

Pricing of green bonds – drivers and dynamics of the greenium*



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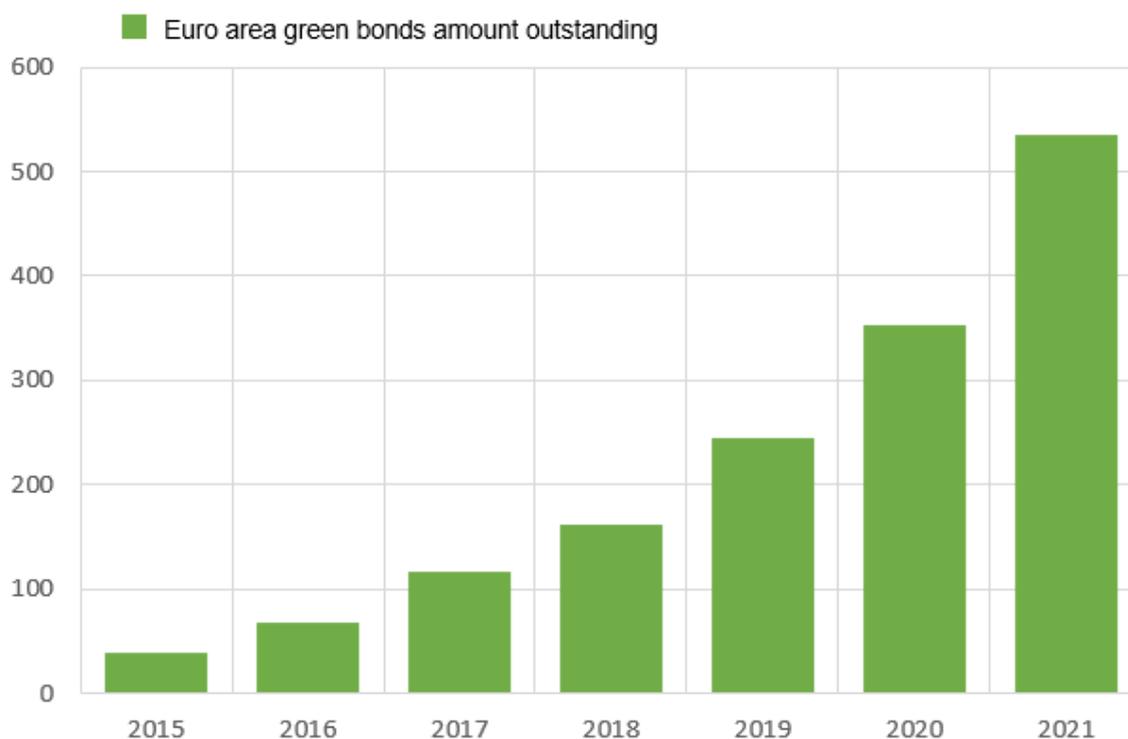
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The green bond market has increased rapidly in recent years amid growing concerns about climate change. But the extent to which green bonds provide cheaper funding to issuers by trading at a premium, referred to as the greenium, is still an open discussion. The paper “Pricing of green bonds-drivers and dynamics of the greenium” provides evidence that a key factor explaining the greenium is the credibility of a green bond. We define credible green bonds as those that have been assessed by external reviewers or issued by more credible issuers. Another important factor is investor demand, as the greenium becomes more statistically and economically significant over time. We find that an increasing share of retail investors in green bond holdings is associated with cheaper funding for green projects. These findings highlight the need to transition towards a mandatory regulatory green bond standard to help strengthen the credibility of this asset class.

Introduction

Green bonds are sustainable finance instruments that aim at financing environmentally sustainable projects and the transition to a low-carbon economy. The green bond market has shown fast growth since 2015 and reached a total of €500bn in amount outstanding in 2021 for all types of euro area issuers. Yet, it still represents a small share of the overall bond market. To foster growth of the green bond market and the availability of financial resources for the green transition, green bonds have to gain investors' trust. The presence of a premium for green bonds, i.e. a greenium, can point to investors' confidence and preferences for these instruments.

