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How and to what extent green bonds are a key component of the fight against climate change?

Helsinki Metropolia University of Applied Sciences

Bachelor Degree

European Business Administration Programme

Thesis

30.04.2019

Abstract

Author(s) Title	François Trochon How and to what extent green bonds are a key component of the fight against climate change?
Number of Pages Date	35 pages + 3 appendices 30 April 2019
Degree	Metropolia Business School
Degree Programme	International Degree Programmes
Specialisation option	European Business Administration
Instructor(s)	Patrik Pehrsson, Supervisor
<p>In this paper, we examine the green financial product name green bonds, by answering the question “How and to what extent green bonds are a key component in the fight against climate change?” The green bond market has seen exponential growth past years and continue its development, thanks to the increase of awareness of investors towards ecological issues.</p> <p>After explaining features of green bonds and its market, this research shows the differences of the product compared to other kind of green investments. Green bonds returns are less impacted by the financials ups and downs because it is a low-risk investment, which also means that the return is often lower when the market is in good health. Green bonds studies show different results for the same sample period, which demonstrate that this market need more time and data to get high-quality analysis. However, the results indicate that we have reason to believe green bonds do not outperform compared to conventional bonds. It exists a wide range of ways to promote green bonds in order to make it continue its growth, like pressuring companies, avoiding taxes, increasing investors reliance and communicating about the product. Green bonds thus represent an efficient way to both make an efficient investment and participate in the funding of green projects.</p>	
Keywords	Green Bonds, Finance, Financial performances, Investment, Returns comparison, Climate change

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1 Introduction

Climate change is the most important fight of the 21st century that humanity will have to face. Years after years, people hear more and more about this major problem and some are trying to find solutions. However, it looks like our efforts are not sufficient and the problem is getting bigger and bigger. The goal of big leaders over the world is now to fix a limit of 2° of global warming until 2100, in order to not face a pure disaster. However, latest studies show that the actions that presidents of major countries took will only limit temperature increase from 3.1° to 3.5°, like Figure 1 below shows.

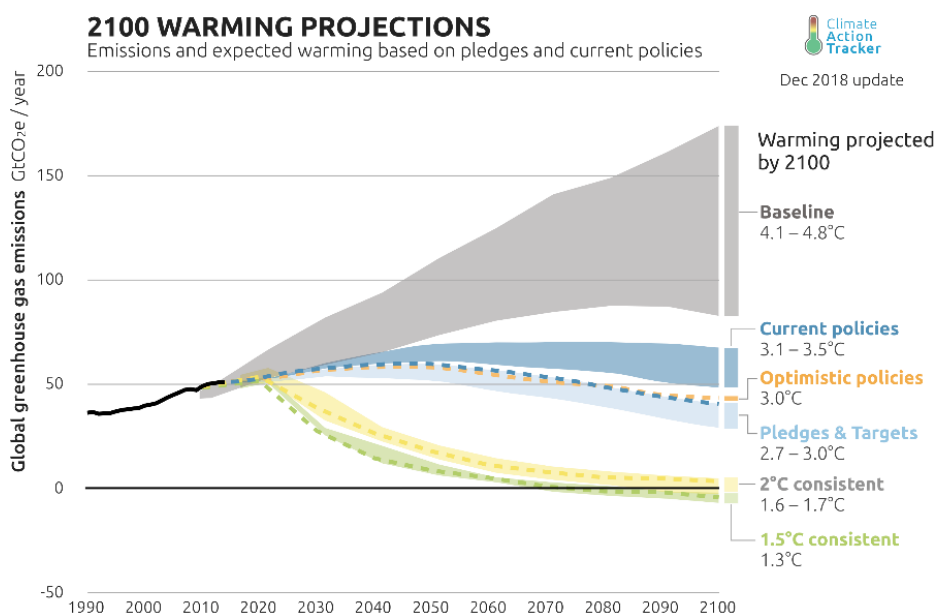


FIGURE 1 - 2100 WARMING PROJECTIONS

Source : Climate Action Tracker 2018

There are plenty of examples of the importance of the problem, for instance experts estimate that there are around 5 trillion plastic pieces in the ocean (McCarthy 2017). Even if some people are trying to act against this global warming and climate change, the efforts are not enough because of the lack of the most important thing: Money.

A lack of financial resources remains one of the biggest hurdles to achieve the cop 21's goal of limiting global temperature increases to 2 degrees Celsius. The UN Framework Convention on Climate Change estimates that investments must increase by about 210 billion dollars annually through to 2030 to meet adaptation and mitigation goals. This

represents less than 0.5% of expected global GDP in 2030 and 1.7% of global investment. (WGES 2017)

Governments do take measures to face this climate warming, but things do not change because these measures are not enough significant. This problem requires big investments and is necessary for the well-being of every single one person living in this world. The main reason why the funds that would improve this problem is too low is because these investments are not profitable investments. In a society conducted by finance and investments, our world leaders are not seeing the importance of this subject. A lot of people are waiting to see the impact of the global warming in their own life before act against it. We can already see changes in some parts of the world, like the WWF website summarize by showing the changes on wildlife, polar regions, oceans, forest and freshwater (World wildlife fund website), but if we wait to see changes everywhere, it is going to be too late. I do believe that these changes and measures will only be successful if both finance and the leaders of the protection of the environments cooperate.

Considering these changes, climate-related investment opportunities have emerged in response to investor demand. The number of investors who incorporate environmental, social and governance criteria has also increased a lot and support this new trend. The green bond is an interesting financial product which aims to fight against climate which currently grow a lot so that is why I will focus my thesis on that subject. The research question I intend to answer in this thesis is **"How and to what extent green bonds are a key component of the fight against climate change?"** We will first define what is a conventional bond and explain what the differences with green bonds are. Then we will see if green bonds are competitive to other kind of green investments and what are the strength and weaknesses of the product. Furthermore, we will analyse studies who compare the financial return of green bonds compared to conventional bonds. Finally, we will see the ways to contribute to the economic upturn of that kind of investments.

2 Bonds theory and terminology

2.1 Bonds theory

I will first give a definition of a regular bond and explain how it works considering the similarities of these products.

"A bond, also known as fixed income instruments, is a debt capital market instrument issued by a borrower, who is then required to repay to the lender/investor the amount borrowed plus interest, over a specified period of time. Usually bonds are considered to be those debt securities with terms to maturity of over one year. Debt issued with a maturity of less than one year is considered to be money market debt." (Fabozzi, Choudhry 2004: 10). "The terms of the bond are described as part of the bond certificate, which indicates the amounts and dates of all payments to be made." (Berk and DeMarzo 2017: 206). A bond is considered as a low-risk investment because the interest is fixed. A low-risk product obviously means that the return is often less important than in other kind of investment. The only risk which exist for investors to do not get their money back is if the company or bank is doing a bankrupt. However, even in that case, investors are often refund because they have the priority over other kind of investments like equity.

In accordance with the fact that bonds are low-risk investments, the bond price activity is very stable compared to the stock market. The bond market in general is growing rapidly. It exists different kind of bonds, depending on the issuer. The first common kind is the treasury bond. It is well-known because it is issued by the government, and it is considered risk-free, which means there is no risk of default. Considering this lack of risk, the interest is quite low but can sometimes be interesting depending of the economic health. Then, there are the corporate bonds. Companies are using bonds as a way of financing their projects. Corporate bonds provide higher returns than treasury bonds because there is a risk of default. It exists a wide range of bonds with different qualities and types. This wide variety comes from the fact that a lot of different kind of companies are issuing bonds, so the rating and return of the bond depends for instance on the size and sector of the company. Finally, the third kind of bonds is the junk bond. It is less used than the other kinds. Junk bonds are indeed highly speculative, so

investors often lack confidence towards this kind of bonds. Their grade ratings are low, however the yields are often very high to compensate the risk taken.

