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# PRICING ESG RISK IN CREDIT MARKETS

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# PRICING ESG RISK IN CREDIT MARKETS

There is plenty of evidence showing that poor environmental, social, and governance (ESG) behaviours can lead to the erosion of a firm’s enterprise value. This has implications for both equity and credit investors. As a result, our investment analysis has historically considered ESG risks alongside more traditional operating and financial risks. However, until now it has been challenging to price ESG risks in a similar way to these core credit risks. This is changing: in order to analyse ESG risks with greater precision, we have developed a pricing model to capture the influence of these factors on credit instruments. Here we explain the methodology driving the model and the investment implications of the metrics it generates.



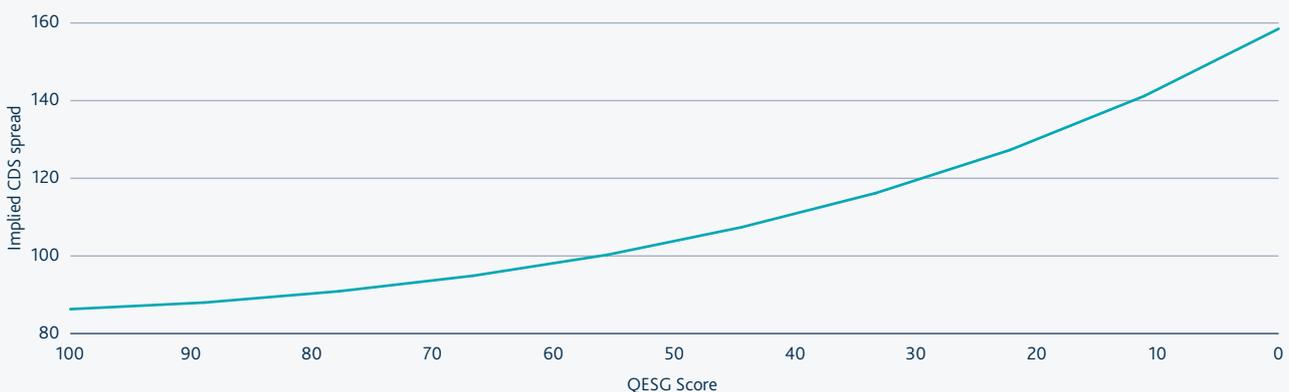
## KEY FINDINGS

To price ESG risk, we took Hermes’ proprietary measure of ESG risk – the QESG Score – for companies in four credit-default swap (CDS) indices. Drawing on external specialist research and the proprietary insights of Hermes EOS, the QESG Score combines a company’s current and future expected levels of ESG risk. We then compared each issuer’s QESG Score with the spreads on their CDS to identify persistent correlations. Our major findings are as follows:

- ▶ Companies with the lowest QESG Scores tend to have the widest CDS spreads and broadest distributions of average annual CDS spreads (see figure 1)
- ▶ Although there are correlations between companies’ QESG Scores and their credit ratings, there is a wide dispersion of QESG Scores within each rating band. This means that credit ratings do not perfectly accurately reflect ESG risks and thereby do not serve as a sufficient proxy for ESG risk
- ▶ Given the positive relationship between QESG Scores and spreads, we created a pricing model that can be used to quantify the contribution of ESG risk to credit spreads
- ▶ This model can be used to identify potential outperformers – firms with wide spreads and high QESG Scores – and underperformers – companies with tight spreads but poor QESG Scores

Figure 1: Implied CDS spreads and corresponding QESG Scores

For illustrative purposes only.



The ability of credit investors to price operating and financial risks – the core risks for the asset class – is based on decades of analysis on best practice. In contrast, the understanding that ESG analysis is vital to comprehensively managing risks and identifying investment opportunities is a relatively recent phenomenon, having evolved from the practice of socially responsible investing (SRI). As a result, research about how to accurately price ESG risks is scarce.

To follow on from our 2014 report, “Giving credit to ESG analysis”, we have developed a pricing model to calculate the contribution of ESG risk to credit spreads. It is the culmination of collaborative work between the Credit, Global Equities and Responsibility teams at Hermes, and Hermes EOS, our corporate engagement team. By enabling us to more fully embed ESG considerations into our investment process, the model will help us to better mitigate risks, identify opportunities and therefore improve the performance potential of our portfolios.

