FocusPoint

Unravelling the Green Bond Premium

How are green bonds priced versus non-green bonds on the secondary market?

- **Green bond yields have been only 0.01% lower than non-green bond yields over the past three years**
- **Yield difference decreased to only 0.007% as a result of the strong growth of the green bond market**
- **37% of green bonds analysed in our sample are trading above their issuer's non-green curve**
- **Yield difference across segments varies a lot, making active management important**
- **Strong demand for green bonds continues**

Unravelling the Green Bond Premium

Green bonds are bond instruments whose proceeds are used to finance projects beneficial to the environment. They are otherwise identical to unsecured issues. A bond's "green" label depends on the type of projects it funds, not on the issuer's green credentials.

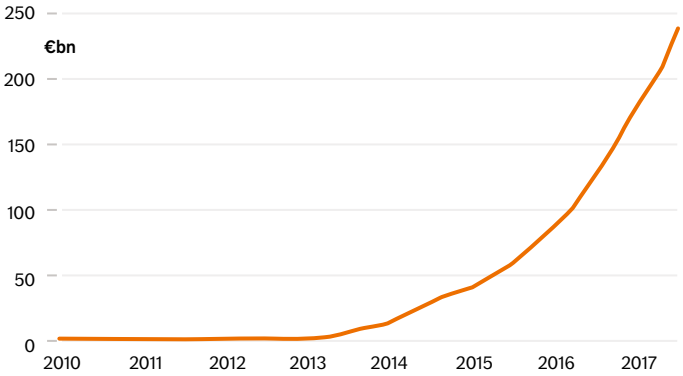
Since the 2014 publication of the first Green Bond Principles, the market for green bonds has grown to over EUR 270 billion. There are several reasons for the strong demand for green bonds from investors. First of all, green bond issuers voluntarily comply with disclosure agreements and performance indicators that meet investors' requirements for greater transparency. Most green bonds have an independent second-party opinion, which helps investors to better understand how the issuer would allocate the use of proceeds. Green bond issuers have also shown a commitment to the integration of finance and sustainability teams to mitigate climate-related risks. The transition to a carbon-neutral economy is likely to impact the private sectors. Issuers that take steps to face the climate-related risks could have an advantage.

There has been considerable research on the pricing of green bonds in the primary market. Until now, though, there has been no complete, in-depth research on pricing of green bonds in the secondary market. To the best of our knowledge, this FocusPoint is the first paper that focuses exclusively on green bond pricing in the secondary market across the full spectrum of global green bonds. It answers several key questions. How much is the green bond's premium? How has it evolved over time? In our analysis, we break down pricing by sector, credit rating, country and currency and we examine whether differences exist in terms of bonds' green credentials.

The methodology of our analysis

We defined our green bond universe using the bonds included in Bloomberg MSCI Global Green Bond Index as a starting point. In our view this is the most credible and most widely used green bond index. The index includes only investment grade and liquid green bonds; it does not include social and sustainability bonds. We have collected monthly data from December 2014 to November 2017.

Figure 1: Global Green Bonds Market

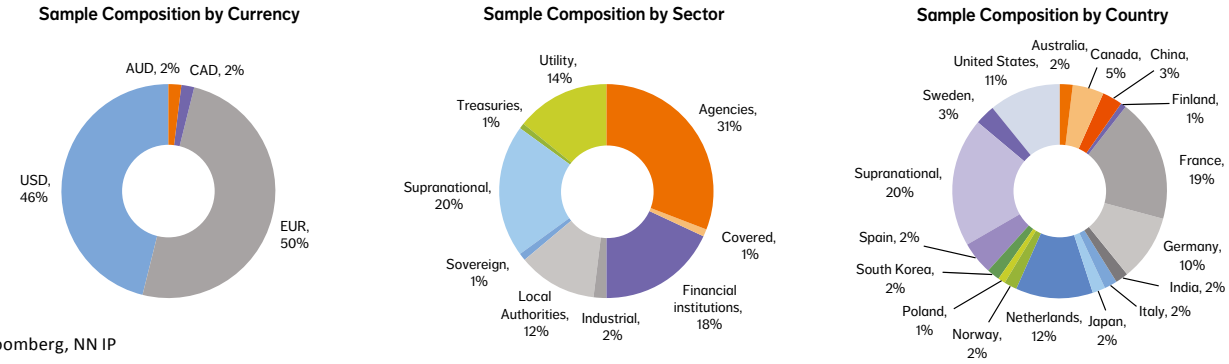


Source: Bloomberg, NN Investment Partners

The market before this period was too fragmented and too small to use in the analysis. Our sample includes 133 unique labelled green bonds issued by 59 entities from 16 countries and 7 supranational organisations.

