

Searching for 'Greenium'

Evidence of a green pricing premium in the secondary Euro-denominated investment grade corporate bond market

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Climate and Sustainability Finance

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Green bonds are functionally similar to conventional non-green fixed income securities, but contain a 'Use of Proceeds' pledge towards 'Green' activities. Raised funds are earmarked by issuers for contributing towards achieving environmental objectives. The purpose of green bonds is to 'internalise environmental externalities and adjust risk perceptions' ¹. Environmental objectives include climate change mitigation, climate change adaptation, natural resource conservation, biodiversity conservation, pollution prevention, and pollution control ².

Whilst investors are exposed to the activities and targeted, measurable positive impact of specific projects, green bonds crucially provide holders with exposure to the credit risk of the issuer (rather than to specific projects). The similarities in the mechanics and profile of green bonds suggest that they should be pari passu with non-green bonds of an identical issuer, seniority, and optionality. This principle of equivalence and assumed flat pricing does not always hold in practice.



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¹ G20 Green Finance Study Group, 2016. G20 Green Finance Synthesis Report 2016.

² ICMA, 2018. Green Bond Principles: Voluntary Process Guidelines for Issuing Green Bonds, June 2018. Paris: ICMA.

Theoretical models to justify the existence of greenium

A cornerstone exploration of the green and non-green bond pricing differential was the study of Preclaw and Bakshi (2015)³. The authors identified that investors were paying a premium to acquire green bonds.

Preclaw and Bakshi presented some potential explanations for the supposed premium implied by their OLS regression model:

- The price premium could be a mechanical supply and demand mismatch for green issues relative to their non-green equivalents. This suggests that 'greenium' could be a short-term phenomenon, unsustainable in the long-term as issuers tend towards cheaper funding. This approach recognises green funding as an inherent funding arbitrage,
- The green bond market should (according to some market participants) trade at tighter spreads to reflect their externalities. This hypothesis is commonly criticised, as holders of green bonds are not the residual claimants of the environmental benefits; the positive impact of green bonds on the environment or to the issuer should hypothetically be enjoyed by holders of green bonds and conventional bonds alike,
- Tighter green bond spreads could reflect an investor preference, where investors derive sufficient benefits to offset the lower cash flow. The authors suggest such benefits could be as simple as 'psychological benefits', brand value, influence with regulators and other non-financial gains and;
- Green bonds may be inherently less risky or volatile than otherwise similar conventional bonds, rendering tighter spreads appropriate to their risk-adjusted return. There is a suggestion, also, that by virtue of the marginal buyers of green debt ('environment-focused investors', which are usually profiled as 'hold-to-maturity' investors), green bonds may be subject to reduced trading activity and may thus exhibit greater price stability, particularly in times of underlying market stress.

The discussion has since further proliferated, provoking several quantitative studies and introducing the notion of a blended benefit to cost of capital from 'new issue premia²⁴ (often drawing a relationship between book oversubscription to premia in the primary market) and the 'Halo effect'⁵ (the positive contribution of green bond issuance to both the green and non-green pricing curves).

³ Preclaw, R. and Bakshi, A., 2015. The Cost of Being Green. Report, Barclays Credit Research.
4 Harrison, C. 2019. "Green Bond Pricing in the Primary Market July-December 2018." Climate Bonds Initiative.

⁵ Basar, S., and Krebbers, A., 2019. Green Bonds May Have Halo Effect.

Conducting a focussed study

The development of the market over time has bolstered the issuers' green and non-green yield curves, providing researchers with more reference points and more meaningful results.

In this study (a/o 31-Aug-20), IHS Markit deconstruct data from the iBoxx Global Green, Social & Sustainability Bond index to explore the notion of 'greenium' in the senior, investment grade Euro-denominated corporate bond tranche of the index.

This is a focussed study, controlling for a potential variation in results arising from a cross-universe study that includes securities from across the debt capital structure, issuer types, and currencydenominations. In our study, we define greenium as the differential between the Z-spread (zero-volatility spread) of a green bond and the Z-spread of an implied (theoretical) non-green bond, controlling for seniority and optionality, where a negative (tighter) spread indicates a premium. The Z-spread is used to remove curvature effects and the implied curve is constructed using linear interpolation (between two neighbouring non-green bonds, by time to maturity) for simplification. This approach does not seek to attribute the supposed benefits of 'issuer premium' or the 'Halo effect', although their influence may be embedded in the results.