“It would be both difficult and inefficient for every investor to privately investigate the default risk of every bond. Consequently, several companies rate the creditworthiness of bonds and make this information available to investors. The two best-known bond-rating companies are Standard & Poor’s and Moody’s.” (Berk and DeMarzo 2017: 233). Bonds are rated into classes between AAA to D. The higher the rating is, the least like to default. (See Appendix 1)

For instance, the Greek government issued bonds to try to face the crisis, which European countries bought to try to help them. The interest rates were higher because of the risk of these bonds. The EU indeed needed conditions before issuing this bonds, like very high interest rates, for instance the 10-year bond rates were around 35% in 2012. (The balance website)

2.2 Key terminology

“The principal or **face value** of a bond is the notional amount we use to compute the interest payments.” (Berk and DeMarzo 2017: 206)

“**Coupon bonds** pay investors their face value at maturity. In addition, these bonds make regular coupon interest payments.” (Berk and DeMarzo 2017: 209)

“The **coupon rate** is the rate of interest that is multiplied by the maturity value to determine the size of the bond’s coupon payments.” (Fabozzi, Choudhry 2004: 22)

“The internal rate of return of a bond is called its **yield to maturity** (or yield). The yield to maturity of a bond is the discount rate that sets the present value of the promised bond payments equal to the current market price of the bond.” (Berk and DeMarzo 2017: 229)

“The **market** is the specific marketplace being accessed. This feature is especially relevant for bonds, which may be issued in the domestic (onshore) market, where funds are raised from resident investors, or the international (offshore, or Euro) market, where funds are raised from non-resident investors. The selection of a market depends on various factors, including cost, availability, overall market conditions, and regulatory restrictions.” (Banks 2007: 120)

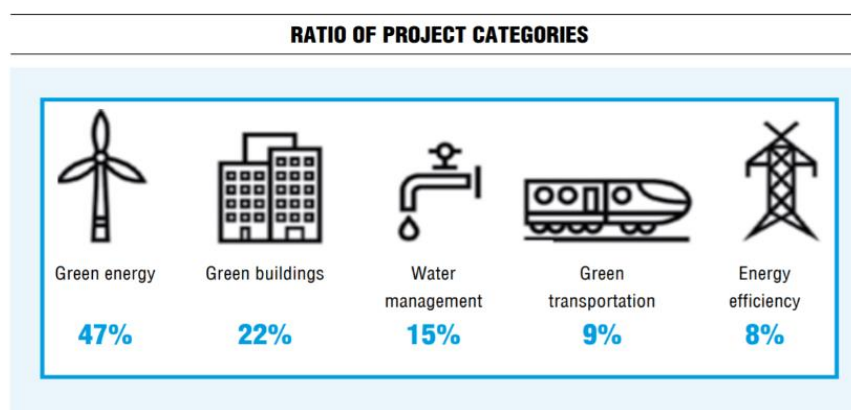
“The **seniority** is the priority of the liability regarding claims on borrower’s assets. The seniority of claims dictates the priority of payment to creditors and equity investors should a debtor company declare bankruptcy.” (Banks 2007: 120)

“The simplest type of bond is a **zero-coupon bond**, which does not make coupon payments. The only cash payment the investor receives is the face value of the bond on the maturity date. As a result, prior to its maturity date, the price of a zero-coupon bond is less than its face value.” (Berk and DeMarzo 2017: 206)

“The **conventional** (or plain vanilla or bullet) is a bond paying periodic interest payments at a fixed rate over a fixed period to maturity, with the return of principal (the nominal value of the bond) on the maturity date.” (Fabozzi, Choudhry 2004: 20)

2.3 Green bonds theory

Green bonds work like regular bonds, the main difference is that they finance investments that offer benefits for the environment or climate protection. Green bonds have been created to fund projects that supports environmental and climate-related projects. Green bonds are more generally part of the green finance, which regroups environmentally friendly investments in order to fight the climate change. The positive impact for the environment can still vary a lot between two different funds. The environmental issue regroups a lot of different branch, for instance the green energy, green buildings, water management, green transportation and energy efficiency.



Source: S&P Global Ratings

FIGURE 2 - RATIO OF PROJECT CATEGORIES

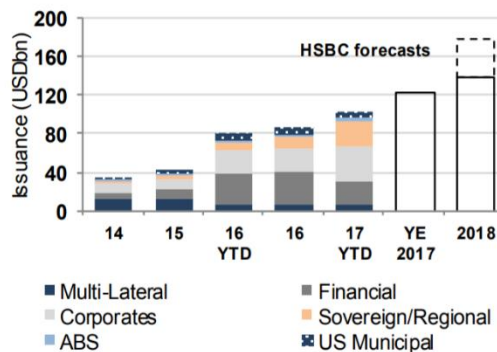
Source : Mihalovits and Tapaszti (2018)

As we can see in the graph above, the green energy is the category of projects who attracts the most people, and therefore represents the highest investments. The main reason is that there are already a lot of projects for implementation of green energy, like with wind turbines and solar panels. Furthermore, it is easier for the investors to see the profitability of its investment. Green energy is also heavily supported by state subsidy in many countries, which enhances its appeal to investors.

The Appendix 2 shows how bonds are traded depending on the financial market tier, the intermediaries and the structure. For the case of green bonds, emissions come mostly from four big sectors, which represents the large amount of green bond supply. These four sectors are corporates (30% of the total emission), financials (25%), sovereigns and sub-sovereigns (21%) and multi-laterals (13%). (Agence France Trésor 2017). Most of the time, bonds are first bought by governments, banks, insurances and funds, which then resell them in the secondary market to private investors. Then, bonds are also traded a lot over-the-counter, even if that is hard to measure exactly how much is traded in each financial market tier because bonds have multiple owner in their lifetime.

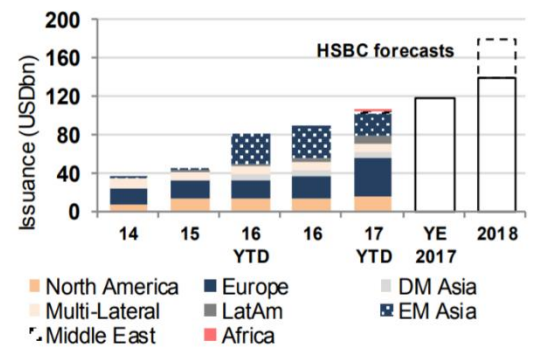
Then, we can evaluate the growth of green bonds, calculated by issuer type and by region thanks to the graphs below.

Annual green bond issuance, by issuer type



Source: HSBC calculations, Dealogic, Bloomberg

Annual green bond issuance, by region



Source: HSBC calculations, Dealogic, Bloomberg

FIGURE 3 - ANNUAL GREEN BOND ISSUANCE BY ISSUER TYPE AND BY REGION

Source : Requin (2017) – Agence France Trésor

We can see the growth of that kind of investments, who reached an annual total volume of green bonds of 120 billion dollars in 2017. Despite this important growth, green bonds only represent a little more than 1 percent of the global bond market, valued at 53 trillion

dollars (Chasan 2019), which still shows that some improvements and growth are possible.

