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# Assessment of Credit Spread in Default Risk using Merton Model

George Jumbe [1], Ravi Gor[2]
[1]*Research scholar, Department of Mathematics, Gujarat University*
[2]*Department of Mathematics, Gujarat University*

***Abstract:*** **This study uses the Merton model to compare the credit spreads for three companies: Hindustan Aeronautics (HA), Eicher Motors (EM), and Adan Enterprises (AE). We use the balance sheets recorded from Ticker data from March 2018 to March 2022. We start by calculating the debt to asset leverage ratios of the three companies and use the ratios to compare their credit spreads. Results indicates that, EM is a low leverage company with 0.41 ratio, HA a medium leverage company with 0.67 ratio and AE a high leverage company with 0.96 ratio.**

***Index Terms:*** **Default Risk, Merton Model, leverage Ratio, Probability of Default, Credit Spread.**

## I. INTRODUCTION

The difference in yield between two bonds with equivalent maturities but different credit quality is known as the credit spread. The exposure to credit risk, which is connected with structural characteristics (assets and liabilities), is offset by the credit spread. Since it may indicate that the borrower needs more money urgently, a rising credit spread may be cause for concern. A smaller or narrowing credit spread is a sign of increased creditworthiness [11].

Merton (1974) pioneered the quantitative modeling of default risk by demonstrating how the market value of enterprises may be used to estimate the likelihood of a company defaulting. The approach simulates a firm's equity as a call option on its assets to determine the structural credit risk of the company. Without taking profits received throughout the course of the option's life into account, the model determines the theoretical price of European put and call options. The market worth of the company's assets in combination with its liability structure determines the event of default. The company is deemed to be in default when the value of the assets drops below a predetermined default level. An important presumption is that the event of default may only occur at the debt's maturity, when repayment is due [13].

This study applies the Merton technique to evaluate the credit spreads related to default risk for three companies: Hindustan Aeronautics (HA), Eicher Motors (EM), and Adan Enterprises (AE). The study uses the balance sheet of assets and liabilities from Ticker data recorded from March 2018 to March 2022.

## II. LITERATURE REVIEW

In 1991, Litterman and Iben presented a model that used the term structure of credit risk to evaluate callable corporate bonds for the first time. They discovered that the default risk, or the possibility that the company will not be able to fulfil its promised payments, either on time or in full, is the essential component of a corporate bond. Because of this, investors want a greater yield (spread) on corporate bonds. The spreads normally get wider as the bonds go closer to maturity [10].

Delianedis and Geske (2001) used the Black-Scholes-Merton diffusion based on option technique to study the elements of corporate credit spreads. They argued that default risk might, in fact, only account for a modest percentage of corporate credit spreads. Using data from November 1991 to December 1998, which includes the Asian Crisis in the fall of 1998, they calculated corporate default spreads as a simple component of corporate credit spreads. They calculated the residual spread by first measuring the discrepancy between the observed corporate credit spreads and option-based estimations of default spreads. They demonstrated that only a small portion, or 5% (22%), of the credit spread for AAA (BBB) enterprises may be ascribed to default risk. They demonstrated that the residual spread cannot be explained by recovery risk or state taxation on corporate bonds. They recognized that the pure diffusion assumption may result in underestimations of the default risk and introduced jump parameters to induce default spread to minimize the residual spread. The characteristics of interest rates, liquidity, and market risk variables were then included. They discovered that I increases in liquidity significantly reduce the residual spread but have no effect on the default spread; (ii) increases in stock market volatility significantly increase the default spread relative to the credit spread; and (iii) increases in stock market returns significantly decrease the residual spread by increasing the default spread relative to the credit spread. Eventually, they came to the conclusion that factors such as taxes, jumps, liquidity, and market risk are more important in explaining credit risk and credit spreads than default and recovery risk [4].

The term structure of credit spreads with jump risk was established by Zhou (2001). With jump risk, a company may instantly default as a result of a sharp decline in value. Even when the company was in good financial health, the model was able to match the size of credit spreads on corporate bonds and could provide curves with different slopes for yield spreads and marginal default rates, including flat and hump-shaped curves [15].

To give additional light on the empirical data, Koopman and Lucas (2005) analysed US data from 1993 to 1997 on real GDP, credit spreads, and company failure rates. Credit and the business cycle were separated using a multivariet unobserved components methodology. They demonstrated that spreads reflect, respectively, a positive and negative co-cyclicality with failure rates and GDP [9].

