CCGR

Centre for Corporate Governance Research

Research Report
No. 2/2025

February 2025

Norwegian Green Bond Market

Gosia Ryduchowska, Moqi Groen-Xu

BI NORWEGIAN BUSINESS SCHOOL

Norwegian Green Bond Market*

Gosia Ryduchowska[a,*], Moqi Groen-Xu[b]

[a] *BI Norwegian Business School, Nydalsveien 37, Oslo, 0484, Norway*
[b] *Queen Mary University of London, Mile End Road, London, E1 4NS, UK*

1. Introduction

In this report, we describe the green bonds market using an example of a country that shares, or even pioneers, these global trends — Norway. Norway is a country with a strong interest in green assets that has provided the issuance and trade of green bonds for over 10 years. Since its inception until the year 2020, the number and value of green bonds issuance rose tenfold reaching the value of almost $ 3 billion in 2020. The relevance of the market rises in line with its size — the Norwegian green bond market attracts foreign issuers and investors that made up around 20% of all participants as of 2020.

We also document ownership patterns of green bonds. In addition to funds, Norwegian green bonds are traded by individuals, non-fund financial companies, as well as government-related and non-profit organizations. Similarly to regular bonds, mutual funds constitute the key participants with over 40% market share. Individuals hold less than 5%, and green bonds attract more government-related and non-profit organizations (12% vs 6%), thus replacing non-fund financial companies that are more prominent in non-green bonds.

*We are grateful to the Research Council of Norway and the Centre for Corporate Governance Research at BI for their financial support, and Nordic Trustee for the data.

*Corresponding author
Email addresses: malgorzata.ryduchowska@bi.no (Gosia Ryduchowska), moqi.xu@qmul.ac.uk (Moqi Groen-Xu)

2. Data

The summary is based on two main data sources – the registry of all the Scandinavian bonds covered by the Nordic Trustee, and the Euronext Securities Oslo. Nordic Trustee is the leading provider of bond trustee services in Norway as well as detailed reference data on all Nordic debt securities issued by the public, financial, and corporate sectors. Euronext Securities Oslo – the only central securities depository in Norway – contains information about securities traded on the Oslo Stock Exchange and the respective settlement details. The report includes details both from the Oslo Stock Exchange and Nordic ABM marketplaces.

We supplement the main data sources with firm-level information about issuers from the Centre for Corporate Governance Research (CCGR) database. It contains financial accounting data for public and private Norwegian companies for 2/3 of the issuer-year observations in the sample. This percentage is smaller for green bond issuers (56%). Bond price data are from the Oslo Stock Exchange, Bloomberg, and Euronext Securities transaction data. Bonds on the Norwegian market are not traded frequently, but we are able to calculate returns for almost 90% of the ISIN-month observations. Around 30% of the observations relies on the prices actually reported for a given security in a given month in one of the sources, the rest relies on the most recently reported price. Carbon emissions are from Trucost and ESG scores from Thomson Reuters' ASSET4. The coverage of the environmental performance data is still a challenge, with Trucost covering around 30% of the issuers of the listed bonds in Scandinavia.

We limit our attention to bonds traded in the years from 2010 to 2020. Given that the first corporate green bond was issued in the year 2013 by the Swedish firm Vasakronan, this time frame allows us to capture and describe the growth of the green bond market from its birth through the early stages of rapid growth.

The summary describes non-governmental bonds traded on the Oslo Stock Exchange. That is, we exclude unlisted bonds but include securities issued outside of Norway that were traded in Oslo. We focus on listed securities to provide insight into the ownership

and trading patterns. We include non-Norwegian bonds to do justice to the international outlook of the Norwegian bond market, especially in the context of green assets that gained popularity in Scandinavia before attracting interest globally. The sub-sets of bonds traded in Norway and issued in Norway overlap to a large extent - Norwegian issuers provide 83% of our listed securities sample and 37% of the bonds issued by Norwegian issuers are listed, and the percentage is much higher - 80% - for green bonds.