The Z-spread is a measure of the spread the investor would realize over the entire benchmark zero-coupon curve if the bond is held to maturity.

The Z-spread is calculated as the spread that will make the present value of the cash flows of a respective bond equal to the market dirty price (reflecting accrued interest in addition to the clean price) when discounted at the benchmark spot rate plus the spread. The spread is found iteratively using the Newton method.

In general, constant spread over the spot curve for a bond at time t on an annual basis is calculated iteratively by using the Newton method:

$$P_{i,t} + A_{i,t} = \sum_{j=1}^{n} CF_{i,j} \cdot (1 + z_t(L_{i,j}) + S_{i,j})^{-L_{i,j}}$$

Where:

 $P_{i,t}$ = Clean price of bond I at time t $A_{i,t}$ = Accrued interest of bond I at time t $CF_{i,j}$ = Cashflow of bond I in the jth period $z_t(L_{i,j})$ = Spot curve $S_{i,j}$ = Constant spread

An equivalent non-green Z-spread is derived by interpolating between two neighbouring bonds





Study findings

From the 26 eligible issuers included in the study, we derive a market value-weighted greenium of -1.84 bps (see Appendix), an incrementally tighter spread in the aggregate versus notional non-green bonds of a comparable time to maturity. Notably, we find the greatest evidence of greenium amongst some of the harder-to-abate sectors, which typically have a greater intensity of greenhouse gas (GHG) emissions, adjusting for operational scale. These findings bode well for the mechanical demand and supply argument, when triangulated with the findings of Climate Bonds Initiative's 'Green Bond European Investor Survey'⁶, which found that investors (respondents) showed a greater appetite for bonds in the highest emitting sectors (namely, 'Energy/Utilities and Industrials').



Of the issuers of both green and non-green bonds from the study universe, 26 had sufficient curve coverage for analysis

⁶ Almeida, M., Filkova, M., Harrison, C., and Sette, P., 2019. Green Bond European Investor Survey. Climate Bonds Initiative with analysis support from Henley Business School.

The iBoxx EUR Green Bonds Select index is a sub-index of the broader iBoxx Global Green Bonds index, composed exclusively of securities from the Climate Bonds Initiative (CBI) Green Bond Database, whose taxonomy is aligned with the Paris Agreement ⁷. Bonds contained in the CBI Green bond database contribute to climate change mitigation and adaptation, in-line with the Paris Agreement 2050 climate neutrality target, keeping the increase in global average temperature below 2oC above pre-industrial levels and in pursuit of limiting the increase to 1.5oC to mitigate climate risks.

Limiting the study to bonds contained in the iBoxx EUR Green Bonds Select index, the market value-weighted greenium was recalculated. The result was an incrementally tighter -2.70 bps premium. An assessment of the probability density function of the index's greenium indicated a greater bias of the bond basket distribution towards even tighter spreads versus non-green comparables.

The curves of the established greenium basket were reconstructed monthly, for the 12 month-ends preceding 31-Aug-20, to provide more colour on the stability of greenium over time. The resulting data portrays material variability in greenium over the period, coinciding with broader market tumult. Another key finding is that the iBoxx EUR Green Bonds Select index prices consistently tighter than the broader index throughout the timeframe.

Whilst the study is too limited to extrapolate indicative axioms from, there are some notable observations to be made. Reacting with a lag post peak market sell-off, the underlying green bond market greenium increased. This could be supportive of a capital bifurcation story, that the relative demand and supply mismatch arose as markets tended towards sustainable securities as the 'quality' trade, adjusting for sector exposure. Issuers of green bonds have historically been large, stable and forward-looking entities ⁸. The quality argument further arises when analysing the differential between the two bond indices. Is the difference in computed greenium a function of the perceived 'quality' of the constituents of the iBoxx EUR Green Bonds Select, which satisfy a more rigorous, Paris-aligned criteria compared to the broader Green bond index of ICMA-aligned bonds?

