In the last decade, a lot of talk in the finance world has been revolved around the so-called corporate green bonds. Such financial bonds aim to help the environment with the projects that support the ecosystem and climate with renewable sources. Since the are is however relatively new, it is hard to predict how green bonds will affect the markets in the future. For the majority, the main question is presented around corporations and how they will make the return on their investment with green bond markets. That is why a lot of the discussions have been done around the mission to have both financial and environmental well being (Flammer, C. 2018, p. 2).

“Green bonds are any type of bond instrument where the proceeds will be exclusively applied to finance or re-finance, in part or in full, new or/and existing eligible green projects ” (Gianfrate, G., & Peri, M. 2019, p. 1). To make bonds green they need to be approved by the third parties. Furthermore, they are usually put in place to provide positive environmental benefits such as CO2 reduction, which they need to display in the long term to categorize them as environmentally friendly making them into

green bonds. In addition to that, the use of green bonds has been since the first issuances in the year 2007 proven to be helpful to current shareholders.

To sum it up green bond market is rapidly growing in the last years and it is important to understand how it functions so that we can predict whether or not it will be useful for the corporations in the future (Tang, D. Y., & Zhang, Y. 2018, p. 1).

2.1.1.1.1 How to Implement Green Bonds

Ever since the green bonds became one of the crucial candidates for long term sustainable investments, the question that arises is how the corporations can implement them into their portfolios. For the corporations that have the resources to invest large sums of money it is vital to understand how the adoption of green bonds can give them financial convenience. By implementation of the green bonds, the market is divided into the primary which originally buys the shares and then the secondary market which trades with the bonds that are already out (Gianfrate, G., & Peri, M. 2019, p. 1).

One of the most widely used ways to implement new bonds on the market is by using electronic platforms. The use of such a device is proving to be very well accepted by the brokers as it allows them to access large groups of brokers without almost any costs. Furthermore, the investors are also benefiting from such an instrument as they can gather relevant information from a large database. In addition to that, in the recent years, a lot of investors are using the benefits of various software engines that allows them to search through various bonds quickly based on various criteria such as yield, maturity, credit quality, etc (Thau, A. 2011, p. 15).

2.1.2 Business organization

A business organization is a type of entry that is used for selling goods and services to consumers. In every organization, it is vital to carry certain requirements and objectives to create the structure and make it work in the long run. Such objectives include supply chain, inside and outside business operations, and similar. The important part of any business organization is for the owner to understand in what type of business it operates and what entry of various business types would be best for the individual task. There are many types of business in which the owner can start to operate (Feldstein, S. and Fabozzi, F. 2008, p. 34).

2.1.2.1 Corporation

Corporations are the structure of the business that has been active for centuries. They are one of the crucial factors that allowed the US to become the biggest industrial economy. Today, corporations account for most of the world's financial activities. For the main segment of this research paper, we will focus on multinational corporations that are widely used all around the world. The importance of multinational corporations became evident at the very end of World War II when the European Union and the US had to create operations of transport and supply chain that would work on bigger markets. The idea was that smaller businesses needed to change themselves into the multinational enterprises as that allowed them to exchange through the boundaries of the country they were primarily operating from (Truitt Weasley B. 2006, p. 162).

The majority of European corporations are based in Western Europe. If we combine all of the corporations that are currently active worldwide we can see that they account for more than 80 percent of the whole industrial production. Because of the importance of the corporations and their influence on today's market, it is vital to understand how they operate and also how their big-money investments influence the green bond markets (Truitt Weasley B. 2006, p. 175).

2.1.2.1.1 European Corporations

The majority of the European corporations with the highest level of impact on the world in terms of influence and capital originate from Germany. The two different corporations that exist in this field are stock corporations and LLC (Truitt Weasley B. 2006, p. 151). In recent years corporations have rapidly increased the issuance of new bonds. The primary and secondary market for bond issuance have been combined during the whole time in the area of the European Union, most of the issuances took place in the continental part of Europe. Another important aspect that needs to be taken into consideration is the overlap between bonds and cash markets in the European Union.

For example, German bonds that represent the majority of the overall bonds in the EU are less advanced because of the lacking cash markets. Such a financial environment influences bonds and affects price volatility. One of the European markets that offer a big cash market is Italy, which also offers the investors high liquidity. The EU needs to fight against fragmentation of the markets and work as one unit as this is the only way that they can be comparable to other big players such as the US and Asia. Furthermore, the European market should not put much effort into going to the private bonds as the performance of the public proves to be a better alternative (Pagano, M. 2004, p.553).

Another aspect that is important when referring to the European corporation is the topic of taxation. Capital income can be created through various gains that the individual or the corporation can achieve through interest from investments such as bonds. However various tax laws differ from one another based on the type of investment (Cnossen, S. 2017, p. 835). In the European Union tax rate of dividends is high in comparison to interest and debt is favored over equity. The dividends have a high tax which is responsible for a higher level of profit retention. Such actions lower the size of capital that is provided on European capital markets and therefore interferes with the advancement of the share markets (Cnossen, S. 2017, p. 829).

2.1.3 Environmental Pollution

Environmental pollution is a broad term for many of the occurrences that happen in the natural habitat. The effects of pollution can be seen in the environment, also it can affect the health of animals and humans. Pollution is usually described and measured in terms of the waste that is formed as the side product from activities that come from living organisms. Humans, for instance, produces the most pollution out of any animal because of the rapid expansions and globalization.

Many argue that the human race started to abuse the environment, especially in recent years, that meaning that the waste that is produced exceeds all of the recommended boundaries. The problems in the excess waste product are that the environment can not correctly adapt to the change and that can lead to many of the unwanted occurrences such as the extinction of species and endangered health for humans.

When we look at the environmental pollution we look into all of the areas that it affects that being atmosphere, land, and water. Humans are affected by all of the areas because of the expansion that we reached during our development (Ian L. Pepper., Charles P. Gerba., Mark L. Brusseau. 2006, p.5). The best way to lower environmental pollution is to lower the waste product, which can be done through the implementation of renewable energy sources. It is also very important for larger organizations to implement and follow corporate social responsibility into their business models. Other strategies include various policies that can be implemented such as the utilization of trading emissions, carbon tax and regulations to phase out fossil fuel energy (Flaherty, M., Gevorkyan, A., Radpour, S., & Semmler, W. 2017, p.1).

In the recent decade, air pollution has rapidly improved in the European Union. The reason for this is mainly the result of various protocols and regulations that have been put into place. Considering the positives of lowering the pollution many experts still argue that the level of pollution still provides concerning risk to the health of all the living organisms and the environment (Amann, M. 2008, p.1).

2.1.3.1 Pollutants

The danger of pollution occurs because of the high levels of pollutants in the environment. Pollutants are responsible for the creation of various microbes that are dangerous for human health. They can be discovered in various states that being liquid, solid, and gaseous. Pollutants occur mostly because of various human activities. The main reason for the danger in recent decades comes from insufficient waste management and poor disposal of the used industrial materials. Such materials can be toxic and once they enter the ecosystem through groundwater or similar they can endanger the human well being. Furthermore once in the ecosystem, pollutants change their structure chemically and then become part of the whole, as the thermodynamics laws state that any mater cannot disappear but merely changes from one form to another. Another aspect that differs from various pollutants is the concentration that they possess, for the duration of this paper this won't be the focus of the attention, however, the pollutants also differ based on the regions and the time they are already active in certain ecosystems.

For all the population it is of the crucial importance to understand how various pollutants are formed in nature and what causes them as this is the only way that we can adapt by using various policies but also think in terms of social responsibility to lower the levels of waste product (Ian L. Pepper., Charles P. Gerba., Mark L. Brusseau. 2006, p.6).

| AGENT | MODE OF TRANSMISSION | DISEASE / SYMPTOMS |
|---------------------------------|----------------------|--|
| <i>Rotavirus</i> | Waterborne | Diarrhea |
| <i>Legionella</i> | Waterborne | Legionnaire's disease |
| <i>Escherichia coli O157:H7</i> | Foodborne | Enterohemorrhagic fever, kidney failure |
| <i>Hepatitis E virus</i> | Waterborne | Hepatitis |
| <i>Cryptosporidium</i> | Waterborne | Diarrhea |
| | Foodborne | |
| <i>Calicivirus</i> | Waterborne | Diarrhea |
| | Foodborne | |
| <i>Helicobacter pylori</i> | Foodborne | Stomach ulcers |
| | Waterborne | |
| <i>Cyclospora</i> | Foodborne | Diarrhea |
| | Waterborne | |

Table 1: Recently discovered microbes that have had a significant impact on human health.

2.1.4 Climate Change

Climate change otherwise referred to as global warming is the rising issue of environmental pollution. The effect of it can be seen in terms of yearly emissions in fig. 1 below. Climate change is measured by the emissions in the air usually in NO_x emissions and non-methane VOC emissions. The change is usually the result of the changing population density, development of the economy, and advances in technology. Furthermore, climate change is also dependent on the environment which can be different in various countries (Amann, M. 2008, p. 24).

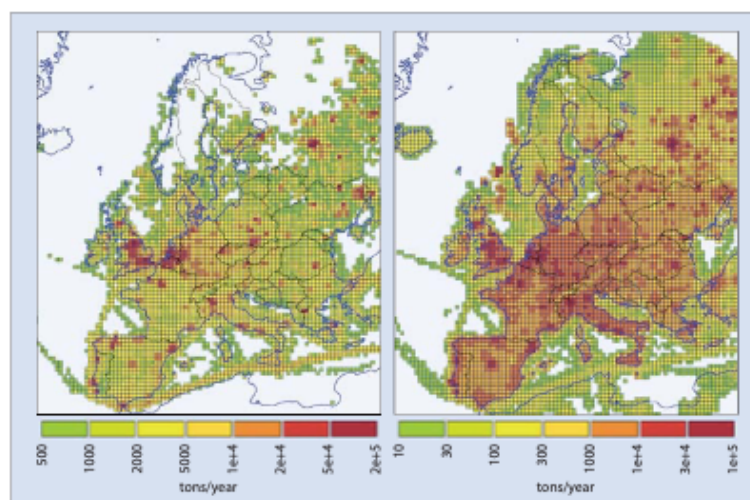


Fig. 1: Density of NO_x emissions (left) and non-methane VOC emissions (right) in Europe in 2004

In the European Union, climate change is also referred to as atmospheric warming and can be caused by various increases in emissions that arise from greenhouse gases, deforestation, inefficient changes in agriculture, and high-level quantities of fishing in seas. Factors that produce the change are in three groups, namely physical, chemical, and biological, and under the common name of forcing agents. The main agent responsible for global warming is carbon dioxide or CO₂. Carbon dioxide works by trapping the increasing heat in the atmosphere at the low concentration, its density is higher than the one from dry air (Ian L. Pepper., Charles P. Gerba., Mark L. Brusseau. 2006, p.396).

