Oil & Gas: Climate performance and the cost of capital

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The Oil & Gas (O&G) sector continues to invest in developing new reserves. Execution of even a fraction of these projects is inconsistent with the 1.5°C climate goal.[1]

Uncertainty around policy and consumer demand creates risk on the future viability of these projects. It seems reasonable then that an O&G issuer's environmental performance and the credibility of its transition plan should factor in its funding costs.

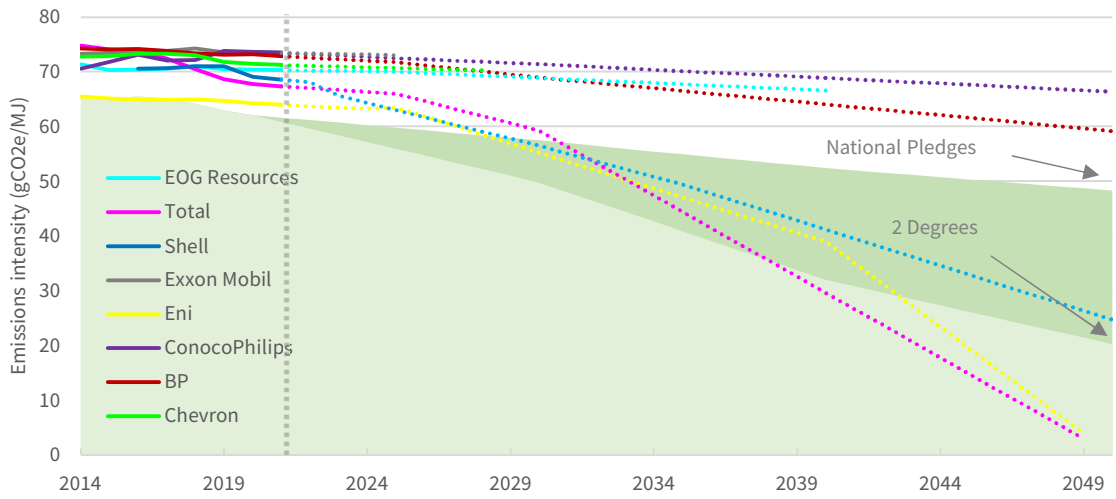
In this note, we use existing datasets to provide a relative ranking of O&G issuers based on their alignment with climate targets. We combine this with market pricing to analyse how much of their current and future environmental performance drives their funding spreads.

Our analysis finds that when considering the whole universe of liquid derivative underlyings, climate performance seems to be a partial driver for funding spreads.

Yet when looking more deeply at bond curves, we find that the fixed income market does not yet fully incorporate climate risk in its pricing of O&G debt. In long-end curves, there seems to be little differentiation between O&G credits depending on future production intentions.

Data indicates that investors are not being paid for the additional risk of investing in poorer environmental performers in this sector. We suggest that investors should evaluate climate risk in their portfolio, and transition into stronger performers, while spreads are flat.

Figure 1. Emissions intensity in the Oil & Gas sector. Source Transition Pathway Initiative, accessed 20 Feb 2023.



[1] "Revealed: the 'carbon bombs' set to trigger catastrophic climate breakdown", The Guardian, 11 May 2022.

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Introduction

About half of the global greenhouse gas emissions related to energy consumption are accounted to the production and consumption of Oil & Gas.[2] Commitments to transition within the sector vary, with some companies making relative stronger investments in clean energy than others. Clean energy investments accounts, on average, for about 5% of the company capital expenditure globally for companies in the sector, up from 1% in 2019.[3] This number is not material enough to achieve energy transition at the pace needed to limit global temperature rises to 1.5°C,[4] and so more capital expenditure is needed.

There is much written on the impact of ESG performance and the cost of capital. MSCI (2020) for instance arrives at the conclusion that low ESG-scoring companies exhibited significantly higher costs of capital than high-scoring ones within most sectors.[5] It seems clear, that if the cost of capital for energy companies was differentiated depending on environmental performance, that would encourage more investment into clean energy.