For the non-green bond group we have taken the bonds from green bond issuers in the Bloomberg Global Aggregate, Bloomberg Euro Aggregate, Bloomberg Canadian Aggregate and Bloomberg Australian Aggregate indices. The descriptive statistics of the sample are summarized in Figure 2. We included green bonds in our analysis only if we had five or more non-green bonds to be able to interpolate the yield curves. To quantify differences we have interpolated the yield curve on a monthly basis per issuer and have assumed that the relationship between maturity and yield is not necessarily linear. The expected (interpolated) yield and the yield of the labelled green bond are compared for every month, resulting in a difference between the interpolated yield curve of the issuer versus the yield of the green bond. A negative difference means the interpolated yield is higher than the yield of the green bond with the same maturity and seniority. The opposite holds when the yield difference is positive. We used simple average to calculate the average yield difference per month and per segment. On average every green issue is matched with 14 non-green bonds of the same issuer with similar

Figure 2: Summary of Green Bond Universe by Currency, Industry and Country



Source: Bloomberg, NN IP

NN investment partners

seniority. Our full sample includes 2,417 data points of green bonds (36 months, 133 unique green bonds) and in our view gives a reliable estimate how much green bonds deviate from the issuer's curve. We believe our model displays a good balanced between simplicity and a goodness-of-fit that minimises statistical error.

The results of our analysis

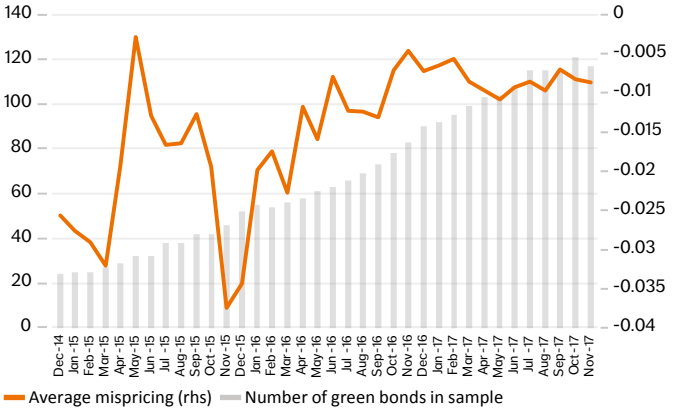
The average yield on green bonds in the sample was lower than the interpolated yield of non-green bonds. The difference between the observed and interpolated yields for the entire sample was -0.011%, meaning that on average and over time, a green bond yield is 1.1 basis points (bps) lower than a non-green bond yield. Still, some 37% of the green issues had a yield above the interpolated curve.

Furthermore, we divided our sample in two equal periods of 18 months. The first sub-sample, December 2014 to May 2016, had 67 unique green bonds and the second sub-sample, June 2016 to November 2017, had 126. On average the yield of green bonds in the first sub-sample was 2.3bps lower than the issuer's interpolated yield, compared with 0.7bps in the second sub-sample. Figure 3 summarizes the number of available issues per month and the average difference between the yield on the green bond and the interpolated yield of the issuer's curve.

Two factors may explain the difference between yields for green and non-green bonds. One is a possible mismatch between supply and demand. The difference in yields may be a result of growing interest from investors and a limited number of issues with a green feature. The growth of the green bond market increases investors' choices and could explain why green bonds have become less expensive over time compared to their issuer's curve.

Another explanation is that in certain market circumstances, green bonds may be less volatile than their peers. In periods of risk aversion, green bonds tend to be more stable, due to more buy-and-hold investors holding the bonds in their portfolios. The bond's lower volatility compensates the investor for its lower yield. The reasoning here is that the investor in green bonds has a long-term horizon and does not trade actively, hence reducing the price volatility.