## WHY WE GIVE CREDIT TO ESG ANALYSIS

There is a plethora of academic and financial studies which show that there is a relationship between ESG risk and financial outcomes<sup>1</sup>. A review of the entire literature is beyond the scope of this research, but we are comfortable in concluding that there is no shortage of evidence that well-governed companies with minimal or positive impacts on society and the environment tend to have lower costs of capital than their less-sustainable peers<sup>2</sup>. This conclusion has an important implication for credit investors: companies with poor ESG characteristics tend to have a higher cost of capital because they are exposed to more risks stemming from externalities – non-financial dynamics, such as fines for not complying with environmental or health and safety regulations – that undermine corporate financial performance.

## ESG RISKS AND VALUATIONS: MAKING A CONNECTION

In order to price the ESG risks of securities, they must be linked with valuations. This is not as straightforward for credit instruments as it is for more standardised securities like equities because, put simply, bond mathematics get in the way. Coupon, term structure, call structure and rates – they all impact credit spreads, making it difficult to isolate the contribution of ESG risk.

But these influences are muted when we analyse CDSs instead of cash bonds. By considering CDS spreads as proxies for priced-in risks, the data are essentially cleansed of issue-level and exogenous events, providing the most homogenous expression of credit risk across a suite of names on a global basis. In this study, we analysed the constituents of four CDS indices – the CDX High Yield, CDX Investment Grade, iTraxx Europe, and iTraxx Crossover – from 2012 to 2016. This sample consisted of around 1,800 issuer-year observations.

## QUANTIFYING ESG RISK

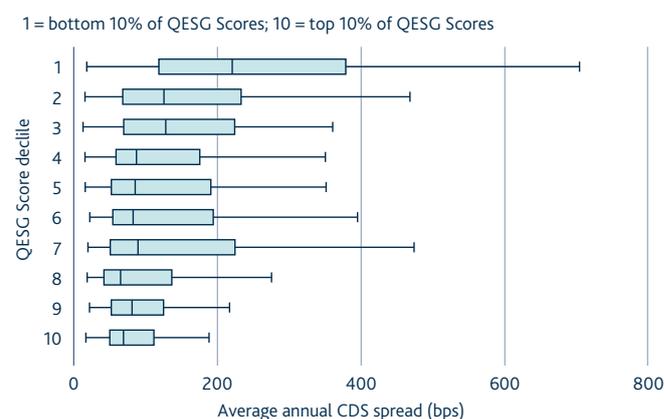
To measure the ESG risks of these companies, we collaborated with investment and engagement teams at Hermes. Hermes EOS and the Responsibility team helped design the study’s parameters, and we drew on the Global Equities team’s proprietary system for measuring the ESG risk exposures of companies. This quantitative method combined specialist ESG research from Sustainalytics, Bloomberg, the Carbon Disclosure Project and Trucost with fundamental insights gained by Hermes EOS through in-depth engagements with companies. For each company in the global stock universe, the team assigns a proprietary score for its exposure to the three ESG sub-categories – environmental, social and governance – and from this deduces a QESG Score (with ‘Q’ denoting the quantitative process employed). The score not only captures a company’s current level of ESG risk exposure, but also changes in various metrics that indicate the direction of travel. The QESG Scores range from 0 to 100, with a high score indicative of superb ESG policies and practices.

## ESG RISK AND CREDIT SPREADS: THE RELATIONSHIP IS REAL

In our analysis, we assessed the 365 companies in the 2012-16 sample, which resulted in 1,825 issuer-year observations. We used QESG Scores to rank each issuer according to its ESG quality, with the first decile containing issuers with the lowest scores and the 10th decile the highest. In each decile, there are about 180 observations.

For each issuer, we calculated its average annual CDS spread and then the distribution of annual average spreads in each decile. Figure 2 shows these distributions, including the minimum, maximum and the median spread.

Figure 2: CDS spreads by QESG decile, 2012-2016



Source: as at February 2017. Data sourced from Hermes Global Equities and Bloomberg. Corrected for outliers.