Given the increasing risk of stranded fossil assets, an increase in cost of capital for fossil investment could drive these projects to be un-investable more quickly that current targets. This is because many fossil fuel projects require significant upfront investments that need to be financed for several years. If the cost of capital increases, it may become too expensive for companies to fund these projects, making them unviable.

As investors become more aware of the risks associated with companies that have poor ESG performance, it is likely that we will see a shift in investment flows towards companies with strong ESG performance. This could have important implications for the future of the fossil fuel industry and the transition to a low-carbon economy.

While ESG-focused investors will divest the O&G sector completely, there are fixed income investors mandated to retain a sector allocation. For those investors, we present a relative analysis comparing the pricing and climate performance within the sector to highlight how the market is pricing the relative climate risk within the sector.

This note considers the universe of O&G companies funded by debt, and analyses what impact a stronger climate performance could have on their current funding costs, both using Credit Default Swap (CDS) spreads,[6] which are easier to compare between issuers, and bond curves, which extend to longer maturities.

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[2] "Beyond the cycle", CDP, 2018.

[3] "Record clean energy spending is set to help global energy investment grow by 8% in 2022", IEA, 22 June 2022.

[4] "Planned New Oil and Gas Investments, Incompatible with 1.5°C Warming Limit, Could Fully Finance Wind and Solar Scale-Up to Curb Climate Change", International Institute for Sustainable Development, 24 Oct 2022.

[5] For example please see, "ESG and the cost of capital", MSCI, 25 Feb 2020.

[6] A CDS is a contract where the protection buyer pays a running spread to be made whole on a reference obligation in the event of a default. The spread can be used to estimate a market-implied probability of default. The spread is also a driver of bond yields, which is the funding cost paid by issuers.

It is important to note that this analysis is relative; the sector is highly problematic from an absolute perspective. For example, one of the companies coming out ranked as 'better' in many studies, recently announced a large-scale intensification of Arctic drilling efforts.[7,8]

Universe selection

Our target universe is the O&G sector with sufficiently liquid debt, from which we can infer meaningful information on pricing. We want the universe to be as large as possible to provide the most data points, but also to comprise sufficiently similar companies that comparisons are possible.

We begin by considering the top 20 producers by market capitalisation from the S&P global oil index, combined with all O&G producers that are part of the iTraxx and CDX IG and HY indices.[9] We narrowed this selection by considering those that have reliable CDS pricing available, within a similar range.[10] The universe is shown in Figure 2.

Figure 2. Oil & Gas universe for analysis. Source: Bloomberg, AFII, accessed 14 Feb 2023.

Issuer	Ticker	Region	Total debt outstanding (USDbn)	Scope 1 + 2 Emissions (kton)	5Y CDS spread
Exxon Mobil Corp	XOM US	North America	45.4	101,000	49
Shell PLC	SHEL LN	Europe	55.8	69,000	55
Chevron Corp	CVX US	North America	26.3	59,000	49
Eni SpA	ENI IM	Europe	27.2	40,890	72
Marathon Petroleum Corp	MPC US	North America	29.4	39,900	93
TC Energy Corp	TRP CN	North America	53.1	36,585	70
BP PLC	BP/ LN	Europe	61.3	35,600	83
TotalEnergies SE	TTE FP	Europe	53.4	35,374	51
Energy Transfer LP	ET US	North America	47.2	29,643	93
Valero Energy Corp	VLO US	North America	10.9	28,600	81
Canadian Natural Resources Ltd	CNQ CN	North America	13.8	26,407	79
Occidental Petroleum Corp	OXY US	North America	21.8	23,293	138
Suncor Energy Inc	SU CN	North America	14.0	21,568	144
Repsol SA	REP SM	Europe	9.1	19,800	74
Cenovus Energy Inc	CVE CN	North America	11.8	19,400	100
ConocoPhillips	COP US	North America	17.3	18,720	56
Kinder Morgan Inc	KMI US	North America	31.5	18,100	86
Equinor ASA	EQNR NO	Europe	27.7	12,100	39
Williams Cos Inc/The	WMB US	North America	22.2	11,920	86
Targa Resources Partners LP	NGLS US	North America	8.3	10,715	125
EOG Resources Inc	EOG US	North America	5.2	5,363	68
Ovintiv Inc	OVV US	North America	4.0	4,228	145
Devon Energy Corp	DVN US	North America	6.8	3,420	125
Pioneer Natural Resources Co	PXD US	North America	6.1	3,248	67
Hess Corp	HES US	North America	5.8	2,900	125