3. The Norwegian bond market

Relative to the size of Norway's economy, its bond market is large; it constitutes about 79% of the stock market and 58% of the Norwegian economy (2018). The Norwegian bond market sub-segment is second in terms of size in Scandinavia, following Sweden. In years 2010 to 2020, there were 19,227 active bonds (NOK 6,630 bn in terms of initial outstanding value) issued by Norwegian companies, and 8,768 bonds valued over NOK 3,636 bn were traded on the Norwegian marketplaces. The market emerged to serve the oil sector but it has grown and diversified since then. There were 438 listed bonds issued in 2010 worth 179 bn NOK and 670 bonds worth 446 bn NOK issued in 2020 (Table I). The latter value corresponds to about 47 bn in 2020 USD.[1] Shipping is the primary sector financed with bonds in Norway with bonds outstanding worth 1,130 bn NOK at issuance (Table II), but it is followed by more conventional sectors such as finance (1,129 bn NOK) and banking (912 bn NOK). Oil and gas firms issued bonds worth 89 bn NOK for exploration and production and 255 bn NOK for services. Apart from Norwegian issuers, the market serves various international companies. Most of the foreign issuers come from the region - Swedish, Finnish, and Danish issuers make up almost 10% of the sample. It is not uncommon that a given company issues several bonds on a given day (as documented by Larcker and Watts (2019)) - the 8,768 bonds correspond to 113,558 unique security-quarter observations and 1,144 unique issuers.

[1] The NOK-USD comparisons in the summary also rely on 2020 exchange rate prices.

Green bonds are fixed-income assets from which proceeds are earmarked for climate-friendly projects (Flammer, 2021). While there is no one route to obtain a green label, most issuers opt to get certified. The certification providers tend to adhere to the Green Bond Principles (GBPs) which is a voluntary set of guidelines for issuing green bonds introduced by the International Capital Markets Association (ICMA). GBPs place particular emphasis on ex-ante verification. E.g., "use of proceeds" is the cornerstone of the framework and it does not make any reference to outcomes delivered by the projects. The assessment before issuance makes the risk profile of green bonds comparable to non-green bonds of the same issuer.

Similarly to the overall Norwegian market, green bonds have experienced rapid growth in recent years. In 2014, a year after the first corporate green bond issuance, there were 5 green bonds traded in Norway with a value of around NOK 3 bn (approximately USD 300 million). 6 years later the primary market increased tenfold and amounted to over NOK 30bn in issuance value and corresponding to 44 bonds. It is a comparable growth relative to the global patterns - Flammer (2021) reports that between 2013 and 2018 the green bonds issuance increased from $5 bn to over $95 bn. It is also a much higher growth rate than of the overall Norwegian bond primary market which approximately doubled over the same period (from NOK 220 bn to NOK 445 bn). Despite the impressive growth rates in issuances, the green market is still small relative to the overall bond trading in Norway making up around 2.4% in terms of outstanding value in 2020. The fraction is slightly higher compared to the global values. Internationally, the green bond market makes up around 0.85% of the total market size (ICMA, 2020).

4. Issuers

Most green bonds in our sample are issued by Norwegian companies, with a considerable share of foreign issuers. The fraction of Norwegian issuers is 76% and is slightly smaller than in the overall sample of bonds (Table III). The higher share of foreign issuers is not because Norwegian companies issuing green bonds avoid listing - it is the opposite.

Out of 89 green bonds issued by Norwegian companies active in the years 2010–2020, 71 opted for listing on the Norwegian marketplace. The same share is significantly lower in the universe of all bonds - 7,166 bonds out of 19,227 issued by Norwegian firms get listed, a fraction below 40%.

Another relevant group of issuers originates from Sweden - 17% of the green bonds in our sample are issued by Swedish companies. The Netherlands issued 2% of the green bonds but only 0.6% of all bonds. All other countries only represent 1% or less of the market.