Figure 3: Average monthly yield difference



Source: NN Investment Partners

The green bonds universe was at its smallest at the beginning of the sample period, which means there were relatively few eligible bonds to be included in our analysis. This increases the weighting of each green bond in the earlier periods when calculating the average yield difference versus the non-green bond curve. For instance, there are only 45 green issues in our November 2015 sample, giving each bond a weight of 1/45, while in November 2017 there are 116 green bonds, each of which has a weight of only 1/116. The volatility of the yield difference time series also decreases as the sample size grows.

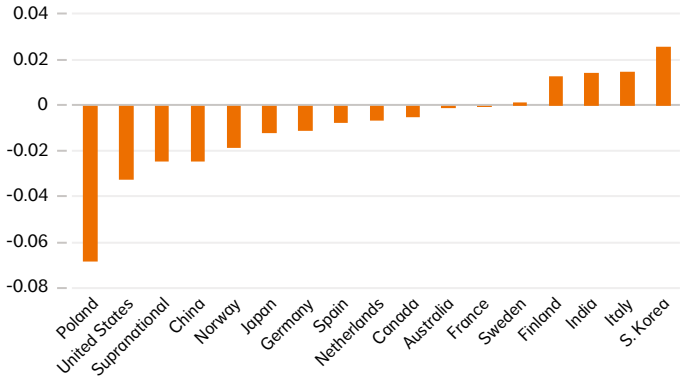
Breaking down the results

We have assessed differences between the average green bond yield and the interpolated non-green bond yield on the basis of country, currency, industry, credit rating and green features. This section describes the outcomes of these breakdowns.

Country

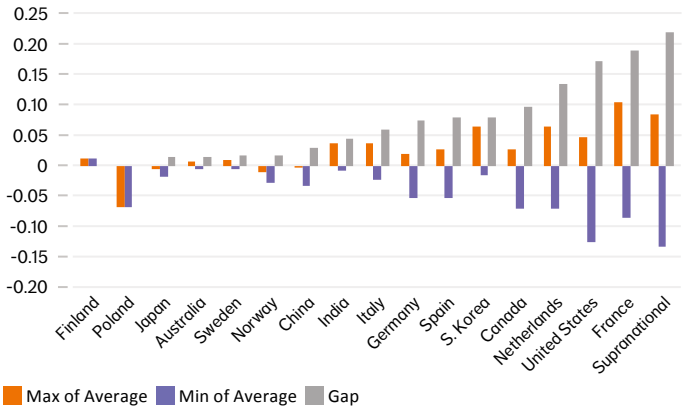
Figure 4 summarizes the relative yield of green bonds across countries. The green bonds issued by entities in South Korea, Italy, India and Finland have higher yields than the non-green issues on average. Polish, US, supranational and Chinese green bonds are on average trading farthest below their issuers' curve.

Figure 4: Average yield difference by country



Source: NN Investment Partners

Figure 5: Minimum, maximum yield difference per country



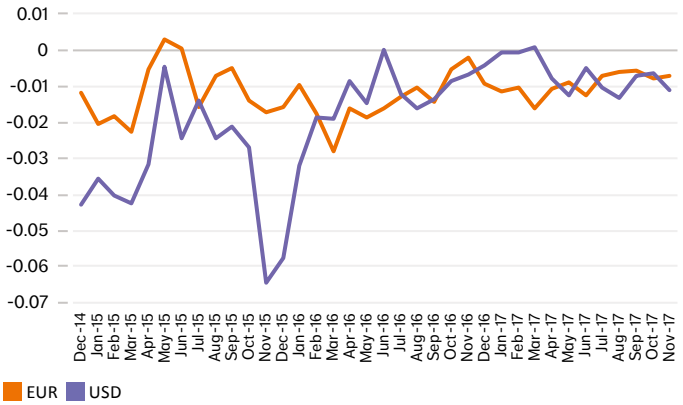
Source: NN Investment Partners

Figure 5 shows the minimum and maximum average deviation per country. Country-specific green bonds should not be ruled out based on aggregate observations, as it could be seen that the difference between maximum and minimum average yield difference varies a lot. French, US and supranational bonds, which showed the biggest gaps between maximum and minimum average yield, make up roughly 50% of our sample.