[7] Equinor and partners to invest $1.44 bln in Arctic gas field. Reuters, 22Nov 2022.
[8] Total/Equinor climate risk CDS trade: IEA update. AFII, 19 May 2021.
[9] We manually excluded Enbridge and Halliburton at this point, despite being classified as oil companies, as they are service providers and not direct producers.
[10] Three National Oil Companies (NOC) were removed due to no or poor CDS data being available; they were Saudi Aramco, PetroChina Co & China Petroleum. Petrobras was also removed due to 5y CDS at 300bp being an outlier; all others were below 150bp.

For context, the selected companies within the sector have Scope 1 + 2 combined annual emissions amounting to ca 0.68 $GtCO_2$. For Oil & Gas producers Scope 3 (the downstream emissions of the oil and gas they produce) is the most significant and estimated as 3x the Scope 1 + 2 emissions total.[11] **This suggests the total annual emissions of this universe of companies could be 2.72 Gt - around the same as the total emissions of India in 2021.[12]**

Drivers of CDS spreads – Data

To understand the drivers of CDS spreads, we need credit data. We have chosen to consider credit rating, leverage and Free Cash Flow (FCF) as drivers. Figure 3 shows a summary of the correlation between these factors and spreads. Rating is the most correlated, with a Spearman ρ (correlation coefficient) of 78% and a R^2 of 65%,[13] which is interpreted as strong correlation. FCF and leverage have moderate correlation.

Figure 3. Linear regression and Spearman correlation coefficient for credit data vs 5y CDS spreads. Source: Bloomberg, AFII.

Data group	Spearman ρ vs CDS spreads	R^2 vs CDS spreads	Standard Error for R^2 calculation
Issuer credit rating (S&P)	78%	65%	19.1
Free cash flow to total debt (trailing 12 month FCF)	44%	22%	28.4
Financial leverage (avg. tot. assets/avg. tot. CE)	38%	17%	29.3

Figure 4. Linear regression and Spearman correlation coefficient for climate metrics vs 5y CDS spreads. Source:

Data group	Spearman ρ vs CDS spreads	R^2 vs CDS spreads	Standard Error for R^2 calculation
Carbon footprint (EUR 1bn portfolio)	39%	11%	30.4
Direct emissions intensity (kTon/EURmm sales)	44%	4%	31.4
MSCI Implied Temperature Rise	26%	4%	31.4
ESG Risk SCR	26%	11%	30.4

To consider if environmental factors are also a driver, we need climate data. Data can be challenging in this space, and there is not a single source to use. We have therefore chosen to investigate several datasets so that we can assess their importance at a later stage. We have chosen to consider historical emissions data, direct emissions intensity ([Scope 1 + 2 emissions] / sales) and carbon footprint ([Scope 1 + 2 emissions] / assets). We are including MSCI Implied Temperature Rise (ITR) and ESG rating which are both forward looking. We will also use recent sector analysis from Carbon Tracker[14] and the AFII FIONA score, in our final rankings. Fixed Income Optimisation for Net zero Alignment (FIONA) is an AFII framework for scoring and optimising fixed income portfolios based on carbon intensity.[15]

Figure 4 shows a summary of the correlation between the continuous datasets and spreads.

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[11] "The Concept of Scope 3 Greenhouse Gas Emissions, and how to measure them for carbon management by Fossil Energy and other companies. Part 1.", Forbes, 27 May 2022.

[12] "Carbon dioxide emissions worldwide in 2010 and 2021, by select country", Statista, 2023.