Table IV presents summary statistics of bond issuers. Issuers of green bonds tend to be bigger than other bond issuers. The size difference is compared by the value of total assets and revenues, but also the outstanding bond portfolio. While there is a high variation in size among all green issuers, the results suggest that the smallest companies do not issue green bonds. Green bond issuers are more profitable and more leveraged.

Green bond issuers differ from the universe of issuers in terms of the industry they operate in. Almost half of the bond market itself is in the finance industry. Subsequent big categories are "municipalities" and "oil companies", with around 10% share each. Among green bond issuers, finance is also the most represented sector, but it is closely followed by real estate and renewables. Each of the three biggest categories makes up around 22% of the sample. The high rank of the real estate industry reflects its many opportunities for environmentally conscious construction and modernisation as well as ease of certification. There are no green bond issuers in the oil industry. The share of municipalities among issuers is much lower and amounts to 3%.

Environmental performance before issuance is comparable among all green issuers. While the environmental score is higher, 0.78 vs 0.73, the overall score and also score of other non-environmental dimensions are not. Big differences are observed in terms of carbon emissions with green bond issuers presenting much lower values. The coverage of the carbon emissions in the studied sample period is, however, quite low. We have non-missing entries for around 6% of the sample, but the percentage is much higher for

green bond issuers (25% vs 5%).

5. Security characteristics

Green bonds are larger than the average bond - the mean issuance amount is NOK 620 million (approximately USD 78.4 million) vs NOK 420 million. This seems naturally related to the differences in size between green bond issuers and regular issuers. The average maturity is shorter than average, with 6.4 years vs 11.2 years. One third of the green bonds have a fixed rate, while for all bonds the fraction is almost one fourth (24%). The average first coupon after issuance is 2.86% on average, which is lower than the average of 3.95% for regular bonds. These numbers, however, are conditional on non-missing coupon data and also do not account for the time of issuance. The average credit rating of green bonds is 4.75 which corresponds to BBB, vs 3.39, which is A, for all bonds.[2] The secondary bond market in Norway is illiquid, with no trades on 96% of all days. The bid-ask spread is 0.57 for all bonds and 0.4 for green bonds, which suggests that green bonds are less illiquid.

Compared to the international sample of green bonds studied by Flammer (2021), green bonds in Norway are characterised by smaller issuance size (USD 253 million in the international sample), comparable maturity (7.7 years in the international sample), a much lower share of fixed-rate bonds (75% in the international sample) and lower coupons (international average of 3.7%).

The difference in maturity we report was also documented in the international sample of green and regular bonds by Fatica and Panzica (2021), although it was smaller compared to our sample (10.6 years vs 12.6 years). Fatica and Panzica (2021) did not find significant differences in terms of credit rating, while in our sample green bonds are lower rated.[3]

[2] Provided ratings come from a composite "universal" rating provided by Nordic Trustee.

[3] Fatica and Panzica (2021) used a different categorical scale, from 1-11 (with 1 corresponding to AAA).

6. Bondholders

Our sample includes 24,685 investors[4] holding bonds in years from 2010 to 2020 (Table VI). The vast majority of them are Norwegian: 94% when equal-weighted, and 74% when weighted by their average portfolio size. However, only 621 of them ever held a green bond. While the majority of them are domestic investors, the share of foreign investors is higher than in the overall sample - 83% when each is equal-weighted and 64% when value-weighted. The Norwegian green bond market attracts more foreign investors, similarly as it attracts more foreign issuers, as documented in Section 4.

We are able to classify types of domestic investors. In the universe of Norwegian bondholders, 84% of investors are individual investors[5]. However, they hold only 5% of the market. In contrast, only 8% of our sample are financial investors, but they hold 63% of the market. This is comparable to the sample in Bretscher et al. (2021) where institutional investors hold 45%-50% of the bond market worldwide. Of these 8%, 1.4% are mutual funds, pension funds, and insurance (we summarize them as "funds"), holding 44% of the market. The remaining financial investors (including banks) hold 19% of the market. The remaining are government-linked and other non-profit investors (3% equal-weighted and 6% value-weighted).