The first country in terms of annual total volume of green bonds is China. Asian financial markets are relatively advanced, so it is not so surprising, especially when it is acknowledged that the ten most polluted cities in the world are located in northern India (Smith 2018). That is why they start to consider and invest in green bonds as a response to these problems they are facing. However, China is issuing way more green bonds than India because their financial situation is different. Meanwhile India is currently a developing country, China is more financially more developed. Thus, they can focus a part of their wealth on the fight against climate changing when India have to complete its financial development first. Then, the United States are in the second place, followed by France and Germany. According to the COP21, green investments and donations made by countries will represent 100 billion dollars each year, in order to finance project who makes countries adapt themselves against global warming or reduce gas emission. The major part of this investment will be made thanks to green bonds. However, as I mentioned earlier the Paris agreement will allow an increase of the temperature of at least 3 degrees, and the last Conferences of Parties did not change the gap fixed in Paris in 2015. The COP 24 took place in Katowice in December 2018 and this event has not been that much successful. The major thing done in Katowice was to confirm the objectives of the Paris agreement, who have been declared "valid" because at least 55% of countries representing 55% of the gas emission signed it in late 2016. The major problem of this agreement is that countries are supposed to respect their engagements but if they do not fulfil their commitments, they have neither sanctions nor fines. This situation is currently happening in a lot of countries. They used the COP21 as way to communicate about their concerns about climate change but we see that there is finally only nine countries in one hundred sixty countries who are respecting their commitments for now. (Marion 2018)

For instance, the most sustainable city in the world, according to the Global Destination Sustainability index, is financed by green bonds. The city of Gothenburg has been the first city in the world to use green bonds to use this financial product, which made the city able to invest around 4 billion euros in green projects, like electric cars and buses, biogas, self-service bicycles, green housing... (City of Gothenburg 2015)

2.4 Green investment psychology

Identifying specifically what kind of person or organisation invest in green bonds is very complicated considering the recent arrival of the product and, as we said earlier, bonds are too often resold and rebought to take conclusions about who invest in green bonds. However, we can identify the demographic profile of socially responsible investors in general instead of only focus on green bonds and try to understand the main factors who makes them buy a green or socially responsible product instead of a conventional one, like equities, normal bonds or currencies.

The first study we will focus on is "The demographic profile of socially responsible investors" and is written by Joan Junkus and Thomas Berry in 2010. This study will show what is the typical socially responsible investor, depending on six demographic factors: Age, Gender, Wealth, Educational level, Marital status and employment status. The results are based on a survey did in the American Association of Individual Investors. The respondents include both socially responsible investors and conventional investors to see if any difference exists. Thanks to the results, we can define the typical socially responsible investor as a female, most of the time single, young, less wealthy and with a better education level than non-social responsible investors. Moreover, we see in the results that the wealthier the portfolio of investors is, the less they are SR, from 36 percent for portfolio lower than 100 000\$ to 26 percent for portfolio higher than 5 million dollars. There is a huge difference between male and female, with 34 percent of SR investors for male and 55 percent for women. Then, the more educated investors are, the more they are SR investors.

Then, the second study analysed to know more about socially responsible investors is named "Segmenting socially responsible mutual fund investors" and is written by Jonas Nilsson in 2009. The study identifies what kind of people invest in these products, but also discuss about the influence of financial returns and social responsibility. It is this time focus only on SR-investors, which will be asked to fill a survey and then put in different segment, depending on if they consider themselves more concerned about the return, the social responsibility or both. We can see that the results about the investor profile are in accordance with the first study, with for instance a majority of women and high-educated people. The first conclusion the study generates is that it exists a group of investors which are more driven by the financial return than the social responsibility. It shows that people who invested in socially responsible investments are not always

socially concerned. Then, the study demonstrates that a high percentage of investors have more important objectives than the financial return. Figure 4 shows us the main

Construct	No. of items	Cronbach's alpha
Importance of social responsibility	2	0.81
Importance of financial return	2	0.76
Perceived consumer effectiveness of SRI	4	0.75
Trust in SRI	5	0.81
Investment confidence	4	0.70
Risk attitude	4	0.69
Investment horizon	3	0.53
Personalization of loss	4	0.66
Investment control	4	0.70

FIGURE 4 - FACTORS GUIDING SOCIALLY RESPONSIBLE INVESTMENTS

factors who makes investors buy socially responsible investment. (Nilsson 2009).

Even though the financial return remains a key factor, it is indeed not the number one factor to investments. The importance of social responsibility and trust in SRI have the better alphas. The investment confidence is currently low, and we will see in the subpart a way to increase the confidence towards these products.

This analyse of the two studies gives us an idea of the green investment's psychology and main factors. However, it is hard for now to give statistics about green buyers and this study have limits. Indeed, socially responsible investment does not always mean green investment: it can also be funds who helps ethics causes, like human rights and consumer protection for example. Then, the world of finance moves quickly and its consumers behaviour too. Thus, the fact that the studies are nine and ten years old means that things could have change. Finally, we only have more information about private investors and not about organisations and corporations.

2.5 Green bonds principles and standards

It is important for green bonds to be clear and clean towards its investors to avoid any kind of greenwashing. Like the Financial Times article written by Terry (2018) shows, it is been in the past green investments which were finally not that green. It is a problem the green sector is facing in order to only sell green investments which are really green. The greenwashing is not fighting the climate change, but it is also discrediting green investments in general. People which invests in green funds and finally realize their

investment did not provide environmental benefits feels betrayed and will be more reticent to invest again in green funds. When you have that kind of scandal, like the most common one, which is to have a little part of the fund owning tobacco or oil assets, it reduces the number of new investors of this market. That is why the green market is changing in intern to propose more classified product, thanks to methods like the green bond principles and the labels. Considering the lack of certification for now, this "green label market" has a very high growth potential.

To clarify the green bond definition and processes, the first tool developed is the Green Bond Principles, which was established in 2014 by a large group of investment banks, including for example JPMorgan, BNP Paribas, Deutsche Bank, HSBC and Goldman Sachs. These banks have now let the lead of this project to the independent secretariat called the International Capital Market Association. The goal of the Green Bond Principles is to verify the transparency, accuracy and integrity of the green bonds and provide guidance to the stakeholders in their research of the product they desire to buy to the issuers. In order to do so, the Green Bonds Principles focus themselves on four core components. The first one is the *use of proceeds*, which is the most important characteristic of green bonds. Indeed, it defines the environmental projects thanks to a list of eligible project categories. The projects should also be assessed and quantified by the issuer. Then, the *process for project evaluation and selection* ask issuers to show the sustainability objectives and the processed used for their green projects, thus being as transparent as possible about their product. Furthermore, the *management of proceeds* corresponds to the process of crediting to a sub-account or moving to a sub-portfolio or tracking in another suitable way all the net proceeds of the green bond. The issuer should follow a formal internal process in order to make each issuance linked to the green investment activities. Finally, it is recommended to do the *reporting* every year, which show the amounts allocated and the results of the green projects. This reporting should include a list of the green projects financed this year with the amount they have been financed. (International Capital Market Association 2018)

The Appendix 3 is a table comparing the Green Bond Principles with rating agencies certifications. It gives an interesting overview of the differences it exists between them, in particular in the methodology implemented in order to deliver the green certification to a specific bond. This appendix is taken from the green bond article written by Ehlers and Packer in 2017.

Then, the next tool is the Climate Bonds Standards. Developed in 2017 by the Climate Bonds Initiative, the CBS is an investor-focused not-for-profit organisation promoting investments in low carbon and climate resilient economy. Contrary to the Green Bond Principles, the CBS provides green definitions specifically for each sector. These definitions are provided by scientists and industry experts. Moreover, the CBS also delivers certifications for assets and projects that meet the standards. Any issuer who wants to get that certification must use a third party approved verifier who verify that the green bond meets all the standards. The Climate Bonds Standard Board currently represents 34 trillion of dollars of assets under management. (Climate Bonds Initiative 2019).

It now exists a wide range of certification, which all have for goal to verify and attest that the green bonds certified are investing their money in green projects. Please see the table below which summarizes certifications that have emerged and explains the characteristics of each of 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.

FIGURE 5 - CHARACTERISTICS OF GREEN BOND CERTIFICATIONS

Source : Ehlers and Packer (2017)

As said earlier, the number of standards and labels for green bonds is growing a lot since two or three years. It exists multiple example of new kinds of certifications. A major one is the Luxflag label. Launched in 2017, this label is the first of its kind worldwide and a lot of other new labels will come. Like any label, its first goal is to provide guidance to investors about the product and certify that it respects the recognised standards.

