So what is a greenium and how do we get to it?

The existence of a greenium is mostly justified by higher demand for green bonds. We estimate the greenium for each curve separately, ensuring it is not polluted by other factors such as sector or maturity

London's Canary Wharf financial district

The theory behind the greenium

One of the peculiarities of ESG (aka “Green”) issuance is the capability to trade at a premium versus regular (aka “Vanilla") bonds. There is no theoretical reason that this should be the case. Green bonds are just as likely to be repaid as Vanilla bonds, or in other words there is no greater or lesser default risk attached to them (from the same issuer, and without subordination).

> *Green bonds are just as likely to default as Vanilla bonds are, so why the premium in green?*

So if Green bonds command a premium, it must reflect a prevalence of demand over supply. The issuance of Green bonds has soared in recent years, but demand has outstripped it. The so-called

"greenium" reflects this through a lower yield being attached to Green relative to Vanilla bond issuance.

But also there is a longevity rationale. Sustainability should mean avoidance of existential risk, and to that extent we could or should expect to see a premium being attached to such product.

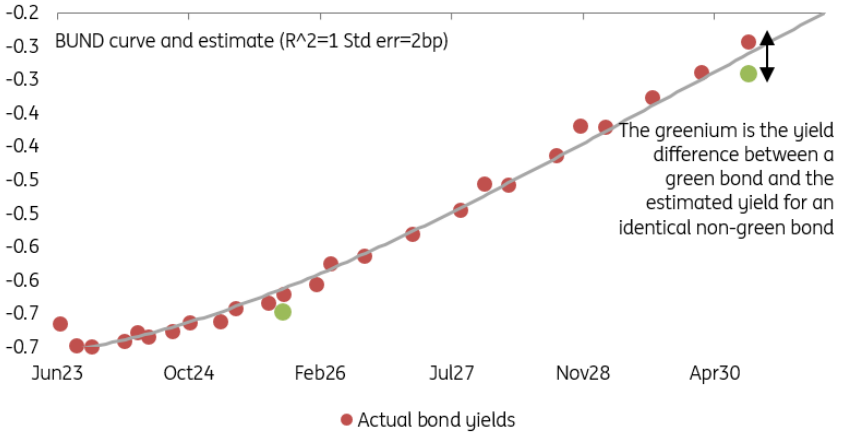
What is a Greenium, our methodology in a nutshell

We have quantified the pricing difference between green and non-green bonds (the greenium in its purest sense, as a price differential). There is more than one way to approach this issue. There is rarely a green and non-green bond sharing exactly the same characteristics (coupon, maturity, size, issue date, currency, sector, etc.) so direct comparison is almost never an option.

> *We calculate the greenium using a curve model. Its agnostic to circumstances and fair.*

One approach is not to try to correct for these factors at all and just compare the average yield between green and non-green bonds. The advantage of this method is that it doesn't rely on any model, but the greenium estimate is liable to be drowned out by other factors (eg, maturity). At the other end of the spectrum, one can resort to a curve model and estimate the greenium for each issuer in order to avoid the measure being 'polluted' by other factors. This is our approach.

The greenium is the spread of a green bonds to the issuer's non-green curve



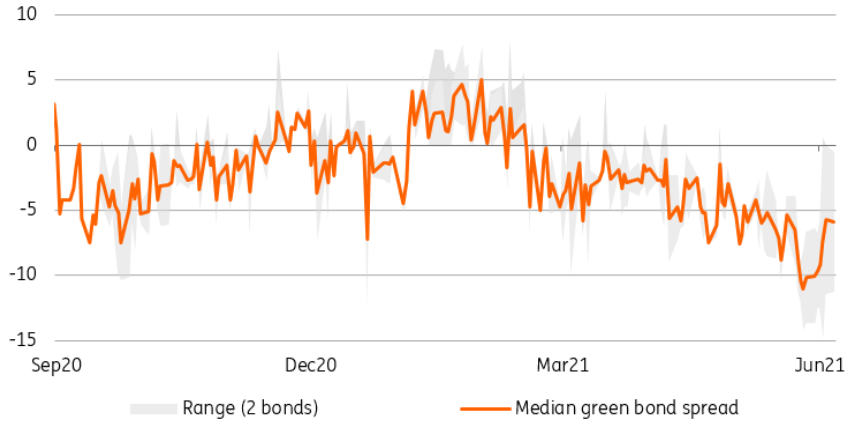
Source: Refinitiv, ING

To achieve this, we build two curve models for each issuer with a sufficient number of green and non-green bonds (3 and 10 respectively): one with a green factor, and one without. In the first case, the value of this green factor is simply our greenium estimate. In the second, the median model residual of all existing green bonds is our estimate. The two approaches are very similar but the second tends to be more robust for curves with only a small number of bonds, so we use both.

Below are some examples of greenium calculations.

Example of generic greenium in Verizon USD

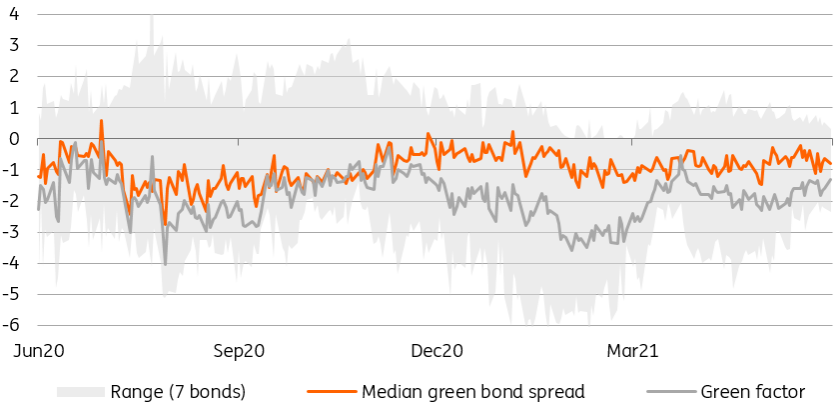
Spread to VZ non-green curve (bp)



Source: Refinitiv/ING estimates

Example of generic greenium in e.on

Spread to EONGI non-green curve (bp)



Source: Refinitiv/ING estimates

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