<sup>1</sup> See, for example, Rob Bauer and Daniel Hann. (2010). Corporate Environmental Management and Credit Risk. ECCE Working Paper. University Maastricht, The European Centre for Corporate Engagement; Allen Goss and Gordon S. Roberts. (2011). The Impact of Corporate Social Responsibility on the Cost of Bank Loans. Journal of Banking and Finance, 35, 1794-1810; Najah Attig, Sadok El Ghoul, Omrane Guedhami and Jungwon Suh. (2013). Corporate Social Responsibility and Credit Ratings. Journal of Business Ethics, 117, 679-694; Sudheer Chava. (2014). Environmental Externalities and Cost of Capital. Management Science, 60(9), 2223-2247; Pornsit Jiraporn, Napatsorn Jiraporn, Adisak Boeprasert and Kiyoung Chang. (2014). Does Corporate Social Responsibility (CSR) Improve Credit Ratings? Evidence from Geographic Identification. Financial Management, 43(3), 505-531.

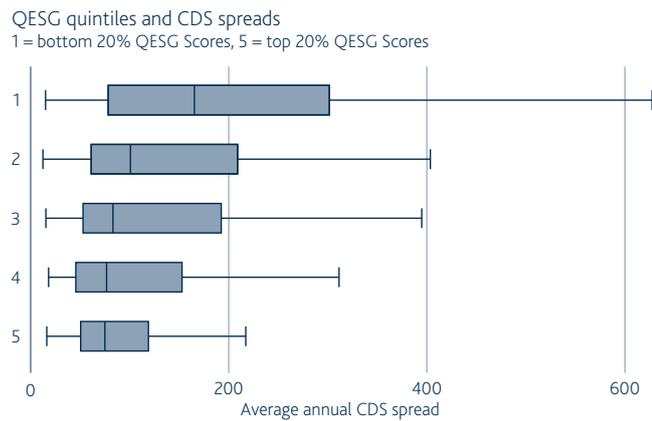
<sup>2</sup> Gordon L. Clark, Andreas Feiner, and Michael Viehs. "From the Stockholder to the Stakeholder." Research Paper: University of Oxford and Arabesque Partners, 2015.

This analysis yielded a number of interesting points. First, issuers with the lowest QESG Scores tended to have the highest median CDS spreads. Second, the distribution of observed annual average CDS spreads was also widest among the lowest QESG deciles. This implies that firms with lower ESG scores produce more unpredictable investment returns. Conversely, issuers with the highest QESG Scores tend to have the lowest CDS spreads and the narrowest distribution of spreads, which should result in a more stable return profile.

Even though it seems that the median spreads for deciles four- to 10 are very similar, our results show that the distribution of CDS spreads across these deciles varies quite dramatically. For example, deciles six and seven have wider distributions of CDS spreads than deciles four and five. This can be explained by outliers. It is also clear that the distributions of CDS spreads for deciles eight to 10 are much narrower than those of the other deciles, alluding to our previous conclusion that companies with higher QESG Scores tend to have lower CDS spreads.

To ensure that our results were statistically robust, we repeated the exercise but calculated the average spreads across ESG quintiles so that there were more observations in each group. The results are shown in figure 3.

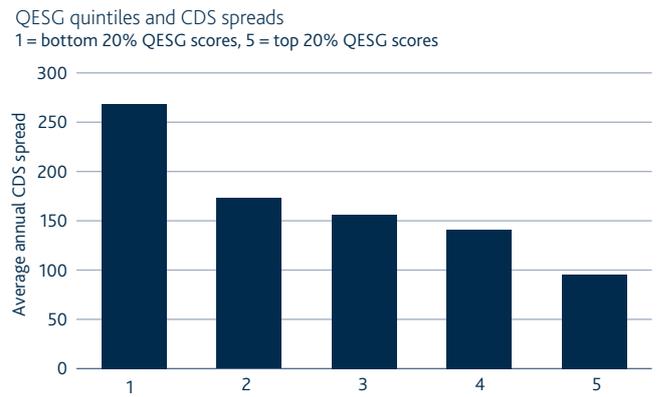
Figure 3. CDS spreads by QESG quintile, 2012-2016



Source: Own calculations as at February 2017. Data sourced from Hermes Global Equities and Bloomberg. Corrected for outliers.

The major conclusion from our decile analysis was reinforced by this quintile analysis. Companies in the fifth quintile, which have the highest 20% of QESG Scores, had the lowest median CDS spreads as well as the narrowest distribution of spreads. Meanwhile, companies in the first quintile – those with the lowest 20% of QESG Scores – had the highest median spreads and the widest distribution of spreads. To further illustrate this, figure 4 shows that average annual CDS spreads decreased as QESG Scores increased. We note that although the correlation between QESG Scores and spreads is consistent, it is not entirely linear, with the greatest change occurring between the first and second quintiles.