2.1.4.1 Climate Bonds

There are a lot of challenges in the establishment of the new climate change approaches into the existing system of the EU infrastructure. The main issue is presented around the lowering waste product and its effect on the environment while at the same time lowering the effort needed for adaptation. Some suggestions propose that it is important to share the plan to lower the climate change danger by establishing green bonds otherwise referred to as climate bonds. The implementation of them, however, is difficult because we do not have the existing knowledge on how they will perform over long term periods. That is why it is of crucial importance to implement them slowly and sustainably fix the issue over longer periods (Flaherty, M., Gevorkyan, A., Radpour, S., & Semmler, W. 2017, p.1).

One of the main milestones concerning climate change policies in the European Union was achieved with the Paris Agreement. The biggest player in the EU concerning bonds is no other than the European Investment bank, which issued its very first climate bond in the year 2007. Since then the rapid growth and interest in similar bonds have been exponential. For a lot of organizations running in this environment, green bonds have been well accepted because they lower the cost of capital. The goal is for the policymakers to understand which markets and issuers respond well to the implementation of climate bonds and how to further encourage the rest of the market (Gianfrate, G., & Peri, M. 2019, p. 134).

In the year 2007 and also two years later the climate awareness bonds that were issued by the previously mentioned European Investment bank totaled 840 million euros, which was the first leap of faith taken by the European Union in response to climate change dangers. The European bank has the benefit of the best possible credit rating and that is why investors from UK and Sweden jumped on the offer as well. Another important milestone was after the year 2009 from the Breeze Finance bonds which is an investment company with total assets of 900 million. They were the first European company that invested in the hope to get the revenue from wind farms which is one of the greenest alternatives. Even taking into consideration all of the German laws and legislations the company still received a poor rating of B on the bond efficiency scale which translates to the understanding that rating agencies take all of the bond evaluations very seriously. The United Kingdom is an example of a country that started to incorporate the green bonds in a very high and complex structure totaling over 55 billion pounds yearly. The decision that was made after the new government coalition in the year 2010, which with the help of the commission made and agreed upon a plan to lower carbon footprint and waste production and make renewable energy (Mathews, J. A., & Kidney, S. 2012, p. 339).

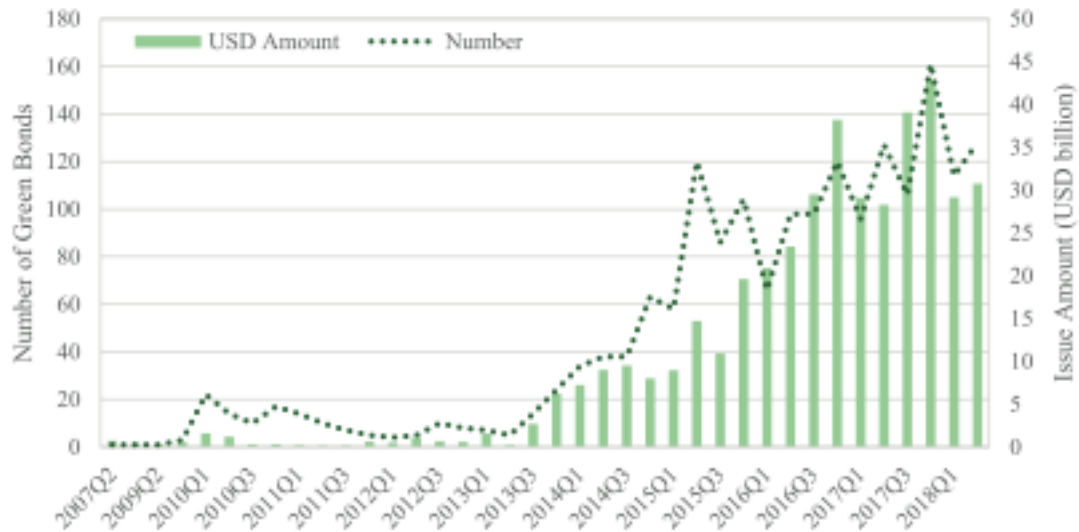


Fig. 2: Number of Green Bonds issued during the years 2007-2018.

European Union is very advanced in terms of climate bond issuance in comparison to the rest of the world. Based on the figure below it is evident that the number of green bonds started growing five years after the first issuance of the European investment bank (Tang, D. Y., & Zhang, Y. 2018, p. 6).

2.1.5 European Government Policymakers

In recent years, the European market operated under the structure of quasi-monopoly, but that needs to change due to recent changes in the market. The competition arose from not only the European countries but also from the non-sovereign market segments. Furthermore, the EU government needs to compete with its level of return to the US Treasuries. Because the markets are worldwide the investor will search for opportunities not only locally but will invest in the market or the institution that will allow him to get the highest return on his initial investment. Few of the main distinctions between the European and sovereign market are the size of the market itself, liquidity and the range of various maturities that it offers (Bertocchi, M., Consigli, G., D'Ecclesia, R., Giacometti, R., Moriggia, V., Ortobelli, S. 2013, p. 10).

It is also important to understand how various bonds affect the government in terms of the obligations towards them. One of the most common securities that are issued is the ones from treasuries, which can vary according to the maturity length. The second type is the one that is not sold directly but is rather created by the underwriters. The third type presents mostly saving bonds and similar. The fourth type is the most complex one as it is not a direct obligation to the government but rather uses its implicit banking system, it is known as federal agencies (Thau, A. 2011, p. 100).

An important aspect of European policymakers is that they operate under a relatively safe environment meaning that they are usually less risky than others. This is achieved through various legislations and laws that protect the investor. That is why bankruptcies in such environments are very rare (Doty, R. 2012, p.20).

2.1.5.1 European Risk discount Policies

There are four main types of risk discounts that are put in place by the European Union in the hope to encourage investors to purchase green bonds. The first one is known as a macroeconomic risk that protects investors from the rapid changes in the economy that happens due to variables usually caused by politics. The macroeconomic risk, therefore, protects their asset portfolios and effects the volatility in the long term. Second in place and most often the most worrying factor for any large investor is called a political risk that has been seen in Europe because of two large crises that occurred first being the Greek crisis in the year 2009 and later the Italian.

| Issuer | closing yield % | spread wrt Bund (bps) | previous yield % | change |
|------------------------------------|-----------------|-----------------------|------------------|--------|
| Germany Bund 4 Jul 2022 1,75% | 1.36 | - | 1.33 | 0.03 |
| Belgium fix rate 28 Mar 2022 4,00% | 2.52 | 117 | 2.37 | 0.15 |
| France fix 25 April 2022 3% | 2.08 | 72 | 2.05 | 0.03 |
| Italy Treas 1.9.2022 5.5% | 5.73 | 437 | 5.77 | -0.04 |
| Spain Govt 31 Jan 2022 5.85% | 6.42 | 506 | 6.46 | -0.04 |
| Finland 15 April 2021 3.5% | 1.54 | 18 | 1.51 | 0.03 |
| Austria 20 Apr 2022 3.65% | 2.00 | 64 | 1.94 | 0.06 |
| Denmark 15 Nov 2021 3% | 1.08 | -28 | 1.05 | 0.02 |
| the Netherlands 15 Jul 2022 2.25% | 1.76 | 40 | 1.73 | 0.03 |
| Slovenia 18 Jan 2021 4.375% | 6.86 | 550 | 6.86 | 0.00 |
| Ireland 18 Oct 2020 5% | 6.26 | 490 | 6.03 | 0.23 |
| Czech Rep. 29 Sep 2021 3.85% | 2.18 | 82 | 2.20 | -0.02 |
| Hungary 24 Jun 2022 7% | 7.50 | 614 | 7.50 | 0.00 |
| Portugal 15 April 2021 3.85% | 9.71 | 835 | 9.63 | 0.08 |

Table 2: 10-year benchmark yield in European countries

That is why every business needs to function under the political stable environment that allows them to work instability. Liquidity risk is the third type of discount risk that was put in action because of the low market liquidity which arises the problem investors lack. The final type of risk is called credit risk and refers to the issue that comes out from the borrower that does not repay the payments necessary. The risk is usually averted by yield spreads and similar. The table below shows 10-year benchmarks in all larger European countries (Bertocchi, M., Consigli, G., D’Ecclesia, R., Giacometti, R., Moriggia, V., Ortobelli, S. 2013, p. 77).

2.2 Key Aspects of the Literature Review

Trough the gathering, filtering, and developing stages of the literature review certain aspects could be considered key elements of this paper. Above all else, it is important to understand the effects of both green bonds and environmental pollution on the world. Green bonds are put in place to help the environment through sustainable projects that are financed by larger financial organizations. Since the first issuance of a green bond in the year 2007, there has been a lot of debate of whether or not such bonds help the environment and whether or not European Union should insist that larger corporations implement it (Tang, D. Y., & Zhang, Y. 2018, p. 1).

The fact of the matter is that green bonds are still relatively new and not enough data is released so it is very difficult for corporations to know their return on investments in certainty. The government also plays an important role because it serves as an instrument that is rewarding companies that invest in green bonds by better optimization for their portfolio. The market is certainly growing and now it is the question of whether or not we can predict the impact it will have in the future.