In a genuine business cycle model with a tiny, exogenously time-varying risk of economic catastrophe, Gourio (2013) incorporated a trade-off theory of capital structure. The corporate bond risk premium fluctuation magnifies macroeconomic changes in investment, employment, and GDP. The model replicates the level, volatility, and cyclicality of credit spreads. The findings showed that huge credit spreads, volatility, and countercyclicality are caused by risk premia rather than predicted credit losses, and that credit spreads are larger than expected credit losses (the product of the probability of default and the expected loss conditional on default) [6].

According to Avramov et al. (2019), structural models are empirically successful in explaining changes in corporate credit risk. These comprised a number of common variables, such as the return on the equity market, shifts in firm growth prospects, shifts in idiosyncratic equity volatility, shifts in the slope of the term structure, shifts in spot rates, shifts in stock returns, and shifts in stock momentum. These variables were shown to account for the majority of the systematic variance in credit spread changes among high-grade bonds and more than 54% of the variation in credit spread changes for medium-grade bonds [2].

Jumbe and Gor (2022) looked at the evolution of credit spreads, volatility, and predicted asset returns as produced by the Merton and Moody's KMV (MKMV) models. Findings showed that, in comparison to the Merton technique, the MKMV strategy produced significant credit spreads [7].

## III. THE MERTON MODEL

The Merton (1974) model simulates a company's stock as a call option on its assets in order to evaluate a company's structural credit risk. The capital structure of the model is derived using the Black-Scholes (1973) option pricing assumptions. The total assets, total liabilities, and total debts with face amounts (strike prices) maturing over a specific time period are listed on the balance sheet. According to the Brownian motion outlined below, the returns on the firm's assets are assumed to have a normally distributed distribution.

$$dV = rVdt + \sigma_V V dW \qquad (1)$$

where $W$ is a standard Brownian motion, $r$ is the risk-free interest rate and $\sigma_V$ is the volatility of the firm's assets (the standard deviation of annualized rate of return). It is assumed that the asset value of the company will follow a lognormal diffusion process with a constant volatility given by [14]:

$$V_T = V_0 e^{\left\{\left(r - \frac{\sigma_V^2}{2}\right)T + \sigma_V \sqrt{T} W\right\}} \qquad (2)$$

where $V_0$ is initial value of the assets specified at $T = 0$ and $V_T$ is the value of the asset at time $T$. The expected value of the assets at the time $T$ is given by:

$$E(V_T) = V_0 e^{rT} \qquad (3)$$

Assuming the value of the business's assets $V_T$ at time $T$ is made up of equity $E$ and debt $D$ in the form of zero-coupon bonds with face values $B$ that mature at time $T$. The following equation determines the capital structure [7]:

$$V = E + D \quad (4)$$

By choosing a debt maturity $T$, any debt is translated into a zero-coupon bond. When $V_T > B$, the company's debt holders are fully repaid the amount $V_T - B$ and shareholder equity is still worth something. On the other hand, if $V_T < B$ the company collapses because of its debt. In this case, debt holders would have first priority over shareholders for the remaining asset, leaving shareholders with nothing. The equity value at a given point in time $T$ can be stated as follows:

$$E_T = \max\left(V_T - B, 0\right) \quad (5)$$

This is the payout of a European call option with a maturity of $T$ and a strike price of $B$ written on an underlying asset $V$. The value of equity, viewed as a call on the firm, depends on $V$ and $\sigma_V$ as well as the observable variables $(B, T, r)$. $V$ and $\sigma_V$ are unobservable variables. Letting $f$ denote the call pricing function, and suppressing dependence on the observable variables, we write [5]:

$$E = f\left(V, \sigma_V\right) \quad (6)$$

Applying the Black-Scholes assumptions, we get:

$$E = VN\left(d_1\right) - Be^{-rT} N\left(d_2\right) \quad (7)$$

for the call option value, and,

$$E = Be^{-rT} N\left(-d_2\right) - VN\left(-d_1\right) \quad (8)$$

for the put option. $N(.)$ is the standard normal cumulative distribution probability function, and,

$$d_1 = \frac{\ln\left(V/B\right) + \left(r + \frac{1}{2}\sigma_V^2\right)T}{\sigma_V \sqrt{T}}, \quad (9)$$