*Disclaimer: This policy brief is based on the ECB working paper “Pricing of green bonds- drivers and dynamics of the greenium”, Pietsch and Salakhova (2022). The views expressed are those of the authors and do not necessarily reflect the views of the ECB or the Eurosystem.

Chart 1: Euro area green bonds amount outstanding (2015-2021, €billion)

Source: Bloomberg.

In our research, we focus on green bonds issued by euro area entities (excluding sovereigns) between January 2014 and October 2021 and investigate if firms benefit from cheaper funding for green projects by issuing green bonds. This is the case if investors are willing to pay a premium for green bonds compared to conventional bonds, i.e. if green bonds trade at a greenium. As a premium on green bonds translates into tighter spreads on green bonds, we investigate the difference in spreads between green and conventional bonds in the secondary market between January 2016 and October 2021. If the difference in spreads between green and conventional bonds is negative, green bonds trade at a greenium.

Bond prices are influenced by many factors, e.g. the payment structure, the market environment, and, in particular, the credit risk of the bond issuer. So, these factors need to be accounted for when analysing pricing differences between green and conventional bonds.¹ To minimise any differences in credit risk, we construct a sample of green and conventional bonds where each green bond is matched with a conventional bond that is as similar to the green bond as possible. In particular, a green and conventional bond of the same bond pair have to be issued by the same issuer, have the same repayment seniority and have to mature within the same year. In addition to that, we minimise differences in bond characteristics that may affect pricing by applying a k-prototypes matching algorithm. The algorithm matches green and conventional bonds of the same issuer, seniority and maturity and chooses among all potential matches the pair with the least differences between the numerical and categorical characteristics of the green and conventional bond. The result is a sample of green and conventional bond pairs which are as similar as possible.

¹ Our study analyses the difference in Option-adjusted spreads between green bonds and a set of similar conventional bonds. The option-adjusted spread adjusts the z-spread of a bond for its embedded options and is a measure of a bond's yield-to-maturity in excess of the risk-free benchmark yield curve.

Chart 2 shows aggregate statistics on the difference in spreads for each pair of green and conventional bonds over time. The statistic shows that, on average, spreads of green bonds are lower than those of conventional bonds as the difference in spreads is negative. But this average greenium only seems to appear over time and may be driven by other differences in bond characteristics. Therefore, we estimate the greenium using a regression approach that controls for other potential differences. Our statistical analysis confirms the presence of the greenium as it finds that, on average, green bonds trade at about a 4 bps lower spread than their conventional counterparts, statistically significant at the 10% level (see also Chart 3 below).

Chart 2: Difference in spreads between green and conventional bonds (2018-2021, bps)