3 Are green bonds competitive compared to other green investments?

3.1 Theory and methods

Although green investors might sacrifice a small part of their return in order to invest in projects which helps fighting against the climate changing, the financial results of their investments remain essential for them. It can be very interesting to compare the historical results of green investments depending on the kind of asset the investors choose. In order to be able to compare the results, I used the assets data's delivered by US.SIF and available at <https://charts.ussif.org/mfpc/>

US SIF is the forum for sustainable and responsible investment, which helps to develop responsible, sustainable and impact investing across all asset classes. "Its mission is to rapidly shift investment practices toward sustainability, focusing on long-term investment and the generation of positive social and environmental impacts." (The Forum for Sustainable and Responsible investment 2019)

The data I used comes from the mutual fund and exchange traded funds Performance Chart, which shows all responsible, sustainable and impact mutual funds and exchange traded funds proposed by US SIF's (Specialized investment fund) institutional member firms. The information I used were current as of the 30th of January 2019. This study thus shows the comparison of green investment issuance only in the United States. Therefore, this study gives us an idea of green bonds performance compared to other kind of green investment in the US market, even though these results cannot be considered as empirical results.

Please see below a table indicating the number of funds analysed by kind of investment, and the total AUM (Assets under management) by kind of investment.

Green investment issuance		
	Number of products analysed	Total assets under management (US\$ millions)
All Cap	7	1 149,32
Balanced	16	6 813,82
Bonds	45	35 752,45
Equity Large Cap	38	47 508,62
Equity Small and Middle Cap	21	8 599,74
Equity speciality	15	22 022,16
International Global Foreign	37	16 258,62

FIGURE 6 - GREEN INVESTMENT ISSUANCE USSIF

3.2 Results and conclusion

First of all, we can see that bond is the investment which have the most products analysed in this chart, with a total of 45 bonds. However, the Equity Large Cap is the one which have the most assets under management with a total of 47 508,62 million dollars. With a first place in terms of products and second place in terms of assets under management, it shows that green bonds are an important part of green investments in general.

Then, I analysed the data by putting them in an excel sheet and classified them by kind of investment. After transcribing all the numbers into excel, I have been able to calculate means to see which kind of investment have been more profitable depending on the investment's time, which kind of investment is more expensive for customers in terms of management fees and so on. Here is the table of the results of this study.

Performance comparison by kind of investment										
	AUM	YTD	1 yr Avg	3 yr Avg	5 yr Avg	10 yr Avg	Prev yr rtn	Mgmt Fee	Exp Ratio	Std Dev
	US\$ Millions	%	%	%	%	%	%	%	%	
All Cap	164,19	-12,76	-9,23	8,85	5,28	11,93	-12,67	0,85	1,16	17,83
Balanced	425,86	-2,75	-0,62	8,19	5,77	8,56	-2,74	0,4	1,17	10,8
Bonds (Fixed income)	794,5	-0,93	1,22	2,9	2,32	4,05	-0,92	0,43	0,87	2,94
Equity Large Cap	1250,23	-4,69	-2,4	13,77	10,01	15,43	-4,67	0,57	0,91	17,49
Equity Middle and Small Cap	409,51	-9,06	-3,82	11,09	6,48	13,11	-9,01	0,71	1,16	18,94
Equity speciality	1468,14	-8,31	-5,2	10,5	6,42	11,34	-8,27	0,24	0,95	14,89
International Global Foreign	439,42	-12,73	-10,34	8,85	3,05	7,47	-12,67	0,79	1,27	14,92

FIGURE 7 - PERFORMANCE COMPARISON USSIF

AUM : Assets under management

YTD : Year to date

Avg : Average

Prev yr rtn : Previous year returns

Mgmt Fee : Management fee

Exp ratio : Expense Ratio

Std dev : Standard deviation

First, we can see that the average amount of assets under management by fund is more important for the equity speciality. Bonds are quite high too with a mean of 794,5 million of assets under management per bond, which means that issuer of green bonds have the capacity to issue big quantity of assets. This capacity of issue a huge amount of money per bonds is obviously linked to an important willingness from the investors to buy green bonds. The Year to date result shows the return from the beginning of the year to the current date. In our case, it just indicates the results from the 1st January 2019 to the 30th January 2019. The results are negative but one month is not enough significant to take conclusions about it. As we can see thanks to the one-year average and the previous year return, last year have been very disappointing for green bonds. However, this decrease is not only linked to green investments. Indeed, all markets got bad financial results last year. For example, in the United States the biggest indexes dropped a lot, with a decrease of 5.6% for the Dow Jones, 6.2% for the S&P500 and 4% for the Nasdaq. This decline of stock markets have been worldwide, with for instance the FTSE All-World index falling 12%, or the Shenzhen composite, which includes many of the country's tech firms, falling 33%.(Edition CNN 2018)

Despite this general decrease of green investments, bonds have been the financial products who suffered the less from that drop. This better result is due to the safety of bonds and its fixed income, linked to its periodic coupon payments. This safety is mostly explained by the fact that issuers should pay these coupon payments, and that in case of bankruptcy companies first pay bondholders before any preferred or common stock dividends, as mentioned in the bond's theory part. Thus, this is logical to see that the standard deviation is the lowest for bonds. Bond's standard deviation is 2.94, way lower than the second lowest standard deviation, which is 10.8 for balanced funds. The standard deviation is calculated with the dispersion of the average returns from the mean returns. In other words, the standard deviation measures the volatility of the financial product. The higher the volatility is, the riskier the product is too, because the product is more likely to have high growth rates but also high decrease rates. This low standard deviation is one of the biggest strength of bonds because nowadays investors are looking

for safe financial products, considering the lack of confidence in the financial system of investors, more particularly because of the 2008 crisis.

On the other hand, this low standard deviation also means that when markets are rising, the return is lower than other kind of investment. That is why bonds have the best results in the one-year average, but the lowest for the three-year, five-year and ten-year average, with respectively average returns of 1.22, 2.9, 2.32 and 4.05 percent. These results are considerably lower than the other green investments. However, bonds remain competitive because of a lot of investors accept to have a lower return if it means that their investment is safer. For instance, even if they would prefer a 10% return in the ten years average, they still prefer a 4% return in ten years average if it means that in bad years like last year the return is positive.

Finally, we will analyse the management fee and the expense ratio. The management fees cover all the operating costs, like the fund's manager, the rent of the office and so on. The expense ratio includes primarily the transaction costs when the investors sell or buy a product. Most of the time, these two different kinds of fees for the investors are regrouped into one, called the management expense ratio. In the graph, bonds have the second lowest management fee and the lowest expense ratio. These low fees are also a key determinant for investors to buy bonds. Fees can rapidly represent a huge amount of money, especially if you invest a lot of money or if you want to trade a lot. Bonds have generally lower fees because of the safety and fixed income of the products. Considering these facts, bonds need less people to look after them and their rentability, to find new funds to invest in and trade your old funds, to advise customers about their investments...

To conclude, bonds investments represent an important part of green investments. The average return of bonds in long periods is lower than other kind of investments but the standard deviation is way lower too, which means that bonds are less volatile and thus less risky. We are currently in a period when investors have a lack of confidence in financial markets and bonds remain attractive considering this safety even if the return is most of the time lower. Finally, the low management fees and expense ratio makes bonds be a competitive product.

4 Analysis of green bonds performances studies

4.1 Methodology

In this part, we will analyse and compare results of studies which evaluates the performance of green bonds and funds and see if there is a difference with normal bonds performances. It is very significant and interesting to have an overview on what are the results found last years about the green bonds performance, depending on the method used, the date of publication and the criteria taken into account. We will see after that even with a big financial background, studies do not find at all the same results about the green bonds performance, which makes us interrogate ourselves about the relevancy of the results found.