Currency

More than 95% of the issues in our green sample are denominated in either euros or US dollars. Issues in Australian and Canadian dollars account for only 1.5% and 2.2% respectively. Figure 6 contains the average yield difference time series for the two main currencies.

Figure 6: Average yield difference by currency



Source: NN Investment Partners

On average the euro issues have a yield difference of -0.8bps and the US dollar issues have a -1.5bps yield difference. The yield differences for green bonds issued in Australian and Canadian dollars are -0.5bps and -1.6bps respectively. Furthermore, 26 of the 67 EUR green bonds, or about 38%, have a positive yield difference in relative terms. For USD-domiciled bonds that percentage is slightly lower at 36%, with positive yield differences accounting for 22 out of 61 issues. As in the country-specific analysis above, the gap between largest and smallest yield difference varies across currencies: 23bps and 21bps for EUR-domiciled and USD-domiciled green bonds, respectively.

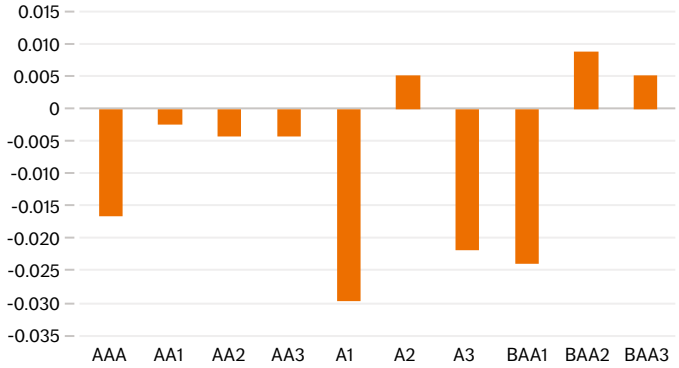
Credit Rating and Sector

Figure 7 contains the average differences in yield of green and non-green bond curves by credit rating. Roughly 50% of our sample is rated AAA, AA1 or AA2, the top three credit rating categories. No clear relationship between credit quality and yield difference could be observed in our universe of green bonds. The large variance in the number of available issues of green bonds across credit ratings makes drawing conclusions difficult.

Next we divided our sample in two major sectors – corporates and government-related green issues – and tracked the relative yield, which is depicted in Figure 8. The sample consists of 45 corporates and 85 government-related green issues, which together make up 98% of the green bonds sample. The remaining 2% are securitized bonds.

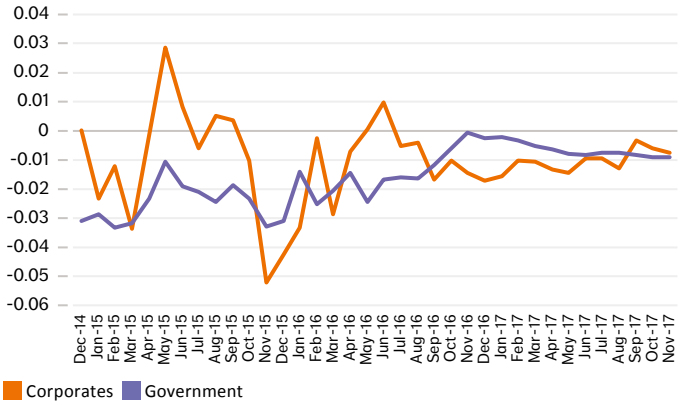
Government-related and corporate green bonds have yields that are respectively 1.1bps and 1bps lower on average than the interpolated yield curve. As the market of green bonds develops and the number of issues in our sample increases, the yield difference seems to converge over time.