As mentioned, ownership of green bonds is less domestic than for the rest of the market. However, the type distribution of investors is comparable to the rest of the market. Around half of green bonds are held by funds, but these represent 29% of the investors equal-weighted, compared to 1.4% for the entire market. Thus, institutional investors on average hold much smaller stakes in green bonds than they do in other bonds. This is also true for other financial investors, making up 12% of the investors (compared to 6% for the entire market) but holding only 1.8% of it. In contrast, non-financial investors

[4]This number excludes market makers. We identify market makers as investors for which the average daily number of "trade" transactions per is 3 or higher. The methodology yields 97 market makers, which is below 1% of trading investors and around 0.2% of the bondholders overall

[5]This category "individuals" includes non-incorporated as well as incorporated non-financial for-profit investors.

hold larger stakes in green bonds. Individual investors make up 33% of investors in green bonds and hold 1.2%, and non-profit investors represent 8% and hold 12%.

While individuals and funds hold comparable value-weighted shares of green and non-green bonds, there is some sort of substitution in ownership of green bonds between non-fund financial investors and governments and non-profit investors The former hold significantly smaller share of green bonds than other bonds, while the opposite is true for government and non-profit investors.

7. Conclusions

The Norwegian bond market plays an important role in both regional and global investment contexts. While the market was initially shaped by the demands of the oil industry, it has achieved a significant degree of sophistication and diversity. The green bonds subset of this market grows rapidly in line with global trends increasing tenfold over the period 2014— 2020. Although it still represents a small fraction of the total bond market, its development reflects an increasing commitment to sustainability and environmental consciousness in Scandinavia and internationally. The presence of international issuers and investors confirms Norway's attractiveness as a hub for environmentally conscious financing.

While green bonds are by definition tied to environmentally friendly projects, they also differ from non-green bonds in terms of their financial characteristics. Their unique features include larger average issuance sizes, shorter maturities, and lower coupons compared to regular bonds, and may appeal to specific types of investors. Issuers of green bonds are also different, they tend to be larger and exhibit distinct financial and risk profiles compared to regular bond issuers.

The ownership structure of the Norwegian green bond market resembles the trends of regular bonds. Individual investors make up a significant share of bondholders, but financial institutions, dominate market ownership. The main differences compared to the overall market include a higher share of foreign investors and a larger role played by non-

financial and non-profit investors. The latter may suggest there are more mission-driven investors within these categories.

The insights presented here using the example of Norway provide a foundation for understanding the dynamics of green bonds in regional and globally. The market is still in the nascent years and operates facing challenges in the context of environmental performance data and evaluations, but has the potential to further grow and attract a diverse set of investors and industries.

References

Bretscher, L., Schmid, L., Sen, I., Sharma, V., 2021. Institutional corporate bond pricing. URL: https://papers.ssrn.com/abstract=3756280, doi:10.2139/ssrn.3756280.

Fatica, S., Panzica, R., 2021. Sustainable investing in times of crisis: Evidence from bond holdings and the COVID-19 pandemic. URL: https://papers.ssrn.com/abstract=3991007, doi:10.2139/ssrn.3991007.

Flammer, C., 2021. Corporate green bonds. Journal of Financial Economics 142, 499–516. URL: https://www.sciencedirect.com/science/article/pii/S0304405X21000337, doi:10.1016/j.jfineco.2021.01.010.

ICMA, 2020. Bond Market Size. Technical Report. International Capital Market Association. URL: https://www.icmagroup.org/market-practice-and-regulatory-policy/secondary-markets/bond-market-size/.

Larcker, D.F., Watts, E.M., 2019. Where's the greenium? Journal of Accounting & Economics 69. URL: https://doi.org/10.1016/j.jacceco.2020.101312, doi:10.1016/j.jacceco.2020.101312.

Table I. Issuances over the years

The table presents the value and the number of bonds issued in the Nordic bond market over the years. The sample is the universe of listed bonds traded in Norway between 2010 and 2020. The unit of observation is one bond.