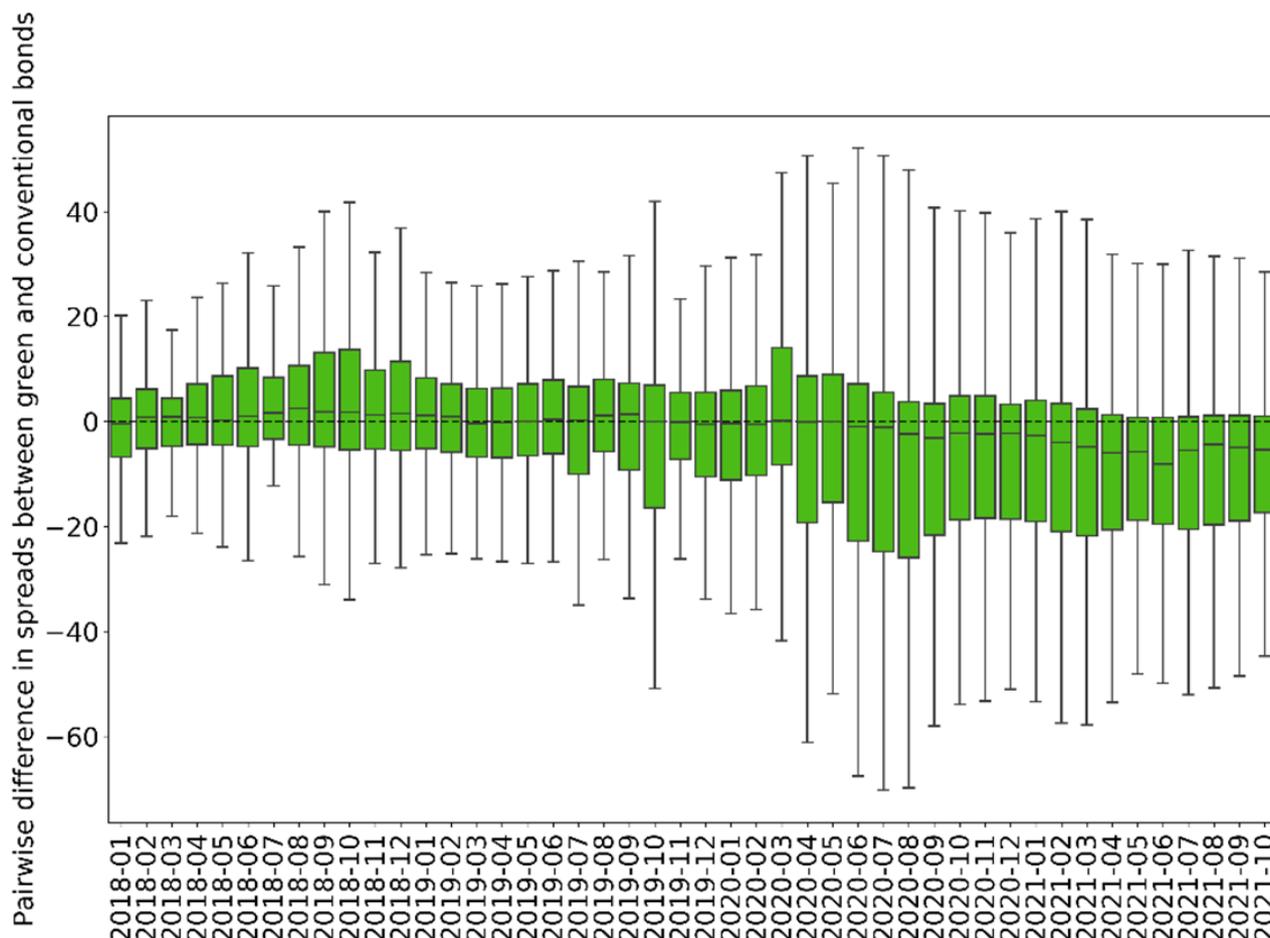


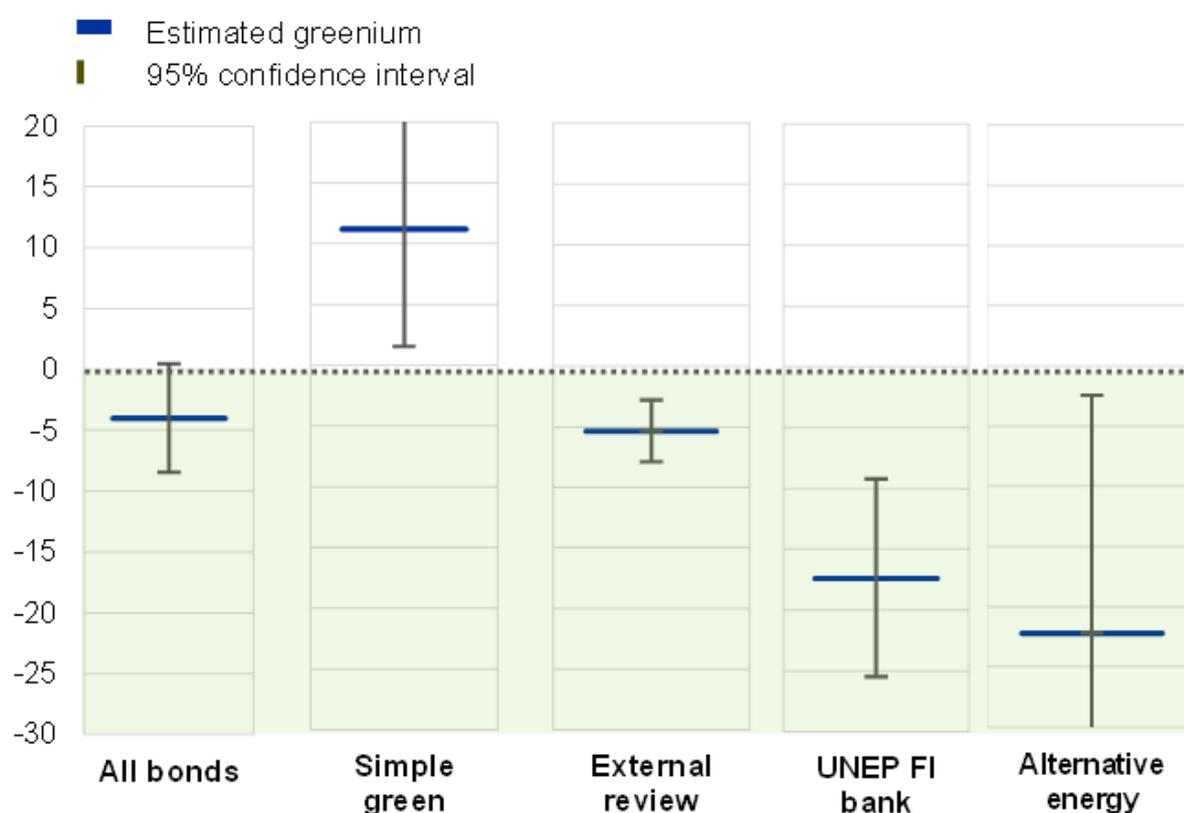
Chart 2 also shows that the range of differences in spreads across pairs of matched green and non-green bonds is large both in the cross-sectional and time dimension. Therefore, we extend our analysis to explore which factors might explain the greenium in both dimensions in a regression approach.

Green Credibility Matters

The first factor that may influence the difference in spreads in the cross-section is the credibility of the green bond label. In the absence of a common definition and standard for green bonds such as the EU Green Bond Standard (EU GBS), investors need to make additional efforts to identify green bonds with a positive impact on the environment or the transition. Our sample uses green bonds identified by Bloomberg based on a definition provided by the International Capital Market Association Green Bond Principles (ICMA GBP).

The ICMA GBP are a market standard that provides a set of criteria for a bond to be identified as green, however, issuers themselves may claim alignment with these principles and a third-party external review is only optional. Thus, we further distinguish the quality of greenness depending on whether a green bond has a third-party external review. An external review of a green bond (e.g., certification or a second-party opinion) may provide investors with an indication that a green bond label is more credible. The second dimension of credibility we explore is the credibility of the issuer, i.e., issuers in green sectors, such as alternative (renewable) energy, or issuers committed to environmental programs such as the United Nations Environmental Program Finance Initiative (UNEP FI), a partnership established by the United Nations Environment Program. Banks that sign the UNEP FI partnership publicly commit to include sustainability principles in all their operations, including their investments. Issuer credibility may contribute to the credibility of green bonds as investors may perceive greenwashing risks to be lower for publicly committed issuers. In these cases, investors may also be willing to pay a premium to hold a greener green bond.