[13] In linear regression R^2 is the sum of the squared deviations of the original data from the mean, whereas the Spearman correlation coefficient is a measure of the rank correlation. As we recognize variables may not be related by a linear function and follow different probability distributions, Spearman correlation is preferred to assess relationship between variables, but we include both for information.

[14] Carbon Tracker is an NGO conducting analysis on the impact of the energy transition on capital markets. This report has looked at large O&G companies, and used their future expected productions to create a relative ranking for environmental impact. For full details please see "Paris Maligned", Carbon Tracker, 08 Dec 2022.

[15] Fixed Income Optimisation for Net zero Alignment (FIONA) is an AFII framework for scoring and optimising fixed income portfolios. It creates relative rankings within sectors and regions based on carbon intensity, but can be adapted to any data source. For an example of this analysis please see "Decarbonising iShares' LQD ETF", AFII, 15 Dec 2022.

None of these factors show strong correlation with the one-day spreads as a single factor. The carbon footprint and direct emissions intensity do however show moderate Spearman correlation, whereas ITR and ESG rating show weak correlation to the spreads. Figure 5 shows the correlation matrix between the ESG metrics; the only factors showing moderate correlation between them are carbon footprint and direct emissions intensity. This confirms the result that carbon footprint and direct emissions intensity are the most individually correlated with spreads.[16]

Figure 5. Spearman correlation matrix for ESG metrics. Source: Bloomberg, AFII.

Factor	Carbon footprint (EUR 1bn portfolio)	Direct emissions intensity (kTon/EURmm sales)	MSCI Implied Temperature Rise	ESG Risk SCR
Carbon footprint (EUR 1bn portfolio)	100%			
Direct emissions intensity (kTon/EURmm sales)	63%	100%		
MSCI Implied Temperature Rise	5%	33%	100%	
ESG Risk SCR	-7%	-17%	7%	100%

Climate ranking

Now we will use the data above to create a climate ranking for our universe. We want to design our ranking process to include all data, and to be relative within the universe, as we are primarily concerned with relative performance.

Figure 6. AFII sector relative climate rankings for universe. Source: AFII.

Company name	AFII Climate Rank	AFII Ranking Group	Carbon footprint (EUR 1bn portfolio)	FIONA score	MSCI Implied Temperature Rise	ESG RISK SCR	CarbonTracker production increase ranking
Equinor ASA	1.20	H	85.1	3	2.7	35.9	1
BP PLC	1.40	H	128.2	6	2.4	33.8	4
TotalEnergies SE	1.40	H	137.2	6	2.2	30.1	9
Shell PLC	1.60	H	176.5	6	2.5	37.6	2
Eni SpA	1.60	H	296.8	9	2.4	26.7	3
Marathon Petroleum Corp	2.00	H	483.4	6	3.5	28.5	n.a.
Repsol SA	2.00	H	352.0	9	2.2	26.9	n.a.
Valero Energy Corp	2.00	H	511.0	6	7.4	30.2	n.a.
Exxon Mobil Corp	2.00	H	308.2	6	6.5	36.4	10
Chevron Corp	2.20	M	254.8	6	7.9	38.4	7
EOG Resources Inc	2.20	M	145.1	6	10	35.9	13
Hess Corp	2.20	M	146.2	6	10	36.1	15
Pioneer Natural Resources Co	2.20	M	91.3	3	10	36.9	14
Devon Energy Corp	2.20	M	168.3	6	10	36.7	12
ConocoPhillips	2.20	M	213.6	6	10	34.7	11
Energy Transfer LP	2.25	M	289.4	6	4.6	39.4	n.a.
Kinder Morgan Inc	2.25	M	265.9	9	10	19.6	n.a.
Williams Cos Inc/The	2.25	M	259.0	9	10	23.5	n.a.
Cenovus Energy Inc	2.40	L	505.1	6	4.6	39.4	8
Canadian Natural Resources Ltd	2.40	L	485.2	9	10	31.8	6
Suncor Energy Inc	2.40	L	362.8	9	10	32.9	5
Occidental Petroleum Corp	2.50	L	321.1	9	4	43.3	n.a.
Ovintiv Inc	2.50	L	311.1	6	10	46.3	n.a.
TC Energy Corp	2.50	L	494.5	9	10	21.4	n.a.
Targa Resources Partners LP	2.50	L	700.2	9	2.5	39.4	n.a.