I decided to analyse studies who focus the United States market. This logical choice comes first from the fact that almost all studies are based in the United States. There was not enough study about another market to analyse or these studies were not relevant enough. Then, it shows the importance of the US market in bonds in terms of size and this market gives some information about these bonds.

4.2 Analysis of studies and conclusion

I found six different studies which represent almost all the studies ever done about green bonds comparison. As a summary, please see below a table which show the different studies, the authors, dates and results.

Name	Author	Date	Results of green bonds performance
Do green mutual funds perform well ?	E.Chang / A.Nelson / D. Witte	2012	Underperform a lot
Green bond finance and certification	Torsten Ehlers / Frank Packer	2017	No difference
A comparative study on the financial performance of Green bonds and their conventional peers	Louis William Wagner Ley	2017	Outperform but slightly
Green bonds : Lower Returns or Higher Responsibility ?	Antoniya Petrova	2016	No difference
The Added Value of Green Bonds	Ellis Piva	2017	Slightly better
Performance Comparison (...) : The US Evidence	Max Taivainen	2018	No difference
Is There a Green Bond Premium ?	Olivier Davird Zerbib	2018	A small negative premium

FIGURE 8 - GREEN BOND STUDIES COMPARISON

We can see the diversity of results between studies even though if they analyse the same product. I will analyse the process used in each study to see if the method used have an impact on the results found.

The first one is "Do green mutual funds perform well" By E.Chang, A.Nelson and D.White. This study is by far the oldest study, published in 2012. They took all green mutual funds in the United States of America with available three-year data. They found the green mutual funds thanks to the website US SIF. Then, they found the data using the website Morningstar. This website gave them the data for both normal and green bonds. The study puts all green bonds into "categories" depending on the investment, which can then be compared to the similar category which contains only conventional bonds. Each category of funds has one "performance indicator" for the green mutual fund and one for the conventional fund. The main results are that green mutual funds have way lower returns than conventional bonds, with for example a return of 2.22 percent in 5 years compared to 3.45 percent and 3.92 percent in ten years compared to 5.10 percent. Green mutual funds have also higher expenses, but lower turnover and lower taxes, which is an acceptable result.

Then, the second study is part of an article named "Green bond finance and certification", written by Torsten Ehlers and Frank Packer in 2017 for the Bank for International Settlements review. Their way of process is different than other studies analysed. They indeed based their analysis on the performance indices instead of directly green bonds. They processed that way because indices contain a wide range of bonds, so it gives an overview of the green bond performances. It can therefore easily be compared to conventional bond indices. They focused more on "hedged returns" to avoid any impact of currency movements which could skew the results. The study shows that there was no difference in performance between green bonds indices and conventional bond indices with the same credit rating. The sharpe ratio, which determine the risk-adjusted performance, was even slightly higher for green bonds, although this difference was too low to be significant. The standard deviation, which measure the volatility of the investment, is a bit lower for hedged returns, and higher for unhedged returns. The volatility remains important because of the volatility represents in part the risk of the investment, and investors seek investments with a good ratio of volatility-return.

The third study is named "A comparative study on the financial performance of Green bonds and their conventional peers", by Louis William Wagner Ley. This study is also a master thesis. This one study is focused on green bonds, compared to the others who were studying green funds in general. It compares the financial performance of 359 green bonds compared to 1291 conventional bonds, in a time period from 2011 to 2017. It uses an extended Fama-French model in order to do the analysis. The results indicate

that green bonds outperform conventional bonds, even though the difference is low. Like the other study found, the performance of green bonds is constantly increasing during the period.

Furthermore, the study "Green bonds: Lower returns or higher responsibility" done in 2016 by Antoniya Petrova show how insignificant results found due to the lack of information and data. The time period analysed is 2008-2016 and is focused on the green bonds market specifically. She used two different methods in order to analyse the market: The time-series analysis and the panel data analysis. She respectively used three and five green bonds indices to try to be able to have a decent panel of data and be able to draw conclusions. Although the results show a slight overperformance of green bonds investments compared to conventional bonds, the coefficients scores are highly insignificant. The reason why she found her results insignificant is because, as said earlier, she focused her study on green bonds, meanwhile some studies can find significant studies because they analyse the green market, which provides more data. She concluded by saying that she found no evidence of different financial returns between green bonds and conventional bonds.

In addition, the fifth study is named "The added value of Green Bonds" and is written by Ellis Piva in 2017. He used a matching procedure, using 112 green bonds issued before December 2016 who were matching with similar conventional bond. He concluded that the yield differential for green bonds is slightly positive with a difference of six basis point (equal 0.06%) and depends on the market segment analysed. Considering the low difference between these two kinds of bonds, he said that the difference in return can vary depending on the credit rating of the bond and the amount issued. He also did an analysis of three green bond indices and found that differences in the definition of "green" influence the investors investment styles and performance. These overall results are positive for the green bonds market.

The study "Performance comparison between green and conventional mutual funds: the US Evidence" by Max Taivainen is also a master thesis, done in 2018. It compares the performance of green fund with their conventional counterpart funds, during a time period from June 2006 to June 2017. The results and conclusions are found with an analysis of the bonds found thanks to three main factors: the CAPM, Carhart 4-factor and Fama-French 3 factor. The results show that there is no statistical difference of returns between green and conventional bonds, which means that there is no premium

to pay if you want to invest in a green product. It also indicates that green fund performances are better over the years and resist well in periods of financial downturns. Those results are very encouraging for green mutual funds.

Finally, the last study analysed is written by Oliver David Zerbib in 2018 and titled "Is there a green bond premium? The yield differential between green and conventional bonds". Like most of the study, it uses a matching method. The process used consists of matching two bonds who have the same properties except for the one property we are interested in. The time period of this study is way shorter than others, from July 2013 to December 2017. The study finds that it exists a negative green bond premium equal to -2 bps (equal 0.02%). This kind of difference looks insignificant but in finance it does has an impact. This premium is even more important for financial and low-rated bonds. Finally, the premium remained negative during the whole period from May 2016 to December 2017, which show that returns have recently been unsatisfactory like we saw in part three.

If we take in consideration all the studies and their results, we can think that the results are way different depending on which study we take into account. These studies do not always use the same methods and formulas and the results are often different too. The main reason of this different results is the fact that it is quite a new subject. Green bonds have been launched recently so the performance can change a lot depending on the sample period taken. Then, the lack of data makes it more difficult to do a clear analysis of this subject and tends studies to use different data depending on what is available at the moment they are doing their study. However, we can see that the only result who said that green bonds massively underperform is the study done in 2012. At this moment, green funds were not developed, and it can be possible that they were outperforming at this stage but that the performances changed over the years. All the five other studies show results which are coherent, saying that green funds and bonds almost have no difference in returns compared to conventional bonds. Finally, the interesting factor is that some studies said that the green bonds performance was increasing over the years, even if we saw in part three that 2018 have been a bad year for green investments.