Chart 3: Greenium estimates for different types of green bonds (2016-2021, bps)



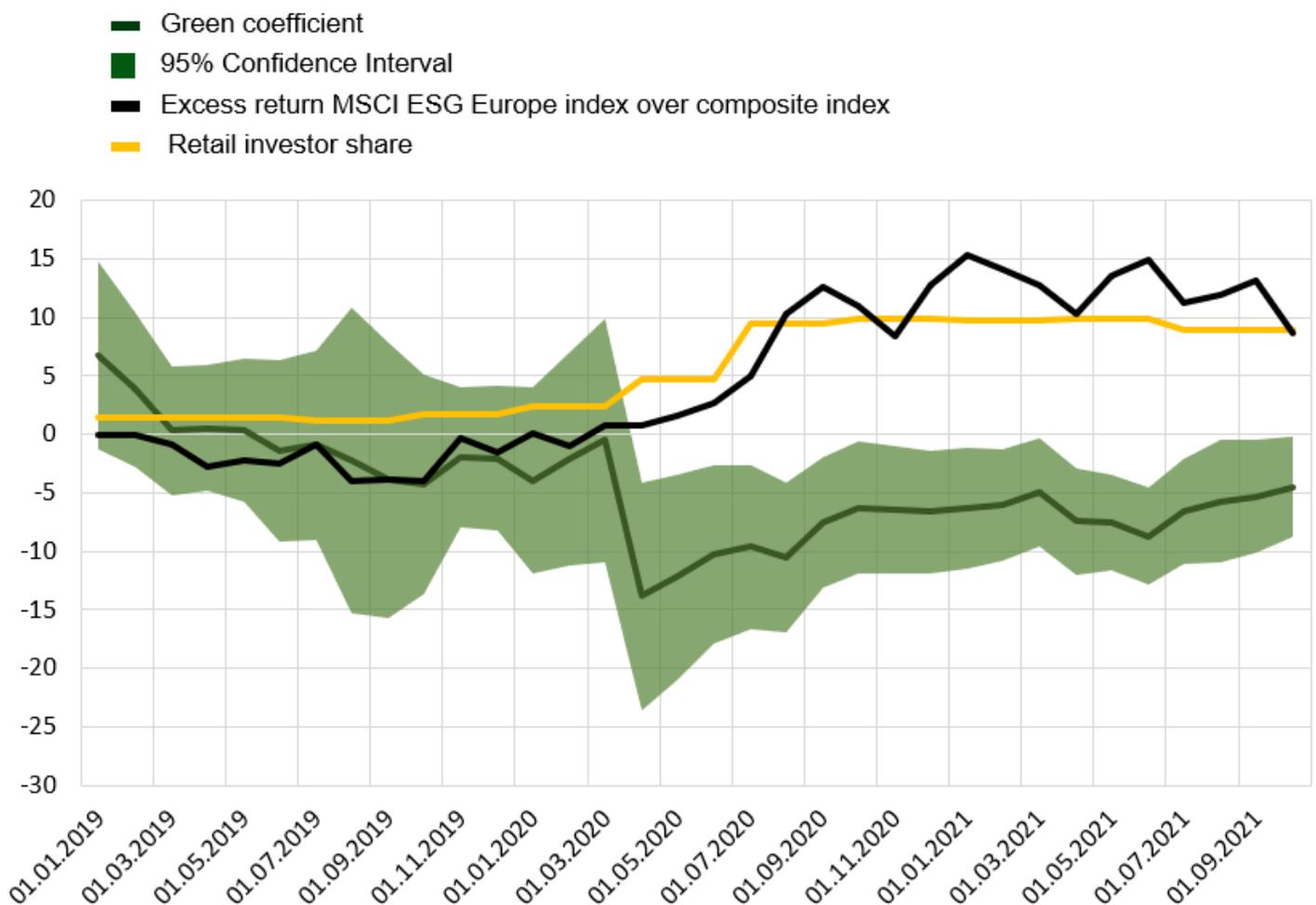
Notes: The chart shows the coefficient obtained from a regression of the option-adjusted spread on a green bond dummy variable, controlling for bond and issuer characteristics and the level of greenness of a bond. Coefficients that lie in the green shaded area indicate the presence of a greenium.