European investors expressed a broad appetite for green bonds from the highest emitting sectors



Greenium was most pronounced amongst the 'highest emitting sectors' identified in the CBI Survey

Sector	Greenium (bps)
Oil & Gas	-9.531
Utilities	-3.443
Industrials	-2.486
Financial Services	-2.200
Technology	2.309
Telecommunications	2.863
Real Estate	3.067
Basic Materials	6.827
Consumer Goods	9.221

Source: IHS Markit

Incrementally higher greenium for the iBoxx EUR Green Bonds Select index



⁷ UNFCCC, 2015, December. Paris agreement. In Report of the Conference of the Parties to the United Nations Framework Convention on Climate Change (21st Session, 2015: Paris). (Vol. 4, p. 2017).

⁸ Ramel, E. and Michaelsen, J., 2020. Do green bonds outperform in 'risk-off' periods? Yes, but beware the nuances. Open Insights, Nordea.



An assessment of the last 12 months indicates variability of greenium with broader market volatility

Conclusion

Our study finds evidence for a modest greenium in the Euro-denominated investment grade senior corporate bond universe (-1.84 bps). The pricing premium is more pronounced when the study is limited to the narrower iBoxx EUR Green Bonds Select sub-index (-2.70 bps). The sub-index contains only securities from the Climate Bonds Initiative's Paris-aligned Green Bond Database, containing only bonds supportive of the 2050 net carbon neutrality target through means of climate change mitigation and adaptation.

Our findings are supportive of some of the hypotheses of the academic community and market participants that a greenium exists in secondary markets. A deconstruction and reorganisation of the derived data indicates some characteristics of greenium being a mechanical demand & supply mismatch, with the highest greenium and perceived investor demand being shared by the highest emitting sectors (-9.5, -3.4 and -2.5 bps of greenium for the Oil & Gas, Utilities and Industrials sectors, respectively). This triangulation gives credence to the findings, which are otherwise statistically insignificant.

The suggestion that the iBoxx Global Green Bonds Select index, adjusting for sector exposure, has a greater greenium bias raises further questions around the attribution of the implied lower cost of capital. These findings support further discussion of the importance of 3rd party due diligence and certification in positive market signalling and the relevance of perceived 'climate ambition', impact credibility, and greenwashing risk in the pricing of green securities. The consistent sector-adjusted premium of the iBoxx EUR Green Bonds Select index prompts us to consider that such factors may be influencing the discount rate.

Greenium is not static over time. As the frequency and magnitude of bond issuance grow, there will be more evidence with which to assess the sustainability of bond greenium and its limiting factors. Market participants should be cognizant of the natural non-stationarity of the data, which gives rise to econometric issues when calculating and forecasting greenium.

Appendix

Note: The polynomial nature of the trendlines is for illustrative purposes only and is not reflective of the method of curve construction employed in the study.



Time to maturity (years)





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Time to maturity (years)

Sector	ISIN	Yield (%)	Rating*	Time to Maturity (years)	Duration (years)	Greenium (bps)			
						to	t-1mth		
Utilities	Engie								
Utilities	FR0013428513	1.07	А	18.81	16.52	-6.35	-3.52		
Utilities	FR0013504693	0.64	А	11.58	10.21	2.87	0.42		
Utilities	FR0013455813	0.47	А	10.15	9.64	-3.38	-2.78		
Utilities	FR0013284254	0.39	А	8.49	7.82	-0.31	-3.85		
Utilities	FR0013245867	0.25	А	7.57	6.97	-8.03	-14.08		
Utilities	FR0013504677	0.31	А	7.57	6.91	1.35	4.55		
Utilities	FR0013428489	0.19	А	6.81	6.48	0.18	2.05		
Utilities	Enel Finance Inte	ernational NV							
Utilities	XS1750986744	0.16	BBB	6.04	5.59	-7.73	-3.24		
Utilities	XS1937665955	0.17	BBB	4.89	4.51	4.27	5.96		
Utilities	XS1550149204	0.04	BBB	4.04	3.95	-3.33	-4.99		
Utilities	SSE Plc								
Utilities	XS1875284702	0.38	BBB	7.01	6.43	-11.90	-13.59		
Utilities	XS1676952481	0.24	BBB	5.02	4.65	-3.54	-0.59		
Utilities	lren SpA								
Utilities	XS2065601937	0.60	BBB	9.12	8.51	-11.13	N/A		
Utilities	XS1704789590	0.49	BBB	7.15	6.54	-5.98	N/A		
Utilities	XS1881533563	0.40	BBB	5.05	4.56	1.87	N/A		
Utilities	Terna - Rete Elet	trica Nazional	e SpA						
Utilities	XS2209023402	0.60	BBB	11.90	11.42				
Utilities	XS1980270810	0.20	BBB	5.61	5.47	3.08	9.25		
Utilities	XS1858912915	0.02	BBB	2.89	2.86	3.60	0.35		
Utilities	EDP Finance BV								
Utilities	XS2053052895	0.37	BBB	6.04	5.72	-5.28	-1.16		
Utilities	XS1893621026	0.24	BBB	5.12	4.86	-8.61	-9.33		
Utilities	Snam SpA								
Utilities	XS2190256706	0.50	BBB	9.79	9.24	-1.62	0.88		
Utilities	XS1957442541	0.18	BBB	4.99	4.63	8.98	9.84		
Utilities	E.ON SE								
Utilities	XS2177580508	0.60	BBB	10.97	10.28	0.33	0.56		
Utilities	XS2047500926	0.45	BBB	9.49	9.34	-3.64	-0.36		
Utilities	XS2103014291	0.20	BBB	7.08	6.74	-5.71	-5.38		
Utilities	XS2152899584	0.13	BBB	5.10	4.74	1.60	-0.97		
Utilities	XS2047500769	0.02	BBB	3.99	3.99	-2.73	-2.15		
Utilities	Electricite de France SA								
Utilities	FR0013213295	0.18	А	6.12	5.68	-14.37	-11.62		