5 Future of the product

5.1 Pressuring companies to do their green transitions

"Lack of standards is not a hinderance to green bond issuance. Pressure on corporates to finance transition will intensify," writes Sean Kidney. (Andrew Whiley 2019)

The biggest carbon emission emitters are multinationals. These big companies are indeed responsible to a large part of the carbon emissions. In 2013, just ninety companies were representing two-thirds of all global warming emissions in the world. (Goldenberg 2013). Nowadays, people are more and more aware that we must change our habits and way to consume. However, things change less quickly in big companies. First, they are that big that any changes they would like to do take some time to be made. It can indeed take years to implement a important change in a company because there are a lot of individuals who needs to agree on the change, which requires a lot of meetings, and then it takes time to implement this changes. Then, they have to be sure it will be a good move and a good strategy for the company and that it will be profitable. That is why changes in companies often occurs when the crowd are putting pressure on them to change. It is most of the time a change in the sales performances who shows a company they have to change, and that people are looking for something different. For example, a drink company who see that their product made with plastic is less bought years after years will probably try a new packaging more sustainable. The other solution, sometimes more aggressive, is done by activist. Green activists try by multiple ways to communicate about the damage caused by companies and show how they could have easily improved it. It could be just by distributing flyers but also more aggressive or illegal actions, like the most well-known which are done by the Non-Governmental Organization Greenpeace. All these actions make companies change their way to product and sell and thus start to do their green transition. This green transition can then be supported by financial instrument like green bonds. Companies indeed do not need to be green at first sight to issue green bonds. They just need to invest the money borrowed on projects who have environmental benefits, like for instance renewable energy projects and energy efficiency for buildings. That is why companies like Apple, Unilever and Bank of American issued huge amounts of green bonds in recent years. It is very interesting for companies because these issuances are a way to get money for new projects but also to increase their brand image. As we saw, the people awareness towards climatic

issues is growing and these companies doing a green transition are showing to their customers that they understand their wishes. These companies also see improvements in financial performance, better environmental performance and more green innovations, and an increase in ownership by long-term and green investors (Flammer 2018).

These companies have not been that much pressure and understood by themselves that they have to start investing in green project to responds to customers wishes. However, it is not the case of every company, for instance for the oil company Royal Dutch Shell. An activist shareholder group of the company launched a campaign to make Shell cut its carbon emission. Like most of the time, this green campaign has been successful and only 6 per cent of people were against it. Shell then had to take measures to show their engagement to climate. Their main engagement is to take the objective to divide by two their carbon footprint by 2050. There are multiple examples like this of new targets set by companies thanks to pressure from activists or investors. This example of however very interesting because it shows that even this kind of big companies, which are almost more powerful than governments, can change, set challenging objectives and start their green transition. "Only investors can make them change" says Mr van Baal. (Raval & Mooney 2019)

5.2 How to help green bonds to be more attractive

First of all, one of the main issues of the green bond market is that the financial market is currently focus on short-term investment. However, green investments are often long-term investment and it penalize a bit this market. "While there are short-term gains to be made, the longer-term environmental disaster spells an economic disaster." (Steve Waygood 2018). Nowadays, investors seek short term return on investment to quickly make their investment profitable and invest in something new. Generally, investors do not keep a share or a bond until its maturity. That is a barrier for the green sector because it still needs a lot of research to develop new technologies, like the new technology who extracts CO₂ in the atmosphere. When a project is still in research phase, it is obviously a long-term investment because the product is far from being launched, which means there is no money earned by the company. It can in addition takes a long time between the launch of the product and the time the company is profitable. This kind of investment can be very profitable but is risky because it depends what are the results of the research and development. That is why we see for now way less very long-

term investments, compared to shorter-term investments like solar panels and wind turbines, even if green bonds investments are a bit more long-term than conventional bonds.

Then, the green bond market must continue to acquire more standards and labels to show to the investors the positive effect of the product on the environment. We saw in part two that things are changing and there are more and more standards, but it still represents a low part of green bonds investment. We also need more clarity on what is green and what is a green bond to put all bonds on an equal footing. It will help the consumer in its choice and facilitate the comparison between two bonds. Furthermore, we can imagine that some tools can be developed to show exactly to the investors the benefits of their investment. For instance, it could be interesting for customers who invest in a project who renovates a building to make it more energy efficient, to see the difference their investment makes, like the energy and the CO₂ saved. In general, all the tools which will increase the investors reliance and appeal for green bonds will be positive for this market. This is something there is no doubt issuers will improve soon, considering they are already able to do very good presentations and graphs for normal bonds.

In addition, the issue of green bonds is more expensive than conventional bonds and can be a barrier. The reason why it is more expensive is partly because of the necessity to get accreditation and to hire qualified consultants. These addition costs could be paid by issuers or for instance the financial regulatory authority, in order to avoid this barrier to the green bond market. For example, the Singapore Monetary Authority refunds the costs of issuing green bonds if the investment meets some criteria (Mihalovits, Tapasztai 2018) and it can be reproduced in other places of the world to enhance green bonds issuance.

Two different tools are currently being discussed in Europe to promote green bonds. The first one is the "One planet summit". During this meeting, they took different measures which are about to be adopted in May 2019. The main measures are the implementation of a taxonomy for environmental investments and rules on information obligations towards investors and the creation of low-carbon indices. Then, the "Green Supporting Factor" is the second tool. Asked by some banks, they want states to give a financial advantage to green bonds compared to normal bonds. It is also currently being discussed considering the importance of the subject. The easiest way would have been to tax more conventional bonds but some countries disagree and prefer less taxes on green bonds.

(Cuny 06/06/2018). The European Union have good intentions but it is the perfect example to show how hard is it to change financial rules. Finance is that big now that every change is hard to obtain, and some people and companies can put pressure to avoid the changes.

Finally, the best way to promote green bonds remain the communication done by states and issuers. There is now a lot of news in the media who show the ecological disaster which is coming, and it can help investors to start buying green bonds. Then, the issuance of green bonds done by countries are very important for the green bond market. First, countries have the capacity to issue big quantity of green bonds and it is good for the market. It also shows to the population and investors that the country believes in this financial product. France is the first issuer of sovereign green bonds with an amount of 14.8 billion dollars, but a lot of countries and cities starts to issue green bonds as well, like Hong Kong, the Netherlands, Ireland, Sweden, Morocco and Kenya. (Cuny 28/06/2018)

6 Conclusion

The purpose of this thesis was to an analysis of green bonds, which are a relatively new capital investment. The green bond market, which is very recent, is growing at great speed since 2014, with sometimes increases of one hundred percent in one year. This financial product has for goal to support projects which are environmentally friendly, in order to fight against the global warming. The growth of this market shows the awareness of investors towards the ecological issues the world is now facing.

Considering green bonds are not the only type of green investments, I decided to do a comparison of performances. We see that green bonds have different and unique characteristics compared to other green investments. The risk taken is less important, so the volatility of the bond is less important too. This study shows the economic downturn in 2017, so green bonds suffered less is this period but also had lower returns where markets were in good health. Although people who invest in green investments are almost all concerned by the importance of the ecological problems, we see that it is not the same kind of investors who will invest in green bonds and in other kind of green investments, like green equities, because the products are very different.

Then, I analysed some studies about green bonds performances to get an overview of the returns of the product last years. The subject is relatively new, so the results found were very different. However, we see that the more the studies are recent, the better the results found were. We can still conclude that the differences in the results found makes those results quite insignificant. We can hope for a better data availability in the future and studies from the best institutes in order to have a decent idea about the financial performances of the product, which seems to be close to the return of conventional bonds. It is proven that there are anyway no advantages for green bonds to have low returns because it would help nobody. "It is a truth [...] that there are no ethics in losing money – not for the investor who needs performance and growth in order to meet investment objectives and certainly not for the fund manager entrusted with the sound management of other people's money" (Hancock 2002: 81)

In addition, I developed ideas and projects which should be implemented or continued in order to increase the attractiveness of green bonds. The product currently suffers from the short-term focus of the financial market and it could reduce the growth potential of the market. Increasing the reliance of investors is a fundamental issue and the market

understood it by starting to implement rules, standards and labels. The support towards green bonds can come from financial advantages gave to green investors, like an avoidance of taxes. An effective way to promote the product remains the communication done by media and states but also by the pressure putted on companies to make them change.

Our current capitalist and ultra-liberal system did make suffer a lot our planet with its wishes to product more, product at less cost by the delocalisation and by giving always more power to rich multinationals, but we are not going to win this war against climate change if we do not use the financial system because its power is too important. We saw in this thesis that green bond is a trendy financial product and a very good way for investors to put their money on a product who finance green projects without necessarily have lower returns on investment.