$$d_2 = \frac{\ln\left(V/B\right) + \left(r - \frac{1}{2}\sigma_V^2\right)T}{\sigma_V \sqrt{T}} \quad (10)$$

$$= d_1 - \sigma_V \sqrt{T}$$

The value of the debt, $D$ is determined by $V - E$. The probability of the company's debt default under risk-neutral conditions is $N\left(-d_2\right)$. Here, the event that shareholders' call option matures out-of-money is what triggers a credit default at time $T$, with the following risk-neutral probability called the probability of Default (PD) [16]:

$$PD = P\left(V_T < B\right) = N\left(-d_2\right) \quad (11)$$

$$PD = N\left(-\frac{\ln\left(V/B\right) + \left(r + \frac{1}{2}\sigma_V^2\right)T}{\sigma_V \sqrt{T}}\right)$$

$$= 1 - N\left(\frac{\ln\left(V/B\right) + \left(r + \frac{1}{2}\sigma_V^2\right)T}{\sigma_V \sqrt{T}}\right)$$

$$PD = 1 - N\left(DD\right) \quad (12)$$

Where $DD$ is known as the distance to default reflecting how far a firm's asset value is from the value of obligations that would trigger a default.

## IV. ASSET PRICE, $V$ AND ASSET VOLATILITY, $\sigma_V$

Since equity is an option on firm value, the volatility of equity, denoted as $\sigma_E$, is also a function of $V$ and $\sigma_V$. Using another geometric Brownian motion for equity $E$ we can obtain $V$ and $\sigma_V$ and use Ito's Lemma to demonstrate that instantaneous volatilities satisfy [8]:

$$\sigma_E = g\left(V, \sigma_V\right) = \frac{V\sigma_V}{E}\frac{\partial E}{\partial V} \quad (13)$$

using Black-Scholes equation, it can be shown that $\frac{\partial E}{\partial V} = N\left(d_1\right)$, then (13) we becomes:

$$\sigma_E = g\left(V, \sigma_V\right) = \frac{V\sigma_V}{E} N\left(d_1\right) \quad (14)$$

$$E\sigma_E = V\sigma_V N\left(d_1\right) \quad (15)$$

where $N\left(d_1\right)$ is essentially the delta of equity with respect to firm value. The price of an equity $E$ and the volatility $\sigma_E$ of its return are observed in the equity market. Finally, (7) and (15), can be solved simultaneously for $V$ and $\sigma_V$.

## V. RETURN ON ASSET (ROA), *r*

A financial ratio known as return on assets (ROA) measures a company's profitability in relation to its total assets. A company's ability to generate a return (profit) on its asset investment is measured by its

ROA. It demonstrates how well a business can turn the funds used to buy assets into net income or profits. Greater ROA levels are always preferred. By dividing a company's net income by all of its assets, ROA is determined. Since different industries utilize assets in different ways, ROA is used to compare businesses in the same industry.

$$ROA = \frac{Net\ Income}{Total\ Assets} \quad (16)$$

## VI. DETERMINATION OF CREDIT SPREAD

The value of the put option determines the price differential between today's risky and riskless value of the debt, so the market value of debt $D$ can be identified with the equation [14]:

$$D = Be^{-rT} - PUT \quad (17)$$

The price difference between risky and riskless bonds is determined by the PUT, and a larger value of the PUT results in a wider interest rate spread. The spread on hazardous debt must expand along with the value of the put option as the firm's value is more volatile. The spread on hazardous debt must also reduce as the risk-free interest rate rises.

The credit spread is the difference between the risk-free rate and the yield on the risky loan. Let us use the market price of the loan at time zero $D$, as our definition. The value of the assets is equal to the combined value of the two sources of financing, equity and debt:

$$D = V - E \quad (18)$$

where,

$$E = VN(d_1) - Be^{-rT}N(d_2) \quad (19)$$

Substituting (19) to (18) we get:

$$D = V - VN(d_1) + Be^{-rT}N(d_2)$$
$$= V\left(1 - N(d_1)\right) + Be^{-rT}N(d_2)$$
$$D = VN(-d_1) + Be^{-rT}N(d_2) \quad (20)$$