	All Bonds		Green Bonds	
Year	Value (bn)	Count	Value (bn)	Count
2010	178.85	438	0	0
2011	170.69	418	0	0
2012	217.29	559	0	0
2013	245.31	681	0	0
2014	219.58	578	3.05	5
2015	192.89	462	3.91	5
2016	213.30	658	1.26	2
2017	290.45	757	5.53	8
2018	284.53	683	2.52	8
2019	315.08	764	11.45	22
2020	445.58	670	30.55	44
Total	2773.55	6668	58.28	94

Table II. Bonds by industry

The table presents the value and the number of bonds in the Nordic bond market by the industry. The sample is the universe of listed bonds traded in Norway between 2010 and 2020. The unit of observation is one bond.

	All Bonds		Green Bonds	
Type	Value (bn)	Count	Value (bn)	Count
Agriculture	2.07	5	0	0
Auto	1.54	7	0	0
Bank	912.47	4341	4.75	6
Consumer services	17.85	41	2.62	4
Convenience Goods	22.03	48	0	0
Finance	1128.81	940	1.7	4
Government	47.10	50	0	0
Health Care	5.85	13	0	0
Industry	117.25	229	4.58	7
Insurance	28.29	49	0	0
Media	8.22	21	0	0
Oil and Gas EP	89.03	127	0	0
Oil and Gas Services	255.04	449	0	0
Pharmaceuticals	0.02	2	0	0
Public sector	352.41	949	2.85	3
Pulp, Paper and Forestry	4.27	8	0	0
Real estate	197.99	631	12.72	27
Seafood	33.44	61	3.49	3
Shipping	1130	155	1.81	2
Telecom/IT	37.53	78	0	0
Transportation	82.78	184	5.6	8
Utilities	179.05	380	18.16	30
Total	3636.64	8768	58.28	94

Table III. Country of issuer

The table presents the percentage breakdown of bonds by the country of the issuer in the Nordic bond market. The sample is the universe of listed bonds traded in Norway between 2010 and 2020. The unit of observation is one bond.

Country	(1) All Fraction	(2) Green Fraction
Norway	82.77	75.53
Sweden	5.02	17.02
Finland	2.44	0
United Kingdom	2.17	0
Denmark	1.99	1.06
Bermuda	1.11	0
Estonia	0.02	1.06
Germany	0.60	1.06
Netherlands	0.59	2.13
Marshall Islands	0.38	0
Other	2.91	0

Table IV. Issuer characteristics

The table presents univariate statistics of bond issuers in the Nordic market in the year before the issuance. The sample is the universe of issuers of bonds traded in Norway between 2010 and 2020. The unit of observation is issuer-issue year. Accounting data are available for the years 2001–2020, while environmental performance data are available for the years 2010-2020.