References

Books :

- Banks Erik (2007) "Finance : the basics" London : Edition Routledge
- Berk and DeMarzo (2017) Corporate Finance, Chapter 6 p206-243. Edition Pearson. Pearson Education Limited [2017] Fourth edition. Global edition
- Fabozzi Frank, Moorad Choudhry (2004), The Handbook of European fixed income securities. Edition John Wiley & Sons 2004.
- Hancock J. (2002) « Ethical money », London, Edition Kogan Page.
- Hahnel R. (2011) « Green Economy : Confronting the ecological crisis », Armonk, NY : M.E. Sharpe cop.
- Koester E. (2011) « How to build a sustainable business? » Hoboken, CRC Press.

Articles :

- C. Edward Chang, Walt A. Nelson, H. Doug Witte, (2012) "Do green mutual funds perform well?", Management Research Review, Vol. 35 Issue: 8, pp.693-708, Available at : <https://doi.org/10.1108/01409171211247695>
- Chasan (2019) "Bonds to save the planet". Bloomberg website. Available at : <https://www.bloomberg.com/news/articles/2019-04-23/bonds-to-save-the-planet>
- Ehlers, Packer (2017) "Green bond finance and certification", Bank for International Settlements Quarterly review, September 2017. Available at : https://www.bis.org/publ/qtrpdf/r_qt1709h.pdf
- Flammer (2018) "Green bonds benefits companies, investors, and the planet". Available at : <https://hbr.org/2018/11/green-bonds-benefit-companies-investors-and-the-planet>

- Goldenberg (2013) "Just 90 companies caused two-thirds of man-made global warming emissions". The guardian website. Available at : <https://www.theguardian.com/environment/2013/nov/20/90-companies-man-made-global-warming-emissions-climate-change>
- Inderjit Kaur, K. P. Kaushik, (2016) "Determinants of investment behaviour of investors towards mutual funds", Journal of Indian Business Research, Vol. 8 Issue: 1, pp.19-42, available at : <https://doi.org/10.1108/JIBR-04-2015-0051>
- Isidore (2018) "2018 was the worst for stocks in 10 years, December 31 2018, CNN Business, available at : <https://edition.cnn.com/2018/12/31/investing/dow-stock-market-today/index.html>
- Junkus, Berry (2010) "The demographic profile of socially responsible investors", Managerial Finance, Vol.36 Issue, pp 474-481
- Ley (2017) "A comparative study on the financial performance of Green bonds and their conventional peers", Erasmus University Rotterdam
- Kochetygova & Jauhari (2014) "Climate Change, Green Bonds and Index Investing: The New Frontier", S&P Dow Jones Indices
- Marion (2018) "9 pays sur 160 respectent leurs engagements climatiques », Up Magazine. Available at : <http://www.up-magazine.info/index.php/planete/climat/8042-9-etats-sur-180-respectent-leurs-engagements-climatiques>
- McCarthy (2017) "The World's Oceans are infested with over 5 trillion pieces of plastic", Forbes. Available at : <https://www.forbes.com/sites/niallmccarthy/2017/03/21/the-worlds-oceans-are-infested-with-over-5-trillion-pieces-of-plastic-infographic/#517ea305ab76>
- Mihalovits, Tapaszti. (2018) "Green Bond, the financial instrument that supports sustainable development", Public Finance Quarterly (0031-496X). 2018, Vol. 63 Issue 3, p303-318. 16p.

- Nilsson (2009) "Segmenting socially responsible mutual fund investors: The influence of financial return and social responsibility", *International Journal of Bank Marketing*, Vol 27 Issue 1, pp 5-31
- Petrova (2016) "Green bonds: Lower return or higher responsibility?", Radboud University, Nijmegen School of Management
- Piva (2017) "The added value of green bonds", Erasmus University Rotterdam
- Reichelt (2010) "Green bonds: a model to mobilise private capital to fund climate change mitigation and adaptation projects", The World Bank
- Requin (2017) "Monthly Bulletin – Agence France Trésor", November 2017, Number 330. <https://www.aft.gouv.fr/files/archives/attachments/26323.pdf>
- Schiliro (2018) "The global financial services industry : the market", Xerfi study, August 2018
- Smith (2018) "Making sense of divisive trends", *Financial Times Europe*, December 2018
- Tavainen (2018) "Performance Comparison Between Green and Conventional Mutual Funds: the U.S. Evidence", Lappeenranta university of technology
- Terry (2018) « ESG ? SRI ? Is your green portfolio really green ? » *Financial Times*, 18 January.
- Wagner W. (2017) "A comparative study on the financial performance of Green bonds and their conventional peers", Rotterdam, Master Thesis in Financial Economics, Erasmus University Rotterdam
- Wansquare (2017) "L'investissement vert n'a jamais autant intéressé la Finance" France, *Le Figaro*
- Whiley (2019) "Climate Bonds : 2019 Green investment Picture : Sean Kidney's Special Post for Blog Subscribers". Available at :

<https://www.climatebonds.net/2019/02/climate-bonds-2019-green-investment-picture-sean-kidneys-special-post-blog-subscribers>

- Vevarka (2010) "Going Green with mutual funds", Barron.com
- Zerbib (2018) "Is there a green bond premium? The yield differential between green and conventional bonds", Tilburg School of Economics and Management

Websites :

- BNP Paribas (2018) "BNP Paribas : Green bond framework". Available at : https://invest.bnpparibas.com/sites/default/files/documents/180430_bnpp_green_bond_framework.pdf
- City of Gothenburg (2015), Projects funded by the Green Bond Program. Available at : <https://finans.goteborg.se/en/greenbonds/projects/>
- Climate action Tracker (2018), Temperatures. Available at : <https://climateactiontracker.org/global/temperatures/>
- Climate Bonds Initiative (2019). Climate bonds standard an certification. Available at : <https://www.climatebonds.net/standard>
- Cuny (06/06/2018) "Il faut une stratégie pour réorienter l'épargne des Français vers la finance verte ». Available at : <https://www.latribune.fr/entreprises-finance/banques-finance/il-faut-une-strategie-pour-reorienter-l-epargne-des-francais-vers-la-finance-verte-780470.html>
- Cuny (28/06/2018) « L'obligation verte de la France atteint le record de 14,8 milliards d'euros ». Available at : <https://www.latribune.fr/entreprises-finance/banques-finance/l-obligation-verte-de-la-france-atteint-le-record-de-14-milliards-d-euros-783300.html>
- Global Destination Sustainability Index (2018). Available at : <https://www.gds-index.com/top-destinations>
- International Capital Market Association (2018). Green Bonds Principles. Voluntary process guidelines for issuing green bonds. Available at :

<https://www.icmagroup.org/green-social-and-sustainability-bonds/green-bond-principles-gbp/>

- Le Monde (2017), Changement climatique : Le cri d’alarme face à l’inertie des Etats. Available at : <https://www.lepetitjuriste.fr/droit-des-affaires/green-bonds-lavenir-de-planete-se-joue-t-finance-verte-analyse-dun-marche-porteur-de-avenir/>
- “Les *green bonds*, ou *obligations vertes* ». Available at : https://www.eccorev.fr/IMG/pdf/Green_bonds_for_otmed.pdf
- Luxflag, Supporting Sustainable Finance, Green Bond Label. Available at : <https://www.luxflag.org/labels/green-bond/about-label.html>
- OECD (2015) , Green bonds : Mobilising the debt capital markets for a low-carbon transition. Available at : <http://www.oecd.org/environment/cc/Green%20bonds%20PP%20%5Bf3%5D%20%5Blr%5D.pdf>
- Selectra (2019), COP 21 de Paris : Le résumé des enjeux et des engagements pris par les Etats. <https://selectra.info/energie/guides/environnement/cop21>
- The balance website, Greek debt crisis explained. Available at : <https://www.thebalance.com/what-is-the-greece-debt-crisis-3305525>
- The Forum for Sustainable and Responsible investment (2019), Information about the USSIF missions. Available at : <https://www.ussif.org/about>
- The Forum for Sustainable and Responsible investment (2019), Data of green bonds performance. Available at : <https://charts.ussif.org/mfpc/>
- World Wildlife Fund website. (2019) Available at : <https://www.wwf.org.uk/effectsofclimatechange>