The yield to maturity for the debt can be obtained by:

$$D = Be^{-yT} \quad (21)$$

Comparing right sides of equations (20) and (21) we get:

$$Be^{-yT} = VN(-d_1) + Be^{-rT}N(d_2)$$

$$y = -\frac{1}{T}\ln\left(\frac{V}{B}N(-d_1) + e^{-rT}N(d_2)\right) \quad (22)$$

The same result can be gained from the fundamental formula on rate of return with continuous compounding given by:

$$y = \frac{1}{T}\ln\left(\frac{V}{B}\right)$$
$$= \frac{1}{T}\ln\left(\frac{B}{VN(-d_1) + Be^{-rT}N(d_2)}\right) \quad (23)$$

The credit spread implied by the Merton model can be finally obtained by reducing the yield rate with the risk – free rate:

$$s = y - r \quad (24)$$

## VII. DEBT TO ASSET LEVERAGE RATIOS

A financial indicator used to determine how much debt is utilized to fund a company's activities is the debt to asset ratio. It is one of numerous leverage ratios that may be used to analyze the capital structure of a company. The financed debt of a corporation, also referred to as interest-bearing liabilities, is used to determine the debt to asset ratio. The share of debt financing is larger and the danger of potential solvency concerns for the business is higher the higher the ratio. A corporation is said to have high leverage if a larger part of its funding comes from debt. A company is said to have low leverage if a smaller percentage of its funding comes from debt. Due to the unique nature of different sectors' capital structures, the ratio is only applicable when comparing companies operating in the same industry. A ratio that is getting close to 1 (or 100%) is a very high percentage of debt financing. Long-term sustainability would be impossible given the firm's potential solvency concerns and the possibility of an event of default. A debt-to-asset ratio that is too low may be a sign that management made bad capital structure decisions, which would lower the firm's shareholders' ideal return on equity.

$$\text{Debt to Assets Ratio} = \frac{\text{Total Funded Debt}}{\text{Total Assets}} \quad (25)$$

## VII. DATA ANALYSIS AND RESULTS

The balance sheets of Hindustan Aeronautics (HA), Eicher Motors (EM), and Adan Enterprises (AE) corporations are displayed in Tables 1, 2, and 3, respectively, based on Ticker data from March 2018 to March 2022. Data is documented on current obligations, total liabilities, current assets, and total assets in the balance sheet. This information is used to determine the provided companies' distances to default (DD), probability of default (PD), and Credit spread given in Tables 4 and 5 respectively.

Using the standard deviation $\sigma = 0.2$ and risk-free interest $r = 0.05$, Table 4 calculates the distances to default (DD) and probabilities of defaults (PD) for three enterprises. Equation (12) is used to compute the distances to default, DD and default probability, PD. For two companies, HA and EM, the distance to default decreases as the debt maturity time increases, whereas the distance to default for AE company increases as the debt maturity time increases. For two companies, HA and EM, the likelihood of default rises as debt maturity time increases, whereas for AE company, the likelihood of default falls as debt maturity time increases.

Using the same parameter values from Tables 1, 2, and 3, and $\sigma = 0.2$ and risk free interest, $r = 0.05$, Table 5 shows the credit yields and spreads for three companies, HA, EM, and AE, respectively. Equations (23) and (24) are used to compute the yields and spreads. While AE's yields and spreads are declining as loan maturity times increase, those for HA and EM are increasing as debt maturity times do as well.

According to the debt maturity dates in Table 4 of three firms, HA, EM, and AE, respectively, the Distances to Default (DD) for each are depicted in Figure 1. For two corporations, HA and EM, the plot illustrates the inversely proportional relationship between the DDs and debt maturity times, with DDs falling as debt maturity times rise and vice versa. The plot also demonstrates the AE Company's increase in DDs as debt maturity period lengthens.

According to the debt maturity dates in Table 4 of three firms, HA, EM, and AE, respectively, the Probability of Defaults (PD) for each is plotted in Figure 2. For the AE company, the plot indicates a decrease in PD as debt maturity periods grow, however for the HA and EM companies, it shows an increase in PDs as debt maturity times increase.