Figure 6 shows the datasets and sector relative climate ranking High/Medium/Low (H/M/L) for this universe.[17] We reiterate these are relative rankings, within an extremely pollutive and difficult-to

[16] We note that one can assume CDS spreads, from a statistical perspective, are non-stationary. Ideally we would want to regress the historical changes in data vs CDS spreads, compared to this point-in-time analysis. However, limited data on the climate side makes this a futile exercise.

[17] We use Bloomberg as our primary data source. Carbon emissions' data is 88% complete, and Bloomberg provides estimates for the rest of the universe. ESG Ratings are 88% complete, and we use statistical methods to estimate the missing names incorporating a penalty, which is part of the AFII FIONA framework.

transition sector. We want the ranking to be simple and easy to understand, but do not want to give the impression that any of these issuers are climate-friendly investments in absolute terms.

The final relative ranking depends on a H/M/L score within each dataset.

For data such as carbon footprint and ESG rating we have assigned a third of the universe to each level.

The AFII FIONA score is itself a relative ranking on carbon intensity within a larger universe, and so we will use it in unadjusted form, [18] and remove carbon intensity from the ranking to avoid double-counting.

For the Carbon Tracker score, only 15 issuers are covered and we have ordered the scores and assigned issuer equally into the three ranks. Where a name is not covered by Carbon Tracker we will use its average rank for the other datasets.

ITR is the hardest dataset to consider, as the levels are very high and disparate; 11 issuers are reported to be aligned with a 10°C rise. As this is a relative ranking, we will assign those issuers the poorest level, and split the remaining evenly.

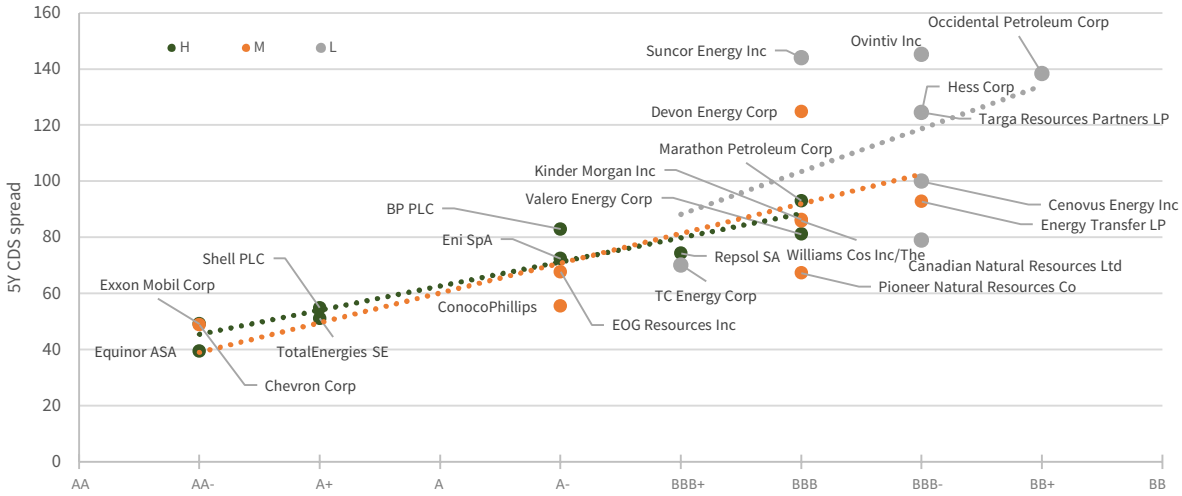
Now each issuer has five scores which must be combined. Two are backward looking (FIONA score and carbon footprint), and three are forward looking (ESG rating, ITR and Carbon Tracker ranking).

Full universe – 5Y CDS pricing

We can now see if, after controlling for credit metrics, climate metrics have an impact on derivative credit spreads. Figure 7 shows spreads against rating for our universe, with High/Medium/Low (H/M/L) categories of climate score as different series. Figure 8 shows spreads against financial leverage for our universe.