3. Hypothesis Development

Three primary hypotheses were identified with this research topic:

Hypothesis 1: There is no difference between the green bond and regular bond in terms of their effect on environmental pollution.

Hypothesis 2: There is no difference in pollution improvement before and after the implementation of green bonds in the European Union.

Hypothesis 3: Different green bonds do not lead to a different effects on environmental pollution.

4. Methodology

Methodology refers to the systematic analysis of the data that is later interpreted and applied to the research paper. In this section, three main parts will be covered and explained in detail. The three parts include research design, research strategy, and data collection processes. Research design focuses on three main parts of how to best decide upon the structure of the paper based on the type that the researcher decides upon. (Loue Sana. 2014, p.11). Furthermore, the method of choice will be explained in greater detail. Secondly, the research strategy covers the very important research ethics that need to be implemented in every type of research design, especially in qualitative because we are in direct connection to the participants.

Ethics also explains how to keep the track of data and the importance of treating all of the received data equally. The last part of the methodology which will be covered in the data selection which includes survey design, sampling, and bias that occurs when using sampling. The methodology is important as it provides the paper the groundwork by which the data will be collected and interpreted. The researcher used all of the knowledge gained through the methodology and hopes that the paper will be successfully designed based on its principles.

4.1 Research design

To make the bachelor thesis successful, it was important to select the research design that would be the most beneficial to the overall structure of the thesis. Out of three research types that the author has decided from, the qualitative research design was selected for this paper. Furthermore, narrative research was selected for the whole duration of this study. Narrative research allowed the author to focus on the real-life problem that is the environmental pollution through the experience of professionals that are affecting it through green bonds. To make the research more believable and less biased the narrative research was conducted on the group of people that were treated equally (Creswell, J. W., & Creswell, J. D. 2018, p.42).

The author has selected the explanatory research design because it best explains the relationship between the two segments of the research topic. Between the two phenomenons that are in interest to the researcher, the explanatory research design serves as the means to collect the qualitative results in the form of information and data that explains the question in greater detail. Explanatory research which can also be used in mixed methods design serves as a kind of two-stage development where the researcher would first create quantitative survey and then based on findings follow up with the qualitative research (Creswell, J. W., & Creswell, J. D. 2018, p.12). During this research paper however, the method of choice is qualitative research method and therefore only the interview will take place. The author will create the questions with the help of secondary data that being journal articles, books, and similar.

When the research began it was important to select out one of the three types of research designs the one that would be the most helpful in proving the correlation between green bonds and environmental pollution in this study. For this, the qualitative research approach was selected.

4.1.1 Qualitative research Approach

Qualitative research is one of the three types of research designs that are widely known and used. The use of qualitative research is primarily in areas such as anthropology, humanities, and sociology (Loue Sana. 2014, p.11). They are mainly used for the researcher that wants to conduct a study on fewer participants but wants to gather more information about each individual that is involved. To achieve this qualitative research focuses on open-ended questions and is mainly gathered by interviews and observations. The focus is mainly on understanding the meaning of the data. The quantitative research approach therefore mainly focuses on the data collection through a larger sample that is mainly collected through surveys and similar. Because of the large data sample, the data collected is more accurate to the wider population and is easier to interpret to the wider population. However qualitative data gives us insights into the individual into the problems that the researcher might not consider at the beginning. For qualitative research, it is crucial to be very selective in understanding whom to interview and what information we hope to gather from any individual (Loue Sana. 2014, p.84).

With this research paper, it was important from the beginning to select a good participant. After the participants were selected the secondary data was collected and the author decided upon which topics of interest should be covered in an interview. The interview was conducted with questions that were asked in the same manner and were later answered openly by the participants. Because of that, the researcher was able to gather various points of view from the people that are continuously operating with green bonds and have various ideas about how the topic should be connected to environmental pollution.

4.2 Research strategy

4.2.1 Research ethics

Research ethics are the fundamentals of any research regardless of the sector or type of project that is being researched. In the making of this paper, all of the guidelines which needed to be taken into consideration were being put in action by the author. This research paper was done in a way to make sure that all of the subjects that were being interviewed came forward with voluntary consent (Loue Sana. 2014, p.119).

The ethics were made under certain sets of principles that the researcher focused on. Such principles included respect and equality between every participant. Furthermore, all of the interviewees were able to answer freely and the researcher put high concern on their welfare. Other aspects that were covered mainly focused on openness, integrity, and honesty to everyone that contributed to the paper. The ethics were not only important for the individuals that were being interviewed but also for the organization that they worked for. For any researcher, it is important to understand that being trusted to work with any organization brings a certain level of responsibility towards that company and also its workers, therefore it is important to keep their integrity. The responsibility of the company is one of the crucial institutional responses (Loue Sana. 2014, p.179).

The last question of the interview was also put in place and asked the participants if they felt fairly treated through this survey. That was put in place to make sure that a high level of integrity was accompanied by through this whole research. In the beginning, the participants were also greeted by the message that explained all of their rights and made sure for them to understand that the paper is voluntary. Furthermore, discretion and anonymity were put in place. All of the recordings did not contain any names of the people that were interviewed and all of the data collected were treated equally regardless of the gender or any other differentiators of the participants. Furthermore, all of the data that was collected from secondary sources is cited adequately to avoid unwanted plagiarism. Lastly, all of the data that was collected was not manipulated in any way and remains presented in a way that was collected. All of these research ethics were put in place to allow u

4.3 Data Collection Processes

To make the study relevant and specific both primary and secondary data sources were used during the whole research paper. Primary data was conducted through the interviews and brought the paper important insight into how the business representatives that are focusing on green bonds see the whole topic in terms of its advantages and issues. Primary data was useful because it allowed the researcher to get a more detailed look into how individuals perceive green bonds and their effect on environmental pollution without having too many strings attached to the textbook approach to the topic. That allowed the study to be more organic and provided another point of view that was extremely useful for data interpretation and provided useful insights.

Secondary data which was also used during this research paper was acquired by online sources such as journals and various databases but also various books that have been published in recent years. All of the information that was collected needed to be carefully connected and then filtered by order of importance for this paper. All of this improved the validity of the results and made them more useful for the researcher.

4.3.1 Survey Design

For the collection of data for this research paper, the interviews were conducted. After the selection of the sample through sampling, the individuals were asked to come to the room with the interviewer without having the time to discuss the questions with other interviewees. The reason for choosing the interview was because of the decision to make this a qualitative study and therefore interview is one of the only options because we can not learn about their opinions about the financial sector through observations.

The interview gives a more detailed look into the opinion of the individuals and can be used to see other variables that otherwise would not be included in a closed type data-gathering survey. The truth, however, is that such a method of gathering information is more expensive to conduct and more time consuming that is why the sample is relatively low. For the questionnaires of this qualitative research, both closed and open-ended questions were put into place during the interview. The reason for asking close-ended questions was to establish the groundwork and get the data that is easier to interpret through graphs. Because the research paper focuses on showing how green bonds are connected and affects the pollution it was vital to create a well-designed experiment and later translate those findings to the cause-and-effect relationship. (Roxy Peck., Chris Olsen., Jay L. Devore. 2012, p.33).

As for the open-ended questions, they present the respondent's opportunity to give their opinion and out of the context answers to the questions. The importance for that comes from the complexity of the research paper that is hard to be proven without only closed-ended questions and also the interviewer needs to get insight from the business leaders into this worldwide arising topic. During all of the interviews, it is important to note that ethics were not breached and every participant was treated equally. By the end, the author managed to gather the information which was relevant to the study and brought important advantage in subject understanding.

4.3.2.1 Sampling

For the sampling of this research, a researcher needs to select a sample that would efficiently represent a broader population. Especially because the research approach is qualitative it is important to be able to generalize the findings. The main reason for selecting a smaller sample in this research comes down to the restriction of resources and lack of information that would allow the researcher to conduct the interviews with leading directors of the field (Roxy Peck., Chris Olsen., Jay L. Devore. 2012, p.38).

The target group for the research that is being presented in this paper includes the individuals that are currently actively working in the larger organization that is currently also active in investing its funds into environmentally helpful bonds. People that were interviewed in this study are having primary residency in Slovenia where they also do the majority of their daily work. Most of the participants are currently employed in a Sava Insurance company that is using the money founds for various foundings and operations. A sample of 10 participants was selected for this study using a qualitative approach. Because the researcher had the opportunity to choose between 17 of the employees that are currently working and only 10 were decided to be picked for the research. To select 10 participants simple random sample was used (Roxy Peck., Chris Olsen., Jay L. Devore. 2012, p.40).

It is important therefore to understand that all of the employees had an equal chance of being selected. The questions were presented in the same form to all of the participants regardless of their position in the organization and their experience because the researcher wanted to focus on the questions that were important for this research paper only.

4.3.2.2 Bias in Sampling

Another aspect to take into consideration is the bias of the sampling that takes place in research. The error of the study could occur because only 10 participants were interviewed. Such a small sample is very vulnerable to errors that could be eliminated if the sample size was larger. Larger sample size could be used if the researcher had time, funds, and connections to other larger organizations that could provide the feedback. It is also important to note that the study is focusing on the European Corporate Bonds even though only people in Slovenia are participating in the study. Even if all of the participants are operating mostly by focusing on the investments outside of the home country mainly in the whole European Union the researcher is still convinced that the information for other country representative investment funds should be collected.

5. Results, Evaluation and Interpretation of the Interviews

5.1 Participants of the Study

During this research 10 participants have selected through the mix of the random data sample. They were selected so that the research paper would get a better perspective on how the business leaders think about the topic of green bonds investment. All of the participants selected had some kind of experience in the financial sector and a lot of them were operating with green bonds on regular basis, therefore, they provided the paper with a lot of personal experience that would otherwise be hard to collect from the secondary data alone.

The data collected was meaningful to the researcher as it came from different age groups, genders, and business experience time. All of the data collected was treated confidentially and will be explained in detail in this segment of the research paper.