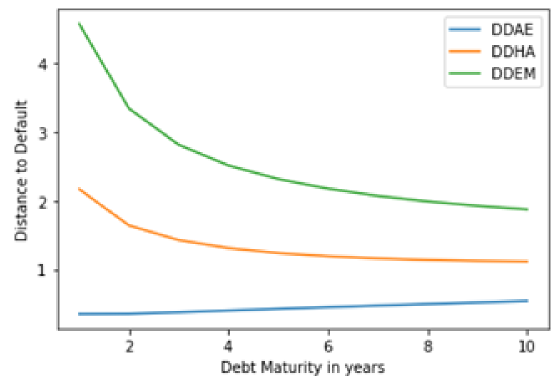


Figure 1. Distances to Default (DD) from Debt Maturity times.

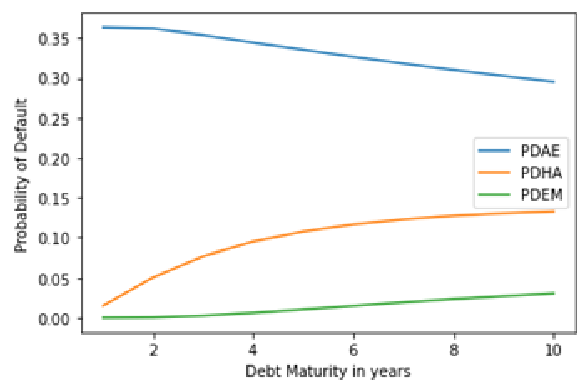


Figure 2. Probabilities of defaults (PD) from Debt Maturity times

The probabilities of default (PDs) for three companies; HA, EM, and AE are depicted in Figures 3, 4, and 5 and are plotted from the corresponding distances to defaults (DDs) from Table 4. The probability of default for the HA company are presented in Figure 3 according to the distances to defaults. The plot demonstrates that for the HA company, PDs fall as DDs rise. Figure 4 depicts a nearly identical scenario to Figure 3 but with a somewhat different graph appearance. It also demonstrates how PDs are falling off as DDs are rising. This finding is consistent with the literature since it shows how stable HA and EM enterprises are with regard to default. The company is more stable the higher the DDs and lower the PDs. The PDs plotted from the DDs for AE Company are shown in Figure 5. A negative straight line association between PDs and DDs is depicted in the plot.

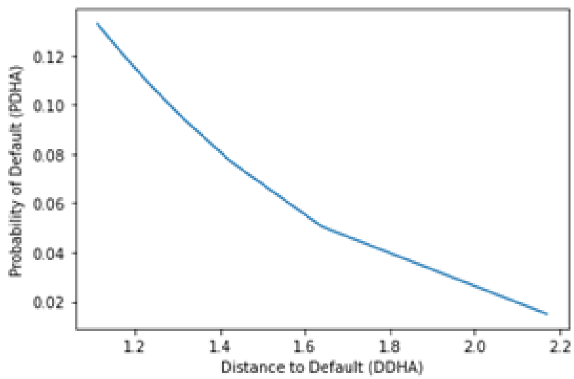


Figure 3. PDHA vs. DDHA

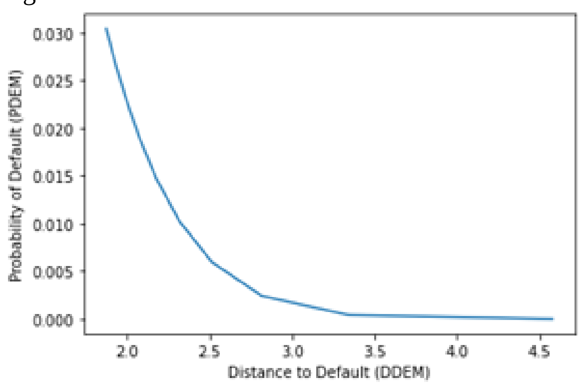


Figure 4. PDEM vs. DDEM

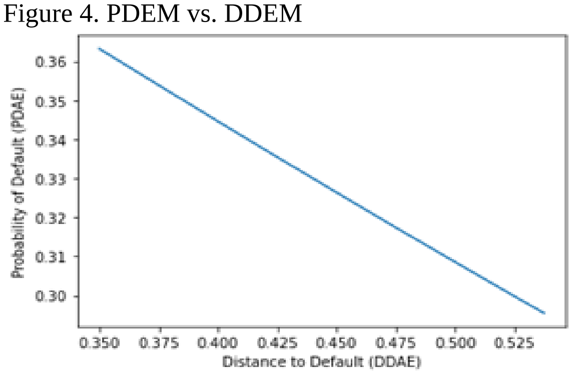


Figure 5. PDAE vs. DDAE

Credit spreads and the debt-to-asset ratio are plotted against the debt maturities in years in Figure 6.