These graphs should be read in the following way. The x-axes represent the credit metric (rating/leverage) and the y-axes represent the one-day CDS spreads. The dotted lines illustrate a bivariate regression model on the independent x-axis values compared to the CDS spreads grouped by the H/M/L sector relative ranking.

Figure 7. 5y CDS spread, S&P credit rating, and AFII sector relative climate ranking. Source: Bloomberg, AFII, accessed 14 Feb 2023.



[18] For this universe of 25 issuers, only two have FIONA score of 1, and 14 have score of 2.

Figure 8. 5y CDS spread, Financial Leverage, and AFII sector relative climate ranking. Source: Bloomberg, AFII, accessed 14 Feb 2023.

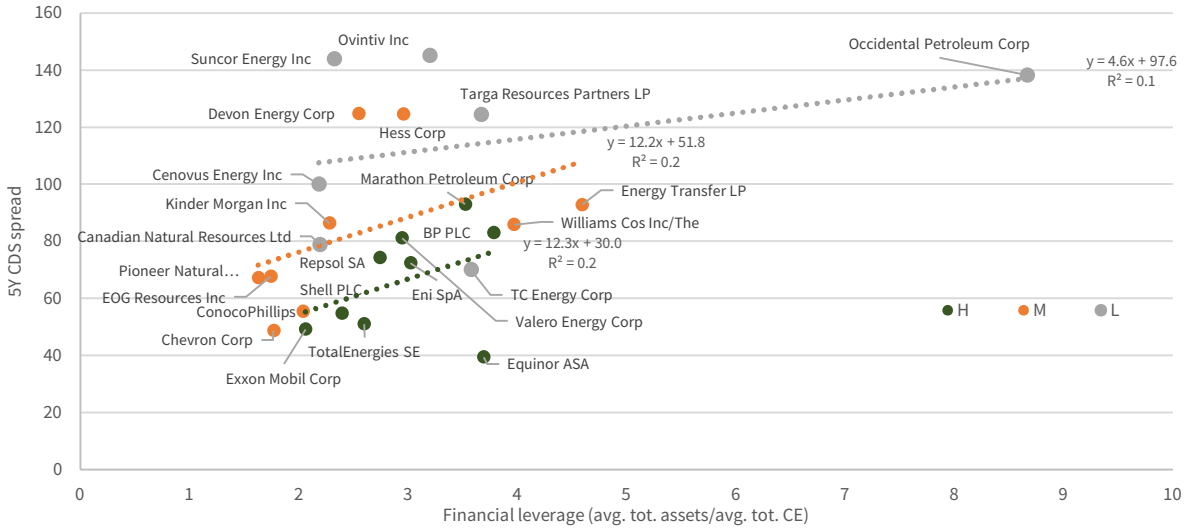


Figure 7 is unclear on whether there is a relationship between CDS spread and climate ranking; four names are rated A- but their spreads are in exact opposite order to their climate rank. We note that the two wider names are European (and the CDS levels are in local currency), compared to the tighter US names, but the spread discrepancies are relatively significant. Figure 3 did show that rating was the most significant individual driver of credit spreads, but still only a medium level of correlation. We also note that many of the poorer environmental performers have lower ratings, and so it is harder to draw comparisons across the rating scale.

Figure 8 is more interesting. On average, the H/M/L categories of climate rank give relatively parallel trendlines, with spread tightening on improvements in ranking. The trendline equations in this graph suggests that moving from L to M might give a 20bp spread tightening, and from M to H another 20bp for most companies.

When comparing individual names within the same rating class more specific observations can be made on a case-by-case basis between the ranking categories, such as the fact that Marathon Petroleum (BBB, H) has a roughly 50 bp lower spread than Suncor Energy (BBB, L) despite having a higher financial leverage.