Utilities	Iberdrola Internatio	onal BV								
Utilities	XS1398476793	0.14	BBB	5.64	5.48	10.72	-2.68			
Utilities	innogy Finance BV									
Utilities	XS1702729275	0.26	BBB	7.13	6.58	-7.89	-2.80			
Utilities	EnBW International Finance BV									
Utilities	XS1901055472	0.49	А	13.17	11.56	-24.05	-32.50			
Utilities	ESB Finance DAC									
Utilities	XS2009861480	0.45	А	9.78	9.08	-1.27	-1.43			
Telecommunications	Telefonica Emisiones SAU									
Telecommunications	XS1946004451	0.09	BBB	3.43	3.13	4.07	0.86			
Telecommunications	Vodafone Group Plo	:								
Telecommunications	XS2002017361	0.25	BBB	6.23	6.05	1.26	1.50			
Technology	Apple Inc									
Technology	XS2079716853	-0.08	AA	5.21	5.21	2.31	2.22			
Real Estate	ICADE									
Real Estate	FR0013281755	1.23	BBB	7.04	6.41	-11.24	-2.70			
Real Estate	Unibail-Rodamco-W	Vestfield S	E							
Real Estate	XS1218319702	0.70	А	4.53	4.44	-3.25	2.03			
Real Estate	Digital Euro Finco L	LC								
Real Estate	XS1891174341	0.69	BBB	5.38	4.82	12.96	6.71			
Real Estate	Digital Dutch Finco	BV								
Real Estate	XS2100664114	1.07	BBB	9.54	8.68	4.98	2.14			
Real Estate	Prologis Euro Finan	ce LLC								
Real Estate	XS2112475509	0.38	А	7.43	7.33	0.82	1.68			
Oil & Gas	Repsol Internationa	al Finance	BV							
Oil & Gas	XS1613140489	0.07	BBB	1.73	1.72	-9.53	-9.53			
Industrials	La Poste SA									
Industrials	FR0013384567	0.41	А	8.25	7.78	-2.49	-2.84			
Financial Services	ALD SA									
Financial Services	XS1892240281	0.41	BBB	2.11	2.08	-2.20	-7.12			
Consumer Goods	VF Corp									
Consumer Goods	XS2123970167	0.68	А	7.49	7.42	9.22	4.57			
Basic Materials	BASF SE									
Basic Materials	DE000A289DC9	0.15	А	6.76	6.46	6.83	5.18			



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Sebastian Meyer is a Director in the iBoxx Product Management division at IHS Markit, offering broad benchmarking and liquid tradable index solutions that track bond markets globally. Sebastian has been at IHS Markit for more than 8 years, helping to drive product strategy and development and prior to that helping in the design, structuring and administration of indices. Prior to joining the firm, Sebastian was Head of Data Management at Credit Market Analysis (now part of ICE) where he worked for 6 years.



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Karim Henide is a Fixed Income Indices Associate, supporting the management and development of the iBoxx product portfolio. Karim's role places him at the forefront of the evolving passive investment and benchmarking landscape, across both public and private markets.

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