5.1.1 Age of the participants

The age of the participants varied greatly as the sector of work where the interview was conducted was very opened and all of the different age groups worked closely together. The majority of participants interviewed were from the age of 30-39 followed by the 20-29 which implies that the age of the people working in the financial sector Sava is relatively young. It is also worth noting that a lot of day to day operations currently operated in the Sava is conducted online and through mobile phones which implies that the younger generation is more wanted in such positions of work.

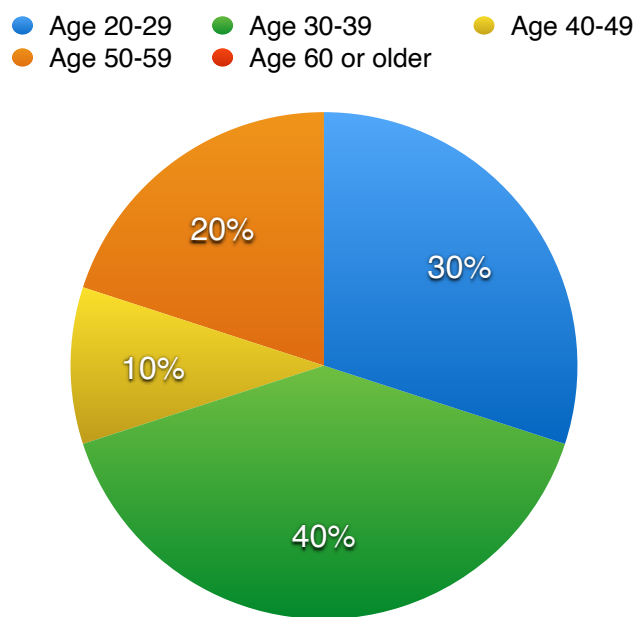


Fig. 3: Age of the participants

5.1.2 Working experience of the participants

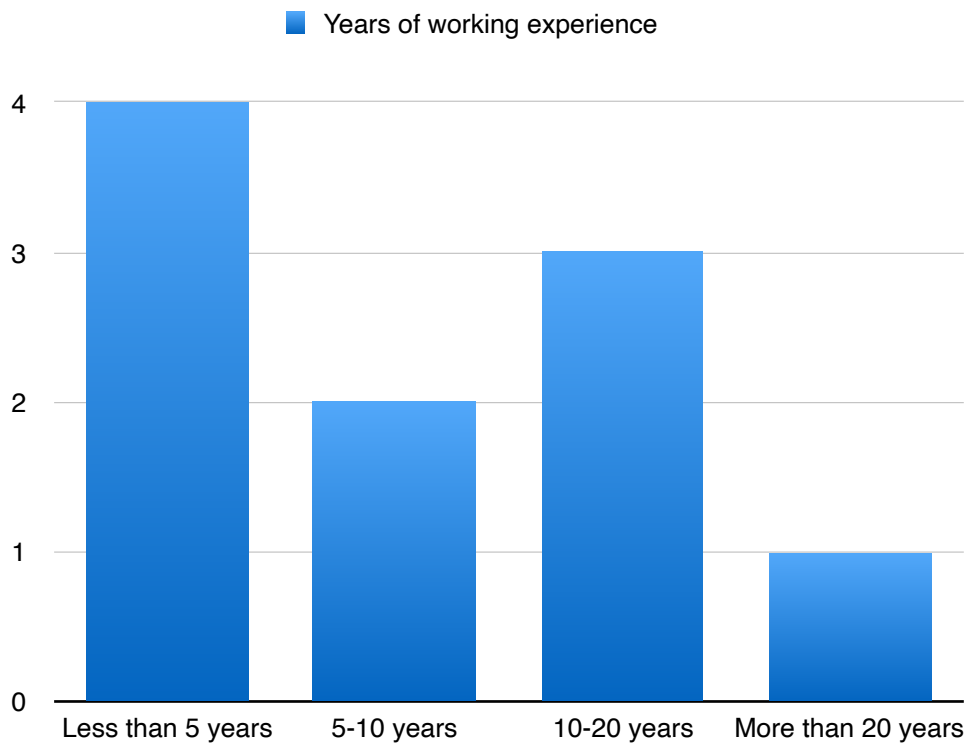


Fig. 4: Years of working experience

The working experience of the participants was connected to their age. Most of the people interviewed had the experience of fewer than 5 years in the financial sector. However, it is worth noting that working experience was connected to the position in the company that individuals had, and most of the time the people that were more experienced led the small group of people and helped them in their daily operations. Also, the younger group was mostly working in the research and development and trading was mostly conducted with the help of more experienced individuals also referred to as seniors of the group. All of the 10 participants selected were employed full-time.

5.1.3 Knowledge about green bond investment

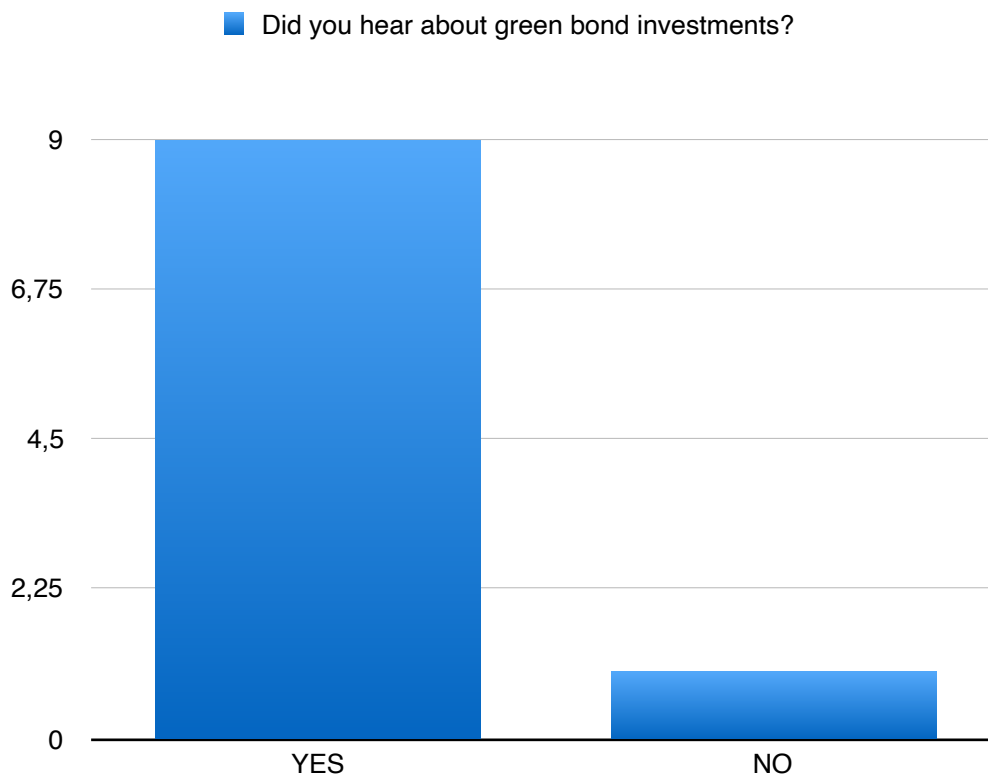


Fig. 5: Green bond recognition

It came to great help to the overall research that the majority of the individuals that participated in the study had a great deal of knowledge about what green bonds are and how they operate. Out of 10 participants, only 1 did not know what green bond investments referred to which could be because the individual was younger and did not have many years of experience in the financial sector. 90% of the participants knew about green bond investments and that was very helpful for the researcher in the interview part of the study.

5.1.4 Operating with bond investments and Operating with green bond investments

Question 4 and 5 of the questionnaire were developed in a hope to establish the connection between the green bonds and the regular bonds. It was important for the researcher to understand how frequently do individuals operate in one and another.

Most of the participants were experienced in the bond investments and operated it frequently on their day to day jobs. There was a surprising amount of participants that were using regular bond investments but never invested in any type of green bond. Green bonds were more commonly used by the people that had more experience in green bond investments rather than the younger generation with less experience that was primarily investing in other types of bonds.

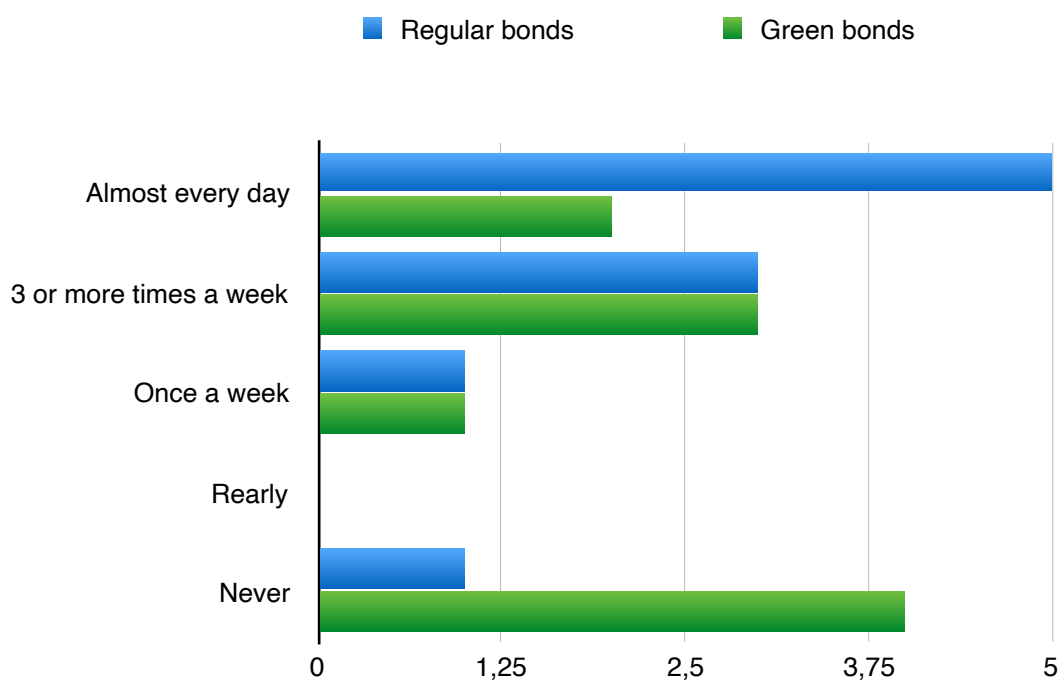


Fig 6: Knowledge of Green Bonds in comparison to Regular Bonds

5.1.5 Effects of green bonds on environmental pollution

To establish the connection between the green bonds and environmental pollution it was first important for the researcher to collect the general and simple to interpret the opinion of the participants in the study. 60% of the people interviewed thought that green bonds affect environmental pollution in a major way which was positive feedback to the researcher as this proves that people employed do believe that there is a correlation between the two. Furthermore, it is beneficial to the study to also have participants that are of the opposite opinion, thinking that there is no correlation between the green bonds and environmental pollution as this allows to get the different type of feedback later in the interview part and makes the overall research paper more objective.