In conclusion, we see some evidence that climate performance is a factor in credit spreads, but it is far from comprehensive. **Opportunities still exist for investors to incorporate environmental analysis in assessing credit value and take advantage of potential mis-pricings.**

Oil majors – bond pricing

The above analysis focused on a single maturity data point, 5y CDS spreads. For oil majors, with complex capital structures, an additional avenue of relative valuation could be through differences across the term structure of funding spread. Given that CDS curves are relatively illiquid and do not extend beyond the 10y point, we conduct this analysis using bond spreads, as all the names in question have fairly well-defined cash curves to draw data from.

The oil majors (also referred to as big oil, or super-majors) are commonly described as the six to eight largest publicly owned companies within the oil and gas sector.[19] For this exercise we have restricted our analysis to those that have several USD-denoted bonds outstanding to be able to compare them. Their names and ESG metrics can be found in Figure 9.

Figure 9. ESG metrics for oil majors. Source: Bloomberg, Carbon Tracker, AFII.

Company name	AFII Ranking Group	Carbon footprint (kton, EUR 1bn portfolio)	FIONA score	MSCI Implied Temperature Rise	ESG Rating	Carbon Tracker ranking
Shell PLC	H	176.5	6	2.5	37.6	2
TotalEnergies SE	H	137.2	6	2.2	30.1	9
BP PLC	H	128.2	6	2.4	33.8	4
Exxon Mobil Corp	H	308.2	6	6.5	36.4	10
Chevron Corp	M	254.8	6	7.9	38.4	7
ConocoPhillips	M	213.6	6	10	34.7	11

Figure 10. Credit relative value for oil majors with USD outstanding bonds over years to maturity. Legend describes credit rating and AFII sector relative ranking. Source: Bloomberg, AFII, accessed 16 Feb 2023.

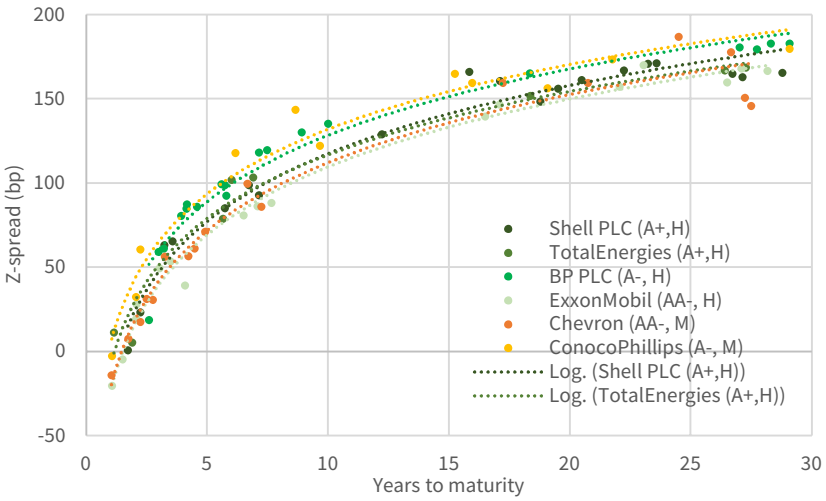


Figure 10 shows the credit relative value over years to maturity for the six oil majors derived from Bloomberg. These interpolated curves have been derived from data compiled in the CRVD tool in Bloomberg, which selects relevant bonds with different years to maturity and analyses their relative value against the companies' respective CDS curves. These curves are shown in Figure 10 as a logarithmic expression of the relevant bonds' Z-spreads together with their underlying points.

The shapes of the curves are virtually identical for all six, with parallel moves depending on credit rating. There is no evidence of any changes in curve shape, depending on environmental performance.

This is an important result; it is one thing for near-term funding spreads not to consider climate impact, but long-dated risks for oil companies will vary significantly depending on their transition plans and should be incorporated in valuations.

[19] What are the Big Oil Super Majors? Herold Financial Dictionary, 2017.

A- rated companies – bond pricing

There are four companies with A- rating in our universe; Eni SpA, BP PLC, ConocoPhillips and EOG Resources. Now we will conduct a more detailed case study on these issuers.