	All Bonds			Green Bonds		
	Mean	Std.dev.	Median	Mean	Std.dev.	Median
Issuer bond portfolio (bn)	4.44	6.37	1.60	13.3	8.73	13.1
Issuer bond portfolio (#)	9.10	9.16	6	18.3	10.4	22
First coupon (avg.)	1.46	1.70	0.95	0.96	0.98	0.70
Total assets (bn)	9.54	12.0	4.03	20.7	15.5	16.9
Revenue (bn)	0.050	0.18	0	0.14	0.32	0
ROA	1.51	2.76	1.08	2.14	3.14	0.89
Leverage	0.13	0.22	0.022	0.26	0.20	0.25
% bonds	0.049	0.15	0	0.078	0.14	0
% liabilities to fin institutions	0.12	0.21	0.046	0.18	0.23	0.11
% finance industry	0.47	0.50	0	0.23	0.42	0
% municipality	0.13	0.34	0	0.030	0.17	0
% oil industry	0.096	0.29	0	0	0	0
% real estate industry	0.091	0.29	0	0.22	0.42	0
% renewable industry	0.045	0.21	0	0.22	0.42	0
% shipping industry	0.029	0.17	0	0.020	0.14	0
% utilities industry	0.014	0.12	0	0.040	0.20	0
Overall score	0.72	0.25	0.83	0.69	0.28	0.89
Environmental score	0.73	0.22	0.80	0.78	0.21	0.88
Economic score	0.69	0.27	0.81	0.65	0.31	0.85
Corporate gov score	0.52	0.22	0.54	0.40	0.20	0.39
Social score	0.76	0.21	0.83	0.74	0.25	0.85
Carbon emission scope 1 (t)	885.5	3802.8	4.48	39.2	140.1	0.31
Carbon emission scope 2 (t)	95.9	495.6	8.41	14.2	20.1	6.58
Carbon emission scope 3 (t)	900.2	3501.4	124.8	231.1	435.9	105.2
Carbon intensity scope 1 /100	3.29	9.23	0.035	0.37	1.55	0.0099
Carbon intensity scope 2 /100	0.25	0.77	0.074	0.16	0.22	0.034
Carbon intensity scope 3 /100	5.41	35.1	1.02	1.07	1.94	0.34
Carbon intensity: direct /100	3.37	9.31	0.035	0.37	1.55	0.010
Carbon intensity: indirect /100	0.70	1.24	0.32	0.48	0.86	0.15
GHG direct impact ratio	1.28	3.59	0.013	0.15	0.61	0.0041
GHG indirect impact ratio	0.51	0.66	0.30	0.36	0.58	0.17
# Issuer-Year	4143			99		
# Issuers	1144			65		

Table V. Bond characteristics

The table presents univariate statistics of bonds. The sample is the universe of listed bonds traded in Norway between 2010 and 2020. The unit of observation is one bond apart from the bottom part of the panel where the unit of observation is bond times quarter.

	All Bonds			Green Bonds		
	Mean	Std.dev.	Median	Mean	Std.dev.	Median
Outstanding amount (bn)	0.42	1.16	0.20	0.62	0.44	0.50
Maturity	11.2	21.1	5	6.38	2.58	6
Fixed rate	0.24	0.42	0	0.33	0.47	0
First coupon	3.95	3.11	3.03	2.86	2.10	2.26
Credit rating[1]	3.39	2.27	3	4.75	2.40	7
Rated	0.32	0.46	0	0.59	0.50	1
Secured	0.17	0.38	0	0.14	0.35	0
Credit event	0.048	0.21	0	0.011	0.10	0
Defaulted	0.032	0.18	0	0	0	0
Senior	0.76	0.43	1	0.91	0.28	1
Junior	0.12	0.32	0	0	0	0
Investment grade	0.74	0.44	1	0.83	0.38	1
% no-trade days	0.96	0.062	0.98	0.96	0.056	0.98
Bid-ask spread	0.57	0.84	0.22	0.40	0.40	0.26
Relative bid-ask spread	0.0091	0.027	0.0023	0.0040	0.0043	0.0026
# Bonds	8768			94		
# Bond-Quarters	113558			606		
# Issuers	1144			44		

[1] Credit rating codes: 1=AAA, 2=AA, 3=A, 4=BBB, 5=BB, 6=B, 7=CCC, 8=CC, 9=C.

Table VI. Investor Type

The table presents univariate statistics on investors in the Nordic bond market. The sample is the universe of investors involved in listed bonds traded in Norway between 2010 and 2020. The unit of observation is one investor. Column 1 shows averages that are equally weighted and column 2 averages that are weighted by investor's average portfolio size.

	All Bonds		Green Bonds	
Ownership fraction	Equally-weighted	Value-weighted	Equally-weighted	Value-weighted
Domestic	0.94	0.74	0.83	0.64
Of which:				
Individual	0.84	0.049	0.33	0.012
Fund	0.014	0.44	0.29	0.49
Non-fund financial	0.061	0.19	0.12	0.018
Gov./non-profit	0.033	0.06	0.076	0.12
# investors	24,685		621	