- I believe green bonds affect environmental pollution in a major way.
- I believe that there is some effect.
- I do not believe that there is any correlation between the two.

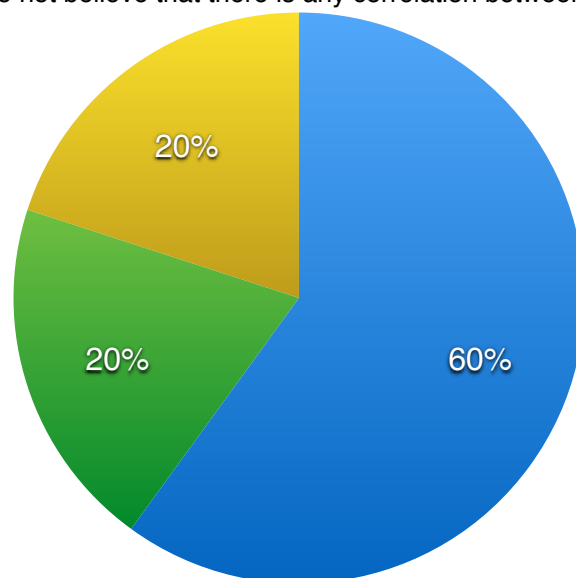


Fig. 7: Green bonds effect on environmental pollution

5.1.6 Effects of green bonds on the world

Following the correlation of the green bonds to environmental pollution, it was also of vital importance to test the participant's opinion on the connection between environmental pollution and its effect on the world. Environmental pollution was discussed a lot in recent years and its effect on the world has been shown to the wider population through movies, documentaries, and various articles.

Therefore it came to little surprise to the researcher that 90% of the participants felt that there is at least some effect of the environmental pollution on the world. People that are operating in the financial industry also need to keep a close eye on various environmental disasters that could happen at any given time and could affect various industries and therefore their investments. As later discussed in interviews most of the participants believe that environmental pollution is an important factor and that lowering the waste product is of crucial importance to have a healthy market that will allow not just investors but also other economic activities to operate in the long run.

- I believe environmental pollution affects the world in a major way
- I believe that there is some effect
- I do not believe that there is any correlation between the two.

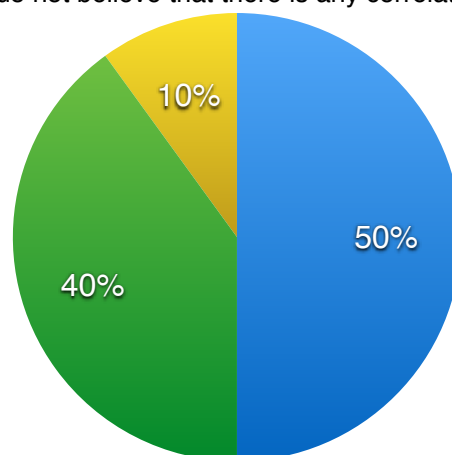


Fig 8: Environmental pollution effect of the world

5.1.7 Gender

Even though the financial sector at which the interview took place is mostly consisting of the male population it was beneficial to the research to also have female participants because they might have a different opinion on the subject of environmental pollution. The participants were treated equally and there was no sign of any variances at their responses to the question asked during the interview process. 70% of the participants were males and 30% of them were females.

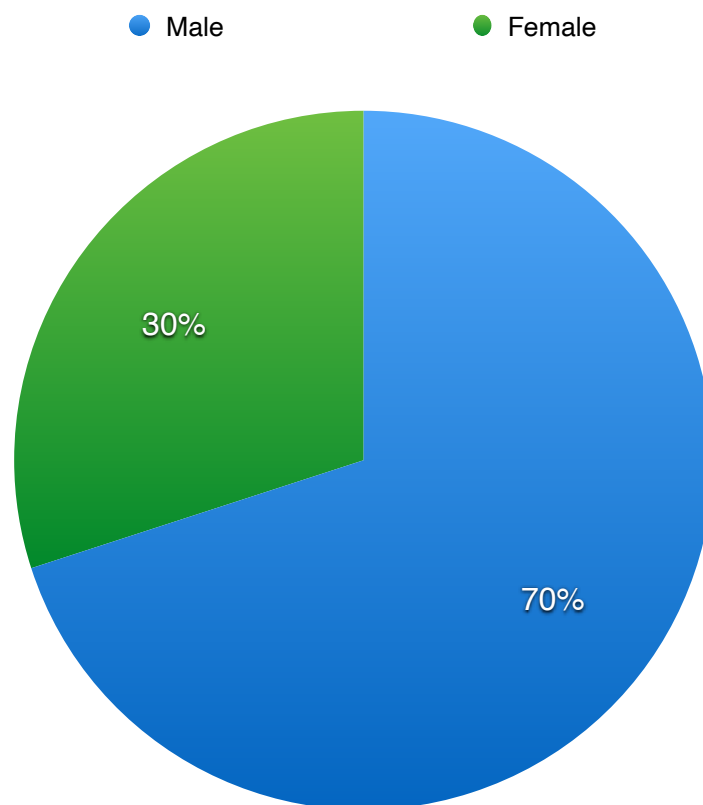


Fig. 9: Gender

5.1.8 Where do you operate from?

Even though the Sava is a multinational investment company that operates internationally it is still important to note that not everyone that is employed within the organization works on the investments outside of Slovenia. 40% of the participants operate strictly from Slovenia and are not performing deals of any kind outside of the country. The people that are operating in Slovenia but also from other EU countries presented 60% of the participants. To have people that are operating also from outside of Slovenia was important for the study as the topic is to understand how pollution affects the European Union, not just Slovenia. It is also important to note that the majority of the people that were operating outside of the European Union usually possessed more working experience and were older in the organization.

● I operate strictly from Slovenia ● I also operate in other EU countries

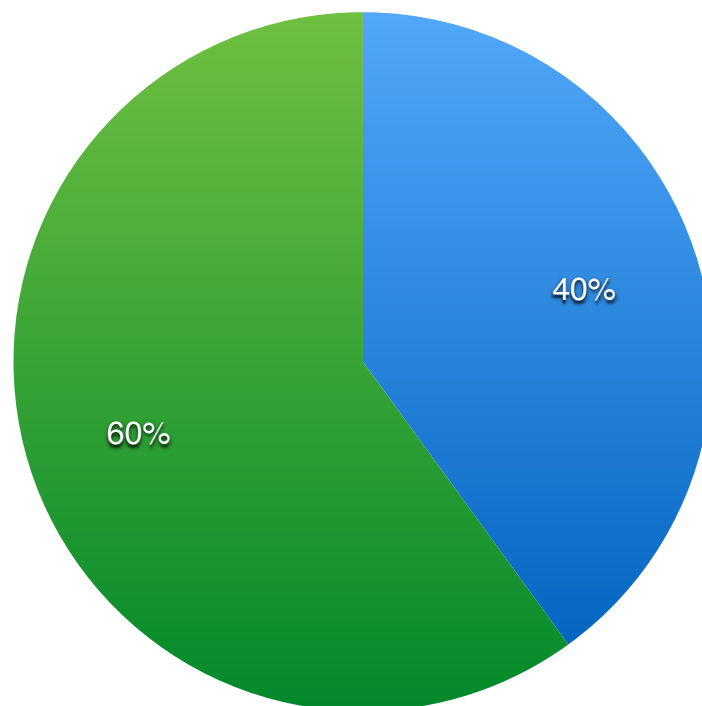


Fig. 10: Area of operation

5.2 Evaluation of the responses in the interview

The interview was conducted through the questionnaire and consisted of three main parts followed by the interview. Altogether 11 questions were being answered by the participants and after that, the 12th question was mainly debriefing and asking for any further comments. The first part of the interview focused on the regular type of bonds and green bonds in more specific terms. The first part consisted of 5 questions and was mainly built around understanding the experience that the individuals have with different types of bonds and their overall opinion of bonds and their effect on the economy. Some of the very important elements of the study were gathered here. The author of the research used the first question especially the question no. 4 to be able to better answer hypothesis 1 which is built around the question of whether or not there is a difference between the green bond and regular bond in terms of their effect on environmental pollution.

Followed by that the series of part 2 questions focused on environmental pollution and was mainly responsible for the author's understanding of how the individuals in the financial industry perceive environmental pollution and its dangers. Followed by that more specific question was asked about the evaluation of how the European Union with its countries performs better in terms of various laws and similar compared to the rest of the world. This was also helpful for the first part of hypothesis no. 2 which focused on the difference in pollution improvement before and after the implementation of green bonds in the European Union.

The last part of the interview consisted of 5 questions that were more specific to the topic of the research paper itself. Here the researcher wanted to gather as much information as possible about both green bonds and environmental pollution. After gathering all of the information the researcher was able to partly answer hypothesis no. 2 which was previously mentioned and partly answered in part 2 of the interview. Furthermore, the last hypothesis was able to be answered which focused on whether or not different green bonds lead to a different effect on environmental pollution.