Appendices

APPENDIX 1 - CONVENTIONAL BONDS RATING

TABLE 6.4 Bond Ratings

Rating*	Description (Moody's)
Investment Grade Debt	
Aaa/AAA	Judged to be of the best quality. They carry the smallest degree of investment risk and are generally referred to as "gilt edged." Interest payments are protected by a large or an exceptionally stable margin and principal is secure. While the various protective elements are likely to change, such changes as can be visualized are most unlikely to impair the fundamentally strong position of such issues.
Aa/AA	Judged to be of high quality by all standards. Together with the Aaa group, they constitute what are generally known as high-grade bonds. They are rated lower than the best bonds because margins of protection may not be as large as in Aaa securities or fluctuation of protective elements may be of greater amplitude or there may be other elements present that make the long-term risk appear somewhat larger than the Aaa securities.
A/A	Possess many favorable investment attributes and are considered as upper-medium-grade obligations. Factors giving security to principal and interest are considered adequate, but elements may be present that suggest a susceptibility to impairment some time in the future.
Baa/BBB	Are considered as medium-grade obligations (i.e., they are neither highly protected nor poorly secured). Interest payments and principal security appear adequate for the present but certain protective elements may be lacking or may be characteristically unreliable over any great length of time. Such bonds lack outstanding investment characteristics and, in fact, have speculative characteristics as well.
Speculative Bonds	
Ba/BB	Judged to have speculative elements; their future cannot be considered as well assured. Often the protection of interest and principal payments may be very moderate, and thereby not well safeguarded during both good and bad times over the future. Uncertainty of position characterizes bonds in this class.
B/B	Generally lack characteristics of the desirable investment. Assurance of interest and principal payments of maintenance of other terms of the contract over any long period of time may be small.
Caa/CCC	Are of poor standing. Such issues may be in default or there may be present elements of danger with respect to principal or interest.
Ca/CC	Are speculative in a high degree. Such issues are often in default or have other marked shortcomings.
C/C, D	Lowest-rated class of bonds, and issues so rated can be regarded as having extremely poor prospects of ever attaining any real investment standing.

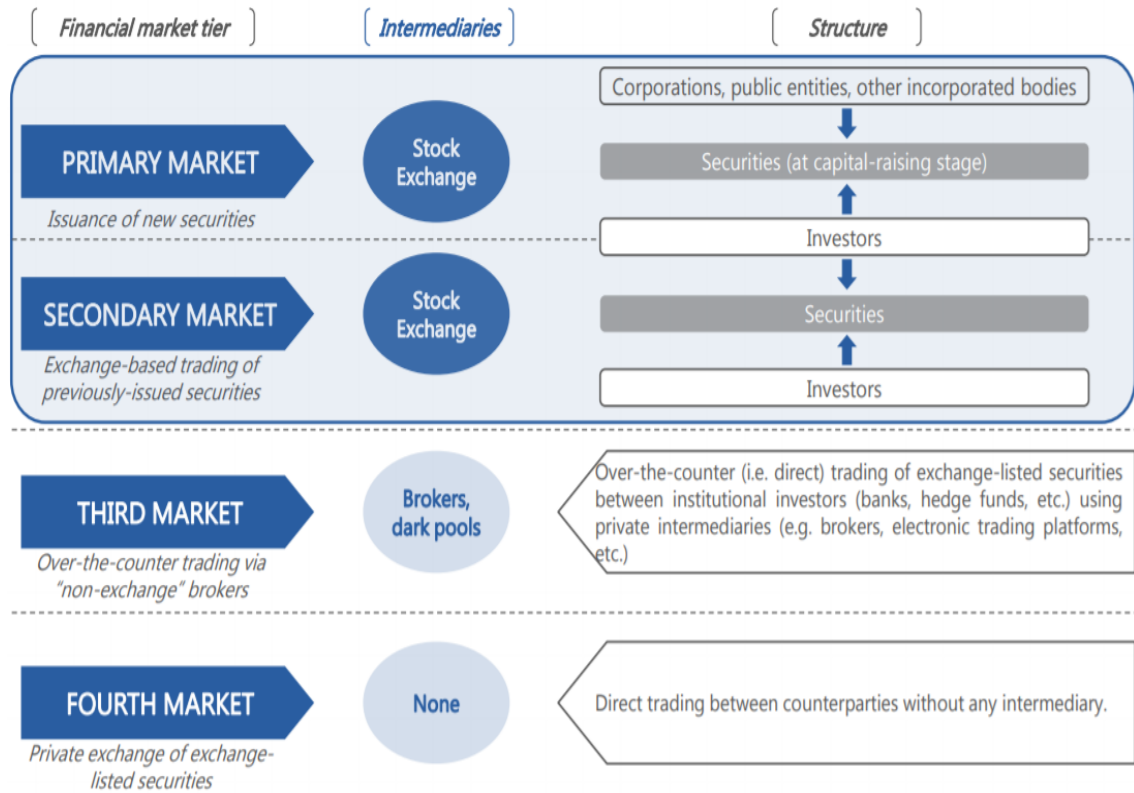
*Ratings: Moody's/Standard & Poor's

Source: www.moody.com

APPENDIX 2 - FINANCIAL MARKET'S STRUCTURE AND BASIC ORGANISATION (SCHILIRO 2018)

Security exchanges operate in primary and secondary markets

Financial markets' structure and basic organisation by market tier



APPENDIX 3 - COMPARISON GREEN BOND PRINCIPLES AND RATING AGENCIES' GREEN CERTIFICATIONS

Comparison of Green Bond Principles and rating agencies' green certifications Table 2

Green Bond Principles	Moody's Green Bond Assessments	Standard & Poor's Green Evaluations ¹
<p><i>Use of proceeds</i> Use should be described and present clear environmentally sustainable benefits.</p>	<p><i>Use of proceeds</i> Assessment depends on percentage of proceeds allocated to eligible project categories. Weighted 40% as a factor.</p>	<p><i>Mitigation</i> Assesses the environmental impact of financing proceeds over the life of the assets. Weighted 60% as a factor.</p>
<p><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.</p>	<p><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.</p>	<p><i>Governance</i> Considers whether well defined procedures in place for:</p> <ul style="list-style-type: none"> - Selecting projects eligible to be financed - Appraising and managing environmental impact - Complying with environmental regulations <p>Weighted 19% as a factor.</p>
<p><i>Management of proceeds</i> Net proceeds should be tracked by formal internal process.</p>	<p><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.</p>	<p><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.</p>
<p><i>Reporting</i> Issuers should provide annual list of projects to which proceeds are allocated.</p>	<p><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.</p> <p><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.</p>	<p><i>Transparency</i></p> <ul style="list-style-type: none"> - Use of proceeds reporting - Impact reporting and disclosure - External verification of impact data <p>Weighted 15% as a factor.</p>

¹ The methodology of Standard & Poor's Green Evaluations differs between instruments that finance mitigation projects and those that finance adaptation projects. The comparison of the table focuses only on the evaluations of instruments that finance mitigation projects, or those that "bring environmental benefits and target areas such as natural resources depletion, loss of biodiversity, pollution control, and climate change".

Sources: International Capital Market Association (2015); Moody's Investors Service (2016a); Standard & Poor's (2017b).