Figure 7: Average yield difference by credit rating



Source: NN Investment Partners

Figure 8: Average yield difference: government vs corporate



Source: NN Investment Partners

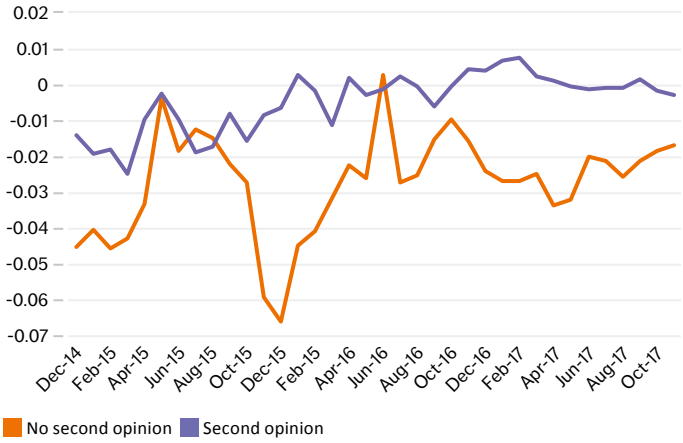
Green features

We also investigated the yield difference over time depending on two green bond-specific features: second-party opinion and use of proceeds. About 73% of the green issues in our sample have second-party opinions; that is, they have been independently assessed as to whether they conform to the green bond principles. Figure 9 illustrates the difference between the performances of green bonds with and without second-party opinions. On average green issues with a second-party opinion in our sample have an average yield of 0.6bps below their issuers' yield curve. Green bonds without a second-party opinion have an average yield difference of -2.5bps.

Finally we broke down the sample based on green bond's use of proceeds. Based on documentation of the issuer's green bond framework, we assigned each green bond in our sample to one or more use-of-proceeds categories. Some green bonds are used for more than one category and there might be an overlap across categories. For instance, 96 green bonds commit resources to alternative energy, but only 31 green bonds allocate resources only to

alternative energy. Similarly, green buildings projects are supported by 27 green bonds, but just seven green issues use the proceeds exclusively for green buildings.

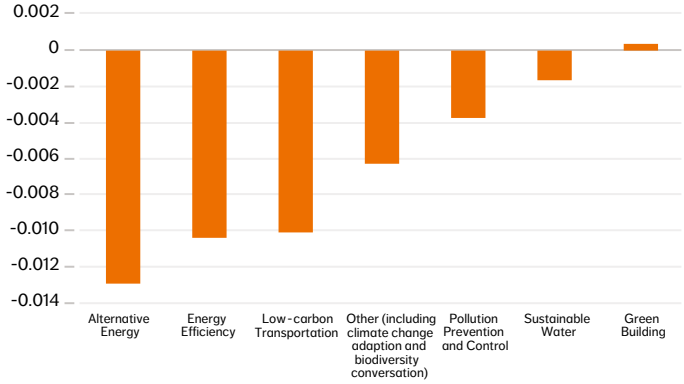
Figure 9: Average yield difference by second opinion



Source: NN Investment Partners

Figure 10 shows that green bonds used for renewable energy projects are trading the farthest below the issuer's yield curve. Unlike all other categories, green bonds used for green buildings are trading slightly above the issuer's yield curve.

Figure 10: Average yield difference by use of proceeds



Source: NN Investment PartnersSource: NN Investment Partners

Conclusion

Investor demand for green bonds has increased dramatically in the past three years. The market's growth has made it possible to analyse pricing of these bonds relative to non-green bonds. Based on our analysis of the greater part of the secondary market for green bonds, we can draw the following conclusions:

- On average green bonds yields are only slightly below the interpolated yield of non-green bonds, with a difference of -0.011%, or -1.1bps.
- As a result of the strong growth of the green bond market, the sample of green bonds increased and their yields moved closer to the interpolated yield of non-green bonds. The difference in the second sub-sample (from June 2016 to November 2017) was only -0.007%, or -0.7bps.
- Roughly 37% of the green bonds have a yield higher than their interpolated non-green curve.
- Yield differences across segments (country, currency, sector, credit rating, use of proceeds) vary a lot. More importantly, within segments, the gap between maximum and minimum yield difference could be as high as 20bps. This makes active management an important factor that can add value.

Bram Bos, Co-Lead Portfolio Manager
Green Bonds at NN Investment Partners
bram.bos@nnip.com

Alfred Meinema, Co-Lead Portfolio Manager
Green Bonds at NN Investment Partners
alfred.meinema@nnip.com

Erwin Houkes, Senior Portfolio Specialist
Credit Strategies at NN Investment Partners
erwin.houkes @nnip.com

NN investment partners