At the end of the interview, the researcher asked the participant if there is anything more he/she would like to add. For the most of interviews, a debriefing was very useful as the participants opened up to some of the topics in the interview that they found interest in, or they would give some additional feedback or provide some arguments to their previously stated opinions. In the debriefing, it is also worth mentioning that participants were mostly expressing the interest that this research put on them and some agreed that the green bonds are the type of future bonds that are very helpful for the environmentally friendly projects. That is why some participants expressed that they will look into green bonds more in the future and will gather more information about their development in the past.

5.3 Hypothesis 1: There is no difference between the green bond and regular bond in terms of their effect on environmental pollution.

The title of the research paper is “ The Effect of the European Corporate Green Bonds on Environmental Pollution”. That is why it is crucial to understand what exactly green bonds are, how they affect the current economy and environment. Green bonds were first implemented on the market in the year 2007, with the hope to gather the money similarly like other bonds but to make the promise to the investor that the investment will be used for the development of environmentally beneficial projects (Tang, D. Y., & Zhang, Y. 2018, p. 1).

Since then the green bond economy has significantly increased and there are numerous of various organizations that offer green bonds to the public. From the year 2013, for example, the total issuance of the green bond market was around 3 billion dollars, and since that time the corporate sector increased the amount for more than double every single year making it a 49 billion dollar industry by the year 2017 (Flammer, C. 2018, p.2).

If green bonds have been put in place with the sole mission to help with the environmental pollution, to help the projects that focus on renewable energy, lowering emissions and waste products it should not be too difficult to prove that they are in some ways different to the regular bonds in those terms. However, for the research purpose, it was important to look at both primary and secondary data and make an objective response when answering this question.

Firstly the author gathered the information from the articles and books about the topic. The results here were a lot more specific and were followed up with various research and data that is necessary when we try to prove something. When the researcher looked into the secondary data it was evident that there is a big difference between how the green bonds operate compared to other types of bonds. Firstly green bonds are relatively new aging less than 20 years in the past in comparison to some other types of bonds that are available to the public for more than three hundred years (Flammer, C. 2018, p.2). That is why the green bonds are not the type of bonds on which a lot of data can be gathered because their performance is not long enough to fully understand them. There has for example been no major crisis that could determine how green bonds would react to such an environment.

Nevertheless, the question of how green bonds perform in comparison to other types of bonds was best answered in the study “The green advantage: Exploring the convenience of issuing green bonds” that was published in the year 2019 by the authors Gianfranco Gianfrate and Mattia Peri. The research was conducted professionally as the analysis was made by comparing 8 matches of green bonds and both primary and secondary markets were taken into consideration. The results of the study can be looked at from two different perspectives first being the perspective of the company that invests in these bonds and secondly the effect that different bonds have on environmental pollution.

Firstly it is important to understand that green bonds on average offer their investors lower returns and carry some transaction cost that otherwise does not exist. However, the data shows that the increasing amount of institutional investors started to invest in green bonds. Their portfolio made this decision because they see the dangers of climate change as well as other types of pollutants (Gianfrate, G., & Peri, M. 2019, p.132). Since the European Investment Bank issued its first green bond investment the growth of them has been increasing every year and by that many dangers for the environment have been lowered, one of them also being the limitation of warming to 1.5 Celsius (Gianfrate, G., & Peri, M. 2019, p.134). It is evident therefore that the companies started to understand the importance of the green bond environmentally friendly project fundings and started to invest more money in such bonds. That was only done however because it is evident that green bonds perform better in terms of helping the environmental pollution than other types of bonds.

Table 7. Bivariate volatility modeling – DCC M-GARCH(1,1) with outlier-free data.

| | (1) Green Bond Index = GB | (2) Green Bond Index = GPB |
|---|------------------------------|-------------------------------|
| Parameter estimates for the green bond market index: | | |
| μ_G | 0.000033 (0.000099) | 0.000367*** (0.000073) |
| a_{0G} | 0.000000 (0.000001) | 0.000000 (0.000000) |
| a_{1G} | 0.042206* (0.022859) | 0.028907*** (0.008305) |
| b_{1G} | 0.954773*** (0.021098) | 0.955050*** (0.008399) |
| Parameter estimates for the benchmark conventional bond market (AB) | | |
| μ_M | 0.000128** (0.000052) | 0.000128** (0.000052) |
| a_{0M} | 0.000000 (0.000007) | 0.000000 (0.000007) |
| a_{1M} | 0.042728 (0.210421) | 0.042728 (0.210348) |
| b_{1M} | 0.950570*** (0.201990) | 0.950570*** (0.201920) |
| Estimates for the conditional correlation parameters | | |
| α | 0.022333*** (0.004981) | 0.000000 (0.000002) |
| β | 0.975925*** (0.005722) | 0.908478*** (0.117834) |

Notes: Numbers in parentheses are standard errors.

GB = Green Bond Index, GPB = Green Project Bond Index and AB, US Aggregate Bond Index.

* $p < 10\%$.

** $p < 5\%$.

*** $p < 1\%$.

Table 3: Market index of the green bond index

The table above shows the market index of the green bond index in comparison to the green project bond index. It is evident that both are positively correlated which means that they have close pricing (Pham, L. 2016, p.19).

When asking the participants the question of what differences do they see between green bonds and other types of bonds the response was mainly connected to the level of expertise in the financial segment that the individual had. Because the differences are easy to understand if the person knows how the green bonds work and operate it was more the question of how much the individual has used them in his/ her career.

Evaluating the responses of the participants the following answers were selected that best describes the overall view of that the individuals in the financial segment believe for this question.

The difference that I see is primarily in what it serves as green bond investments are usually put in place to help the environment and focus on clean energy projects [I1]

I mean they both work on a similar principle I think however green bonds have the tax exempt income which are helpful for many organizations furthermore I would like to say the green bonds usually help in positive manner so also the investors are happy also for us it is good to establish certain connections to large organizations such as the world bank which likes to be reminded that we also work with green bond investments. [I4]

Green bonds or something that I look at and say eco, I see green, I see the future and I believe that they will play an important part however I do not see them as anything different than the traditional bonds I look at everything in the same manner the only thing that I care about as a chief in this department is to make a safe investment for our clients we do not care much about where we invest we always look at everything in the same manner.

[I5]

Green bands are used to found certain projects that wouldn't get the necessary means of money otherwise they are greatly appreciated by governments and various institutions Autre bonds whoever are always looked at something that the individual only does for himself in order to make a return on his money that being an investment. [I6]

Green bonds focused on helping the environmentally friendly projects where is the other types of bonds or mostly just for investments that should bring the profits over time. [I9]

With investing you have to be very careful to know what you invest at and green bonds are the type of bonds that make you think about only about the financial returns she will get but also where the moneys going to and how it will affect the economy so there is that aspect as well. [I10]

After carefully examining the responses of the participants involved in the study it is easy to draw a connection on the believe that they all share in common. Answers collected had a similar opinion by the majority and that is that the distinction between the green bonds and regular type of bonds is that green bonds focus on environmentally clean projects. Participants expressed that they believe green bonds play an important part in helping to found environmentally helpful projects.

Some of the participants also mentioned the fact that the majority of the companies that are investing do not look at only the environmental help but look more into their benefits. The participants no. 4 said that tax benefits are evident in some cases, also it is good for the public perception and can be helpful for establishing business connections to some of the organisations. It is, therefore, a connection between helping the environment but also personal benefit.

Participant no. 10 also mentioned a very important point in how the different types of projects differently affect the environment that is very true and it is important to mention that it is not in the interest of the study to determine how different project differently affect the environment but rather establish the benefit that the green bond has over the other type of investment bond.

To sum it all up, hypothesis 1 can definitely be answered. There is a big difference in terms of how green bonds affect environmental pollution in comparison to another type of bonds. Both primary and secondary data of the study were beneficial in answering this hypothesis.

Green bonds, therefore, are put in place to help and fund environmentally beneficial projects and they are most certainly performing successfully for the majority of times since the first green bond issuance in the year 2013. For the future, the investors must get a clear idea of how different investments will be approached and what organizations are best at using the funding to make a positive difference in the world. The positive effect of the green bond can also be seen in the rise of the amount of issuance since the year of 2007, this is shown in the fig. 2 of the paper.

5.4. Hypothesis 2: There is no difference in pollution improvement before and after the implementation of green bonds in the European Union.

For the second hypothesis, it was important to determine how the implementation of the green bonds after the year 2007 affected pollution. If the green bonds serve its purpose it would be important that there should be some kind of the benefit that was achieved in recent years. To answer this question both primary and secondary data were needed. In the questionnaire, two questions were put in place to help with answering this hypothesis that being the question 2a and 3b.

First, it is important to define pollution. In the literature review of this study, a lot has been written in terms of what pollution is and how it affects the world. The important part is that pollution is present in the atmosphere, land, and water therefore in all shapes and forms of life. In recent decades of human existence, we were able to expand rapidly but also with that came a lot of waste products and dangers for the environment. (Ian L. Pepper., Charles P. Gerba., Mark L. Brusseau. 2006, p.5).

It has been said that to most effectively fight against environmental pollution the question of how to lower the waste product and find new energy sources needs to be answered. In search of this question, a lot of funding is required as all of the new projects need to have some kind of money foundation for them to start to work. That is why green bonds must be developed around these types of projects and allow them to operate (Flaherty, M., Gevorkyan, A., Radpour, S., & Semmler, W. 2017, p.1).

When we look into air pollutants there are five different aspects of data that we take into the consideration, that being sulphur oxides (SO_x), nitrogen oxides (NO_x), ammonia (NH₃), non-methane volatile organic compounds (NMVOC) and fine particulate matter (PM_{2.5}).