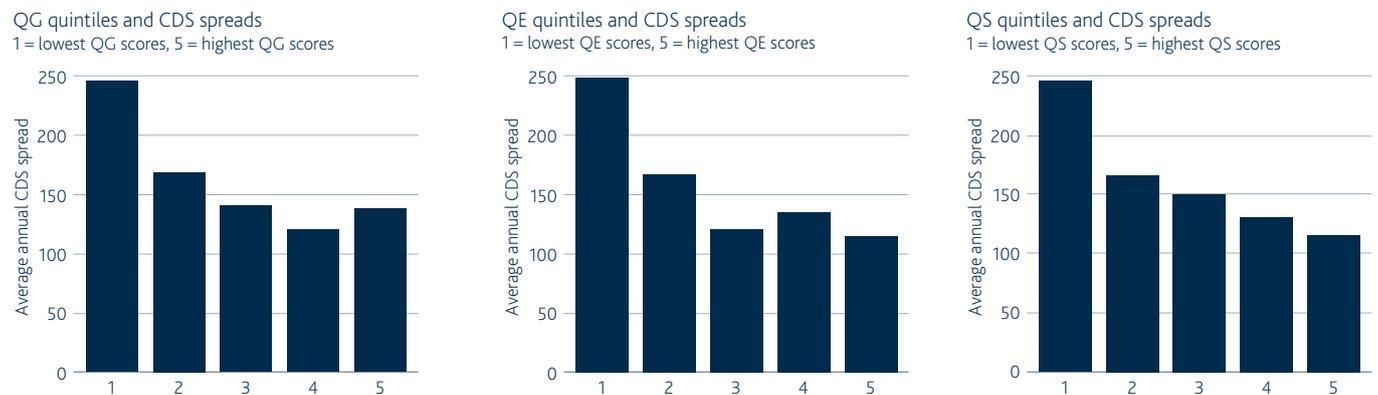
Figure 4. Average annual CDS spreads by QESG quintile, 2012-2016



Source: Own calculations as at February 2017. Data sourced from Hermes Global Equities and Bloomberg. Corrected for outliers.

Because ESG analysis considers multiple sustainability concerns, it is worth taking a closer look at the three main sub-categories – environmental, social and governance – to learn if the any one of them had a stronger correlation with spreads than others. By examining the average annual CDS spreads for every environmental, social and governance quintile, we can determine whether the observed effect for the overall QESG Scores holds true in a similar way for the three individual sub-categories. Figure 5 shows the average CDS spreads by quintile for companies' environmental, social and governance behaviours.

Figure 5. Average CDS spreads by environmental, social and governance quintiles, 2012-2016



Source: Own calculations as at February 2017. Data sourced from Hermes Global Equities and Bloomberg. Corrected for outliers.

<sup>3</sup> See, for example, Bauer and Hann (2010).

The results matched our analysis of the link between QESG Scores and spreads: for all three ESG dimensions, issuers with the lowest scores had the highest CDS spreads. Although the correlation between ESG performance and CDS spreads is not directly linear, we can conclude that higher ratings for each ESG sub-category are correlated with lower CDS spreads. The strongest effects were evident in the social sub-category.

**The wide range for each rating bucket corroborates our view that credit ratings in isolation are not sufficient proxies for ESG risks.**

**IS ESG PERFORMANCE CORRELATED WITH CREDIT RATINGS?**

After investigating whether there is a correlation between companies' ESG risk exposures and their CDS spreads, we aimed to find out if there is a correlation between ESG concerns and credit ratings. In our analysis, we used credit ratings assigned by Fitch, which had the highest coverage of all the rating agencies of the companies in our sample. When a Fitch rating was not available, we used a Standard and Poor's assessment instead. Following the convention practised by academics researching ESG behaviour in relation to bond spreads and credit risk<sup>3</sup>, we applied the scheme shown in the appendix to assign a numerical value to every credit rating.

From here, we ran an ordinary least squares (OLS) regression between the credit ratings (the dependent variable) and the QESG Scores. This enabled us to establish the significance of the correlation between issuers' credit ratings and their ESG behaviours. The results are shown in the appendix.