Our findings suggest that issuers only benefit from cheaper funding if the green bonds they issue are more credible. Chart 3 shows that the greenium is only present for green bonds that have been externally reviewed, and it is even stronger for those that have been issued by a credible issuer. Specifically, green bonds that have had an external review trade on average at 5 bps lower than conventional bonds of the same issuer. Moreover, green bonds issued by UNEP FI banks enjoy a greenium of around 17 bps and green bonds issued by alternative energy firms trade at more than 20 bps lower than their conventional counterparts. These findings suggest that the credibility of a green bond or of its issuer is a strong determinant of the presence of a greenium.

Time dynamics of the greenium and investor demand

Next, we analyse the dynamics and drivers of the greenium over time. Aggregate statistics in Chart 2 suggest that green bonds started to trade at tighter spreads in around the second quarter of 2020. We explore if this dynamic also holds in a regression approach, and also whether the appearance of the greenium is driven by higher investor demand. Our findings confirm that the aggregate greenium only appears in the second quarter of 2020 when green bonds start to trade at tighter spreads than conventional bonds. Before then, green and conventional bonds do not show any statistically significant difference in pricing. Moreover, this appearance of the greenium seems to be associated with household demand. As can be seen in chart 4, the greenium appeared exactly at the time when the share of retail investor holdings of green bonds increased. These findings seem to be part of a common trend in ESG/green assets also documented by, for example, Pastor et al. (2021) and Van der Beck (2021). These studies show outperformance of green/ESG equity securities that Pastor et al. (2021) explain by higher investor demand due to rising climate concerns, which is also evident in the excess return of the MSCI Europe ESG leaders index in chart 4.

**Chart 4: Greenium estimates for different types of green bonds
(2019-2021, green coefficient in bps, Excess return and retail investor share in percent)**



Notes: The chart shows the coefficient obtained from a regression of the option-adjusted spread on a green bond dummy variable, controlling for bond and issuer characteristics. Excess return is measured as the difference between the return of the MSCI Europe ESG leaders Index and the MSCI Europe Index since 2019. Retail investor share refers to the share of a green bond held by households and non-financial corporates. Sources: Bloomberg, Securities Holdings Statistics by Sector.

Conclusion

Our research presents three main findings. First, on the full sample, we find that green bonds benefit from cheaper funding, showing a greenium of about 4bps. Second, this greenium is explained by green bonds with higher greenness. Credibility matters, both at the bond and the issuer level. Third, we find that the greenium becomes more economically and statistically significant over time and that this is associated with increased holdings of green bonds by retail investors.

This paper contributes to the policy debate about the European Union Green Bond Standard (EUGBS). In particular, it highlights the need for a regulatory standard that provides a clear definition of green bonds and requirements to assure that proceeds raised from the issuance of green bonds contribute positively to the transition. Institutional investors may have varying incentives to monitor the environmental performance of green bonds, while retail investors may not have the capacity and knowledge to do so. Thus, a clear regulatory standard is important in helping to channel investments into projects fostering the transition. Furthermore, a unique standard can help strengthen the credibility of this asset class and reduce reputational risks for issuers and investors. It may also improve the pricing of financial risks and limit sudden revaluations of green bonds following individual cases of greenwashing. Therefore, it would seem appropriate that the EUGBS transitions towards becoming a mandatory standard over a reasonable timeframe as suggested by the ECB Opinion on EUGBS. Some caveats for a too quick transition to a mandatory standard include the risk of divestment from existing green bonds and potentially resulting market disruptions and volatility. This needs to be balanced against the need to take swift action to support the green transition through an efficiently functioning green bond market.² ■

² Opinion of the European Central Bank of 5 November 2021 on a proposal for a regulation on European green bonds. See also, Special Feature “Climate-related risks to financial stability” in Financial Stability Review of May 2022.

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