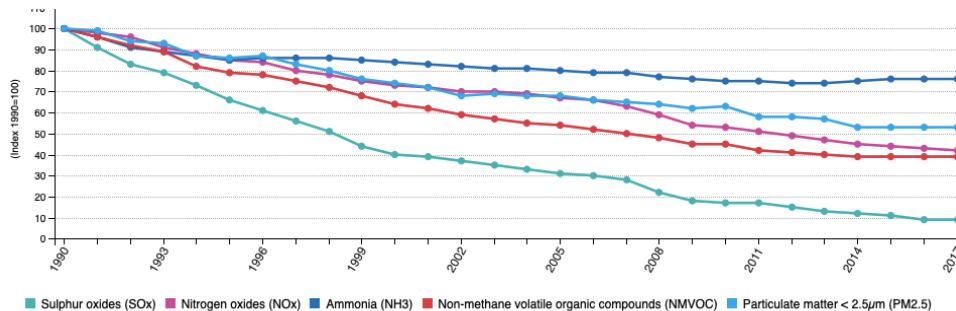


Fig. 11: Emissions of air pollutants

The table above which was taken from the European environment agency clearly shows that since the year 1990 the level of air pollution has had a big drop. That is good news for the EU as it means that the laws and regulations which were implemented one of them also being green bonds work in favor to lower the pollution.

One of the important reasons why environmental pollution was lowered and emissions of the greenhouse gases experienced a substantial amount of decrease in the last couple of years was the Paris Agreement. The agreement was created by the united nations and was developed in the year 2016. However, just recently the US President Donald Trump decided that the funding of such a project is meaningless and stepped back from the deal. Because of the lack of funding many individuals were skeptical of the dangers that this move could bring in the future (Tang, D. Y., & Zhang, Y. 2018, p.10).

Panel C. Apple issues green bond after Trump's Paris Climate Accord exit zoom in

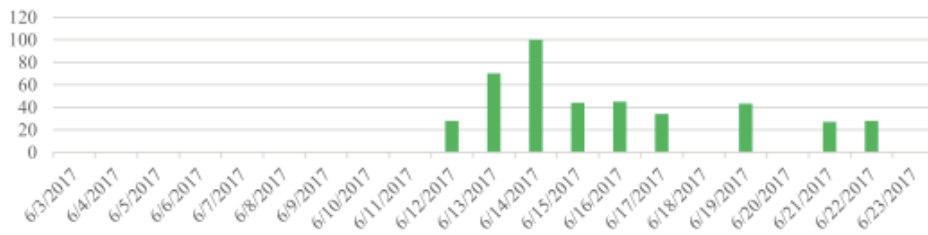


Fig. 12: Apple green bonds issuance

Because one of the largest companies in the world Apple saw the dangers that Trump's Paris climate agreement exit could bring the company issued the largest amount of green bonds to date that is over 1 billion dollars in green bonds straight after Trump announced exit (Tang, D. Y., & Zhang, Y. 2018, p.10).

Secondary data, therefore, proves that there is a difference in the market that was achieved through the implementation of green bonds. Organizations need to be aware of that and bigger companies like Apple start to understand that such investments could be crucial for lowering environmental pollution across the world.

For the research paper also primary data was collected. The responses were various that is why the researcher will separate them into two components firstly the opinions of the participants that believe that no benefit arises from the implementation of green bonds in the market and later the other responses that believe the opposite.

The participants that fall into the category of not believing that there has been improvement since the implementation of green bonds have expressed the following opinions.

Not really I think Europe is considered to be a very green continent however it is my believe that Asian and similar economic power houses also put a lot of effort and money in hope to lower their environmental pollution. Whoever the European Union performs better than America. [11]

Not really I have heard of some projects that were made in the European Union actually but I was also discussing it with my friend and we both came to the conclusion that this is just made for the media and a lot of these organizations are using such projects to appeal to the public and to lower their tax rates. I don't believe any organization would put any money inside if it wouldn't see the instant return on their investment from it or some other type of benefit. [11]

I mean they're not as good as other types of foundation programs that are focusing strictly on helping to fund the project but there as close as you get. [16]

Only one out of ten participants strictly believed that there is no benefit of implementing green bonds. Furthermore, one participant expressed that he would not like to answer because he does not possess enough knowledge of the subject. All of the others which will be shown below thought that the green bonds played an important role in helping with the lowering of environmental pollution in recent years.

Yes absolutely just like I said before I read about one project that was made in the UK and I am certain that in Africa and other Third World countries such bonds can make a huge impact and difference like I also said before I think it is important for there to be some kind of a commission or some kind of an institution that will distinguish the bonds and hopefully focus on the ones that actually make a difference. [I2]

Yes of course I don't want to repeat myself too much but I heard that a lot of projects have been made in Africa that were founded with the help of environmentally friendly bonds there also referred to as climate bonds and I believe that they are really helpful to the environment [I4]

I do believe so but it is really important that we establish our fundamentals and for us to really understand in what we are investing in the biggest problem that I'm facing is that sometimes I would like to help certain projects I would like to invest my money but because I do not have all of the data I cannot make any risky moves and endanger the money offer clients. [I5]

Very much so, I have actually been currently investing through the Nordic investment bank which I have great relationships with and their families a lot of these projects that are of large size and help by reducing the greenhouse gas emissions they are also promoting the energy efficiency and focus on various renewable energy sources. [I9]

70% of the participants had a strong belief that ever since the environmentally friendly bonds have been available the pollution has been lowered. Some of the participants even mentioned some of the projects that they have been directly part of that have helped lower the pollution in the EU. Participant 9 mentioned that the Nordic investment bank to which he has great connections helped to lower the so-called greenhouse gas emissions which are the key aspect of pollution.

To conclude the hypothesis 2, both primary and secondary data that was gathered during the research paper propose that the implementation of the green bond lead to the lowering of the environmental pollution level. However, it is important to add that the Eurobonds are not the only responsible factor for lowering the level of pollution in the European Union. They are used and are beneficial but we cannot say that they are the only used factor let along that their operations are more successful than the ones from others. Green bonds are the funding instrument that is used to invest in environmentally friendly projects and that helps in lowering the pollution levels. However, there is also another type of sector that focuses mostly on the legislation of renewable energy and its efficiencies such as the Energy Union and Climate action (Amann, M. 2008, p.25).

It is very important that the EU stays constant and follows the train of implementing more and more green bonds because they help in terms of lowering waste product and pollution levels.

5.5 Hypothesis 3: Different green bonds do not lead to a different effects on environmental pollution.

The final hypothesis of this research paper was built around the question of whether or not different green bonds lead to different effects on environmental pollution. Here it was important for the researcher to determine how different bonds differently affect environmental pollution. Since the first issuance of the green bond, there have been many options for investments made in various directions. For example, green bonds can be displayed by various identification and certification schemes which can later be added to many of the characteristics that define them.

| | CBI Climate Bonds Certification | Green bond indices ¹ | CICERO Second Opinions | Moody's Green Bond Assessments | Standard & Poor's Green Evaluations |
|---|---------------------------------|---------------------------------|------------------------|--------------------------------|-------------------------------------|
| Use of funds must be tied to green investment | Yes | Yes | Yes | Yes | Yes |
| Eligibility criteria differ by sector | Yes | Yes | | | Yes |
| Ex post monitoring/assessment | | | | Yes | |
| Granular assessments of greenness | | | Yes | Yes | Yes |
| Quantitative weights for specific factors | | | | Yes | Yes |

¹ Bank of America Merrill Lynch, Barclays MSCI, Standard & Poor's and Solactive.

Table 4: Different types of bonds

Furthermore, it is important for the investors to asses and understands how different green bonds operate the comparison of green bond principles and rating agencies green certifications as defined in the paper by Torsten Ehlers and Frank Packer in detail defined the topic.

| Green Bond Principles | Moody's Green Bond Assessments | Standard & Poor's Green Evaluations ² |
|---|---|---|
| <i>Use of proceeds</i> Use should be described and present clear environmentally sustainable benefits. | <i>Use of proceeds</i> Assessment depends on percentage of proceeds allocated to eligible project categories. Weighted 40% as a factor. | <i>Mitigation</i> Assesses the environmental impact of financing proceeds over the life of the assets. Weighted 60% as a factor. |
| <i>Process for project evaluation and selection</i> Decision-making process should be outlined; in particular, how projects fit into green categories, eligibility criteria and environmental sustainability objectives. | <i>Organisation</i> Sub-factors: effectiveness of environmental governance and organisation structure; rigorous review and decision-making process; qualified personnel and/or reliance on third parties; explicit criteria for investment selection; external evaluations for decision-making. Weighted 15% as a factor. | <i>Governance</i> Considers whether well defined procedures in place for: - Selecting projects eligible to be financed - Appraising and managing environmental impact - Complying with environmental regulations Weighted 19% as a factor. |
| <i>Management of proceeds</i> Net proceeds should be tracked by formal internal process. | <i>Management of proceeds</i> Sub-factors: segregation and tracking of proceeds on accounting basis; tracking of the application of proceeds by environmental category and project type; reconciliation of planned investments against allocations; eligibility rules for investment cash balances; external or independent internal audit. Weighted 15% as a factor. | <i>Governance</i> Considers whether well defined procedures in place for preventing proceeds of the bond from being used for other purposes than the intended green financings. Weighted 6% as a factor. |
| <i>Reporting</i> Issuers should provide annual list of projects to which proceeds are allocated. | <i>Disclosure on use of proceeds</i> Sub-factors: description of green projects; adequacy of funding to complete projects; quantitative descriptions of targeted environmental results; methods and criteria for calculating performance against targets; reliance on external assurances. Weighted 10% as a factor. <i>Ongoing reporting and disclosure</i> Sub-factors: reporting and disclosure post-issuance; ongoing annual reporting; granular detail on nature of investment and environmental impact; quantitative assessment of impacts to date; comparison of assessments of impacts with projections at time of issuance. Weighted 20% as a factor. | <i>Transparency</i> - Use of proceeds reporting - Impact reporting and disclosure - External verification of impact data Weighted 15% as a factor. |

Table 5: Detailed assessment of green bonds

Finally, we can look at the return of the risk that the companies have to calculate before making the investment decision here we can also quickly see the differences between various bonds. In the table below we can see how various monthly total returns that have been annualized affected the different currencies. That implies that green bonds also differ based on the currency in which they are offered. (Ehlers, T. and Packer, F. 2017, p. 96).