Figure 6. QESG Scores by credit rating from 2012 to 2016

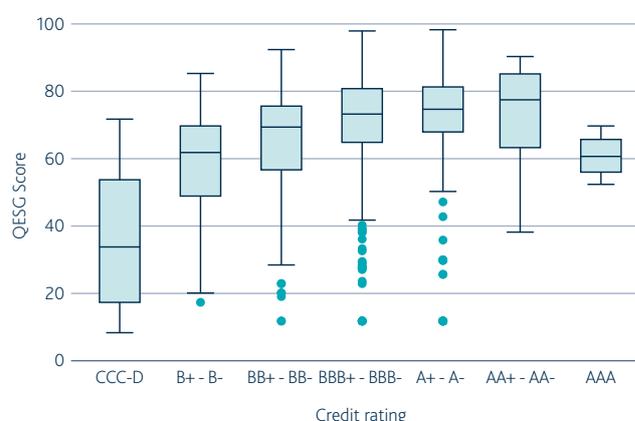


Source: Own calculations as at February 2017. ESG data sourced from Hermes Global Equities and credit ratings from Fitch Ratings.

The straight, upwards-sloping blue line depicts the fitted values from the linear OLS analysis, which represent the predicted relationship between credit ratings and QESG Scores. The grey area around the straight line is the 95% confidence interval, depicting the area in which the actual observations fall with a 95% likelihood. The scatter plot depicts the actual observations in our sample.

While we are aware of the potential econometric problems<sup>4</sup> that could arise from conducting a simple OLS analysis using this type of data, the results still yield several interesting insights. First, there is a significant positive correlation between the QESG Scores and the credit ratings of the underlying issuers, showing that higher QESG Scores tend to coincide with better credit ratings.

Figure 7. Distributions of QESG Scores by credit ratings, 2012 to 2016



Source: Own calculations as at February 2017. ESG data sourced from Hermes Global Equities and credit ratings from Fitch Ratings.

However, there are some notable exceptions. Some companies in our sample with low QESG Scores have high credit ratings, and vice versa. We would view the former group as candidates for ratings downgrades and the latter as likely to benefit from upgrades. As such, this analysis could serve as a screen to identify issuers that should be avoided due to their poor ESG exposures relative to their credit ratings. Similarly, it could provide a useful way of detecting investment opportunities arising from companies' positive ESG characteristics.

The distribution of QESG Scores across ratings categories is shown in figure 7. The wide range for each rating bucket corroborates our view that credit ratings in isolation are not adequate proxies for ESG risks. Admittedly, the median QESG Score is higher for issuers further up the ratings spectrum – the exception being the AAA rating bucket, which contains a very small number of observations. However, the chart also shows that the distribution of QESG Scores is very broad across all ratings categories: in the BBB and A segments, for example, there are some notable outliers that have relatively low QESG Scores despite their reasonable credit ratings. This raises an important point: by relying solely on credit ratings, an investor might underestimate the risks carried by issuers with low QESG Scores.

## DEVELOPING A PRICING MODEL FOR ESG RISK

Given the correlation between ESG behaviours and average annual CDS spreads and credit ratings, we aimed to develop a model that priced ESG risk. To do this, we adopted an OLS regression model that sought to explain the level of CDS spreads of the issuers in our sample<sup>5</sup>. As explanatory variables for these spreads, we took the issuers' QESG Scores, the square of the QESG Scores, and credit ratings. This enabled us to decompose the effects of the QESG Score and the credit rating. We included the square of the QESG Score in order to capture the non-linear relationship between QESG Scores and credit spreads that we observed previously. From the estimated regression, we then calculated the implied CDS levels for each QESG Score<sup>6</sup>, which we display in figure 8<sup>7</sup>.

Figure 8. Implied CDS spreads based on QESG Scores

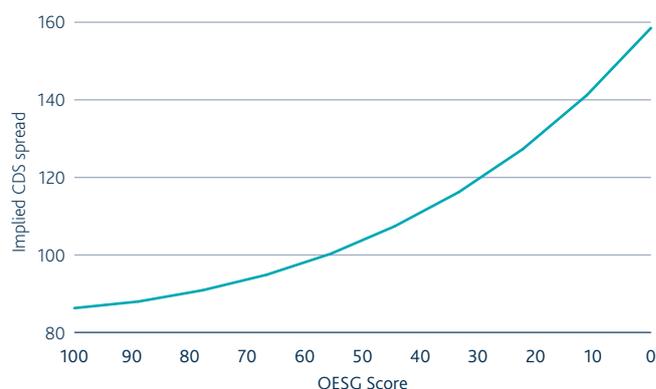
QESG Score	Implied CDS spread (basis points)
100	85.7
90	86.3
80	88.0
70	90.9
60	94.9
50	100.3
40	107.4
30	116.2
20	127.3
10	141.2
0	158.5

Source: Own calculations as at February 2017. Data sourced from Hermes Global Equities and Bloomberg. Corrected for outliers.