In Figure 11 it is evident that all forward-looking metrics point to the fact that EOG Resources and ConocoPhillips should receive a lower AFII sector relative ranking than BP PLC and Eni SpA. The question is if this is priced in the bonds or not.

Figure 11. ESG metrics for the four case study companies. Source: Bloomberg, Carbon Tracker, AFII.

Company name	AFII Ranking Group	Carbon footprint (kton, EUR 1bn portfolio)	FIONA score	MSCI Implied Temperature Rise	ESG Rating	Carbon Tracker ranking
BP PLC	H	128.2	6	2.4	33.8	4
Eni SpA	H	296.8	9	2.4	26.7	3
EOG Resources Inc	M	145.1	6	10	35.9	13
ConocoPhillips	M	213.6	6	10	34.7	11

Figure 12 Bond Z-spread over years to maturity for A- rated companies. Source: Bloomberg, AFII, accessed 16 Feb 2023.

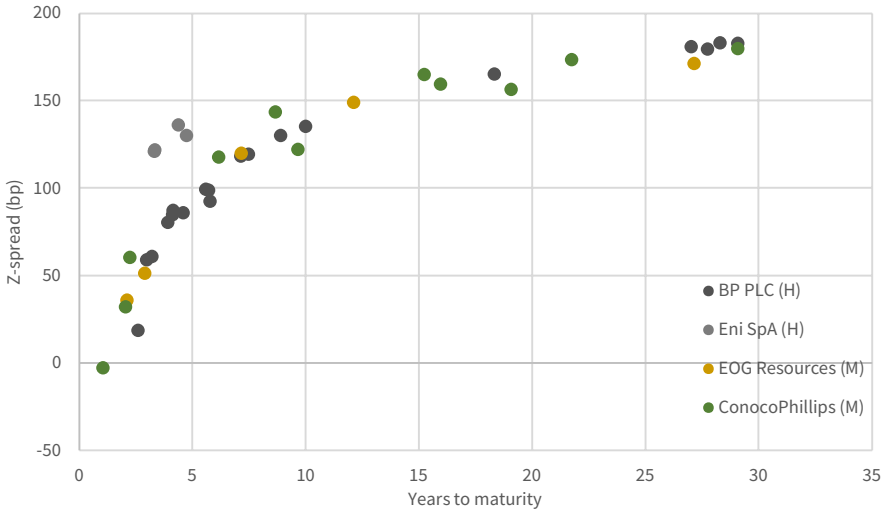


Figure 12 shows USD bonds' Z-spreads for the four companies over different years to maturity. Eni has the fewest bonds available in USD, they generally issue in EUR, and there are a few small USD private placements which were excluded. These bonds seem wide of the general curve, despite a high climate rating, but this may well be due to its lack of frequent issuance in this currency. Amongst the other issuers, there is little evidence of differentiate pricing; all bonds seem on the same curve.

In Figure 11 it is clear that there is a real difference in outlook; in ITR BP and Eni are aligned with 2.4°C (so still above Paris targets), but EOG and ConocoPhillips are aligned with 10°C, suggesting no reasonable transition plan. Carbon Tracker analysis suggests that EOG will increase production 50% by the 2030s, and ConocoPhillips by 25%, whereas BP and Eni are reported to be around flat, which is a very different outlook.

The 30-year bonds shown in Figure 12 however all trade at similar yields, which assigns virtually no difference in the relative risk of those assets becoming stranded, despite significantly different production outlooks and environmental scores.

Conclusions

This analysis presents a starting point for the discussion of how climate commitments are priced into the fixed income market in a high-emitting sector. It is intended to spark further research and debate. We hope it begins to support the hypothesis that when it comes to climate risk, the market is not yet fully efficient.

Figure 8 is the only part of our analysis which suggests some differentiated pricing for climate performance, and it is not persuasive. Figure 12 suggests long-dated bonds spreads do not vary depending on longer term transition plans, and it is longer-dated assets that are more at risk from policy change, and becoming stranded.

Even where a portfolio retains exposure to a high emitting sector, climate risk may be mitigated if weighted in favour of relatively better performers at flat spreads.

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