| | | Hedged returns ¹ | | | | Unhedged returns ² | | | |
|---------------------|--------------------|-----------------------------|----------|-------------|------------------------|-------------------------------|----------|-------------|------------------------|
| | | Cumulative over 36 months | Mean (1) | Std dev (2) | Sharpe ratio = (1)/(2) | Cumulative over 36 months | Mean (1) | Std dev (2) | Sharpe ratio = (1)/(2) |
| Green bond indices | Standard & Poor's | . | . | . | . | -4.18 | -1.48 | 18.44 | -0.08 |
| | BofA Merrill Lynch | 9.17 | 3.06 | 8.64 | 0.35 | -6.45 | -2.15 | 18.92 | -0.11 |
| | Solactive | . | . | . | . | -4.52 | -1.51 | 18.66 | -0.08 |
| | Barclays MSCI | 10.23 | 3.41 | 9.61 | 0.35 | -3.43 | -1.14 | 17.23 | -0.07 |
| Global bond indices | Broad-based | 11.26 | 3.75 | 11.64 | 0.32 | 3.46 | 1.15 | 14.97 | 0.08 |
| | AA average rating | 10.29 | 3.43 | 10.21 | 0.34 | 0.97 | 0.32 | 14.16 | 0.02 |
| | A average rating | 11.02 | 3.67 | 10.99 | 0.33 | 3.12 | 1.04 | 14.08 | 0.07 |

Table 6: Return of the risk

The secondary data therefore easily proves that there is a significant difference between not only the return of the money but also in terms of how it affects environmental pollution through that. However for the research paper also the interviews were conducted and will now be used to back up the fundings in journals and books. On the question of how do you think different green bonds differently affect environmental pollution, the following data was gathered.

Yes of course just like in every investments transaction different types of bonds focus on different projects and therefore have different affect on environmental pollution and don't get me wrong I believe that some of the projects are helping the environment but it is hard to say that that is the primary focus of these organizations. [I1]

Coming from mutual bonds or otherwise known as mutual funds I from experience know that there are many different types of bonds and also stocks that an investor can choose from and each and every single one of them the first buy their size price and also effect that it has on the company individual and the environment. [I2]

Different bonds different investments different strategies [I5]

Yes of course just like different fundraisers put money for different projects different green bonds are put in place for various reasons. [I6]

Well I think that the different types of investments are made to different types of results will be achieved it is hard to say because I'm not really in this field too much but yeah I can tell you from experience of other companies and investments that I make especially the stock market there's so many different options from which the investor can choose from and it is really hard to determine the one that will make the same affect as the other one so everything is special everything is unique and everything will play a different role [I10]

Out of the participants that were interviewed during this research and answered this question everyone had a similar opinion. Some of them also referred outside of the green bonds and expressed their opinion that different types of bonds differently affect the economy. That is why it is normal that green bonds also differently affect the projects and corresponding to that the levels of the pollutions that are the result of these projects.

Both primary and secondary data in this study prove the same answer. The data gathered through the research shows that different green bonds differently affect environmental pollution.

6 Conclusion

While researching and writing the paper the author was able to look into the economy of green bonds and its effect on environmental pollution. The results of the study approved the hypothesis that the author based the research upon and provide a groundwork on which the conclusion can be written. Green bonds are the arising bonds which since their first implementation in the year 2007 gathered a lot of interest from various investors. The benefit is that they allow the investors and companies to have the alternative investment which does not only work to bring them the money return but also funds the environmentally friendly projects that can be helpful to the whole world. The author was very interested in the topic and decided to investigate it through the help of both primary and secondary data which has been carefully analyzed and implemented in the findings of this research.

Three main hypotheses that were defined in the methodology part of the paper were asked and with the help of articles, books, and participants all of the questions were answered. The researcher was very pleased and

would like to express the gratitude towards all of the participants that were kind enough to invest their time and effort to express their opinions on all of the questions that the author asked. The results were positive for the research and can be separated into three different segments based on the hypothesis which they answered.

The first hypothesis was built around the question of whether or not there is a difference between the green bond and another type of bond in terms of their effect on environmental pollution. With the help of books, journals, and interviews the author was able to provide a definitive answer to this question. Green bonds were implemented so that they could help to fund the environmentally friendly projects and based on the data that was gathered during this research this is done to a great extent and is, in fact, beneficial to the environment. This was the first positive feedback on the whole topic of this research paper upon which another hypothesis can be discussed.

The second hypothesis asked if the implementation of green bonds in the European Union helped to change the levels of pollution. Once again the primary and secondary data were collective and it was discovered that in fact, the change is evident. Furthermore larger organizations such as Apple already understand the benefit of investing and using green bonds, which is positive as it will convince smaller companies to invest as well and follow the lead of the giants. Of course, we cannot say that the green bonds are solely responsible for lowering pollution levels in the EU but we can say for sure that they are one of the main mechanisms that have years of working proof and that they were successful.

The last hypothesis was made in the hope to determine if different types of green bonds lead to different effects on environmental pollution. Here it was important to first distinguish what is meant by different green bonds and then using the secondary data to find the records of various bonds

that could be compared. The data was found in both books and journals.

Secondary data suggested that there is a difference and this can be looked at the fact that there, in fact, are various types of investments that green bonds can found. They differ based on the location and the type. Even though they share a common goal to help the environment it is important to note that their output is different and therefore they affect the environmental pollution differently.

The researcher answered some of the questions but just like in any research there is more that could be asked and the arising topic of green bonds poses more questions than it answers. Because the area is now there has not been a lot of data gathered yet and it is hard to compare them to any kind of stocks or other bonds which have been on the market for hundreds of years. It is the hope of the researcher that this paper will bring more interest to the alternative types of investment which are helpful to the environment. Only time will tell before the green bonds will have sufficient data that will be available to the investors so that they can predict how their investments will work in such projects. From the interviews, it was easy to gather the knowledge that everyone is interested to invest in the climate bonds and everyone would like to help the environment but investor return is even more important. That is why the author concludes that it is important for the green bonds to stay transparent in a way that they offer the investors all the data and for them to keep being so closely monitored by the institutions. With that, the future will allow even bring the expansion of them which will be good not only for the investors but also for the environment.

The author hopes that investors and government work together and create projects worth funding that will help the environment while also making a positive return for the economy.

6.1 Further research

For further research, the author would suggest looking more into how pollution is affected outside of the European Union. The paper could focus also on another continent and with that more data could be gathered and later analyzed in terms of how various green bonds across the whole world affected the pollution. The trough that we could gather important information about which green bonds have the optimal success rate and more investors could later found such projects.

It is also worth noting that the researcher was limited to only gather data from Slovenia therefore the additional research which has participants in other countries of the EU could also be conducted.

7 Appendices

7.1 Appendix 1

Questionnaire

This is the first part of the questionnaire which will take you approximately 5 minutes to complete. All of the answers submitted will stay anonymous and will be treated equally with other participants. Please make the (x) on the bullet point to which you want your answer to be marked.

Thank you for helping me with my research.

Gregor Potisk

Question 1: How old are you?

- Between 20-29
- Between 30-39
- Between 40-49
- Between 50-59
- 60 or older

Question 2: For how long have you been working in the financial sector for

- Less than 5 years
- Between 5 and 10 years
- Between 10 and 20 years
- More than 20 years

Question 3: Did you hear about green bond investments?

- Yes
- No

Question 4: How frequently do you operate with bond investments on your job?

- Almost every day
- 3 or more times a week
- Once a week
- Rarely (almost never)
- Never

Question 5: How frequently do you operate with green bond investments on your job?

- Almost every day
- 3 or more times a week
- Once a week
- Rarely (almost never)
- Never

Question 6: Do you believe that green bonds affect environmental pollution?

- I believe green bonds affect environmental pollution in a major way.
- I believe that there is some effect.
- I do not believe that there is any correlation between the two.

Question 7: Do you believe that environmental pollution affects the world?

- I believe environmental pollution affects the world in a major way.
- I believe that there is some effect.
- I do not believe that there is any correlation between the two.

Question 8: What gender are you?

- Male
- Female

Question 9: Do you operate strictly from Slovenia or also from other EU countries?

- I operate only from Slovenia
- I also operate in other EU countries

7.2 Appendix 2

Dear participant,

thank you for your participation in the study. With your help, I am able to conduct my Bachelor thesis on the subject "The Effect of the European Corporate Green Bonds on Environmental Pollution".

Informing the participants of the study:

The duration of the interview is approximately 15-25 minutes. It includes open-ended questions.

In case you desire please do not hesitate to ask for clarification of any question during the interview. The questions are presented in a way that there is no right or wrong choice if you wish we can skip any question or we can come back to it at the end. This interview aims to gather your opinions and beliefs about my research topic. All of the responses will be treated confidentially and will be anonymous.

Thank you for your participation!

Three parts of the interview:

1. Bonds and Green bonds |
2. Environmental pollution and the European Union
3. Correlation between Green Bonds and Environmental pollution

1. Bonds and Green bonds

- a) What importance do you believe that bonds play in the economy?
- b) Have you ever invested in bonds?
- c) Have you ever invested in green bonds?
- d) What differences do you see between green bonds and other types of bonds?
- e) Do you believe that green bonds will play a significant role in the future?

2. Environmental pollution and the European Union

- a) What is your opinion on environmental pollution?
- b) Do you think the European Union performs better in the fight against environmental pollution compared to the rest of the world?

3. Correlation between Green Bonds and Environmental pollution

- a) What correlation do you see between Green Bonds and Environmental pollution?
- b) Do you think that green bonds are the type of investments that help in building sustainable projects around the world? Did you hear of any projects that were founded because of the green bond investments?
- c) How do you think different green bonds differently affect environmental pollution?
- d) How do you think environmental pollution has changed after the first green bond was implemented?

Has this interview motivated you to engage in more green bond activities?
Would you like to add anything to what we discussed during this interview?
Debriefing.

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