This trend is clearly shown in figure 9. It presents the implied CDS spreads from our OLS regression, which explained the natural logarithm of the CDS spread with the QESG Scores, QESG Scores squared, and a variable controlling for the credit rating. The chart is illustrative, as this relationship only holds true for this particular regression.

Figure 9. The relationship between implied CDS spreads and QESG Scores

For illustrative purposes only.



Our model depicts a relationship between CDS spreads and QESG Scores for the entire sample. It is important to stress that our analysis does not enable us to conclude whether better ESG behaviours cause lower spreads; rather, it establishes a correlation between the two. However, it is clear that issuers with higher QESG Scores have far tighter implied credit spreads than those with low QESG Scores, and we can now draw on this finding in our analysis of companies.

## INTEGRATING THE MODEL AND LOOKING AHEAD

The movements of credit spreads relative to the market are often mainly explained by measures of credit risk, but we know that ESG risks are also influential. Our analysis showed that companies with poor ESG practices tend to have wider and more volatile spreads, with the reverse being true for firms with good ESG characteristics. And while there is a correlation between credit quality and our proprietary QESG Scores, the considerable dispersion of scores within each credit-rating category used by agencies makes it clear that these measures are not a sufficient proxy for ESG risk.

As a result, credit investors must use a more precise measure of ESG risk if they aim to accurately capture its influence on spreads. In the past, we could estimate the impact of ESG risk on valuations in anecdotal terms, but plotting spreads against QESG Scores has enabled us to develop a pricing model that quantifies the compensation we should receive for a given level of ESG risk. As such, the model helps us to identify opportunities in lower-rated companies with higher ESG Scores, and to spot issuers at risk because their spreads are too tight relative to their QESG Scores. This complements the models we use to price the core credit risks – operating and financial.

To expand upon this research, we aim to investigate the viability of a momentum strategy favouring issuers with improving QESG Scores. We also plan to assess the effects of engagements undertaken by Hermes EOS, given that these activities help mitigate ESG risk – especially for controversial issuers.

<sup>4</sup> Such an analysis did not allow us to draw any conclusions about the cause-and-effect relationship between QESG Scores and credit ratings: it simply identifies a correlation. Furthermore, we also chose an OLS approach in order to depict our conclusions in graphs. With credit ratings as the dependent variable, whose values range between one and seven, a Tobit analysis would have been the more appropriate regression model.

<sup>5</sup> The OLS regression model is estimated using robust standard errors.

<sup>6</sup> We calculated the implied CDS spreads for every tenth QESG Score, i.e. for QESG = 10, =20, =30, and so on.

<sup>7</sup> The regression output can be found in the appendix.

## APPENDIX: REGRESSION OUTPUT FOR THE PRICING MODEL

This table presents the regression output of the underlying regression model for our pricing model.

### It takes the form:

$$\ln(\text{Annual average CDS spread})_{t_0} = \text{Constant} + b_1 * \text{QESG Score}_{t-1} + b_2 * (\text{QESG Score}_{t-1})^2 + b_3 * \text{Credit rating}_{t-1} + \text{error}.$$

The CDS spreads are measured at  $t_0$  while the explanatory variables are measured in  $t-1$ , one year before.

	ln(Annual average CDS spread)
QESG Score	-0.0121** (0.048)
(QESG Score squared)	0.0001 (0.214)
Credit rating	-0.6006*** (0.000)
Constant	7.4867*** (0.000)
R-squared	50.50%
Number of observations	1,158

\*\*\*, \*\*, \* indicate statistical significance at the 1%, 5%, and 10% levels.

We applied the scheme shown in figure 10 to assign a numerical value to every credit rating.

Fitch rating	Rating grade	Assigned rating code
AAA	Investment	7
AA+		6
AA		6
AA-		6
A+		5
A		5
A-		5
BBB+		4
BBB		4
BBB-		4
BB+		3
BB		3
BB-		3
B+	Speculative	2
B		2
B-		2
CCC		1
DDD		1
DD		1
D		1

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