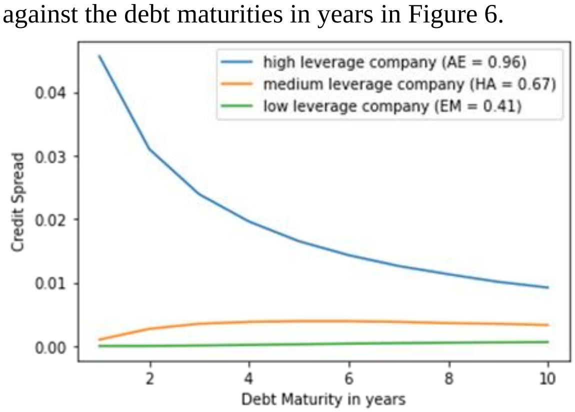


Figure 6. Credit Spreads from Debt Maturity time in years.

We see the following while examining the term structure of credit spreads as determined by (24) and plotted against various debt maturities: The plotting of the credit spreads against different debt maturities demonstrates how a low-leverage enterprise (EM) has a flatter credit spread term structure with early spreads close to zero because it has sufficient assets to cover its liabilities. When debt maturity increases, the spread progressively increases before starting to decline at the long end.

A medium-leveraged company (HA) has a humped-shaped credit spread term structure. The spreads are initially small since the firm has adequate assets to pay down its liabilities. The spreads quickly rises before steadily falling over longer maturities indicating the fluctuation of asset values which could lead to insufficient assets to cover the debts.

A high-leverage corporation (AE) has a credit spread term structure that slopes downward. It starts out very high and gets lower as maturities get longer as more time is given for the company's assets to increase in value and cover liabilities.

## VIII. CONCLUSION AND SUGGESTION FOR FUTURE RESEARCH

In this study, we have used the Merton approach, to evaluate the credit spread of three companies: Hindustan Aeronautics (HA), Eicher Motors (EM), and Adan Enterprises (AE). We estimated the credit yields and spreads for each company after measuring the distances to default (DD) and probability of default (PD). By comparing yields and free risk interest of similar maturity and various credit quality, we calculated credit spreads. We also calculated the debt to asset leverage ratios of these companies and used them to compare their credit spreads. As a result of having enough assets to pay its liabilities, a low-leverage firm (EM) with a leverage ratio of 0.41 had a flatter credit spread term structure with early spreads close to zero. Spread gradually rose when debt matured before beginning to fall at the long end. The credit spread term structure of a medium-leveraged corporation (HA) with a leverage ratio of 0.67 had a humped shape. Since the corporation had enough assets to cover its debts, the spreads were initially minimal. When asset value variations could easily lead to insufficient assets, the spread then quickly increased before progressively decreased for longer maturities.

A high-leverage company (AE) with a leverage ratio of 0.96 had a credit spread term structure that sloped downward; it started out very high and was lowering as maturities got longer as more time was given for the company's assets to increase in value and meet liabilities. In the future we will consider comparing the credit spreads generated by Merton and the Moody's KMV (MKMV) models.

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Table 1. Liabilities and Asset values for Hindustan Aeronautics Ltd

| Time ($T$) | Mar 2018 | Mar 2019 | Mar 2020 | Mar 2021 | Mar 2022 |
|---|---|---|---|---|---|
| Current Liabilities | 26,097.94 | 28,193.22 | 31,128.53 | 25,414.19 | 25,019.85 |
| Total liabilities($DHA$) | 47,660.73 | 50,427.79 | 52,739.56 | 51,637.40 | 57,755.42 |
| Current Assets | 37,011.51 | 39,644.23 | 41,392.33 | 40,385.84 | 45,007.12 |
| Total Assets ($VHA$) | 47,660.73 | 50,427.79 | 52,739.56 | 51,637.40 | 57,755.42 |

Source (Hindustan Aeronautics Ltd, https://ticker.finology.in/company/HAL)

Table 2. Liabilities and Asset values for Eicher motors Ltd.

| Time ($T$) | Mar 2018 | Mar 2019 | Mar 2020 | Mar 2021 | Mar 2022 |
|---|---|---|---|---|---|
| Current Liabilities | 2,194.63 | 1,978.24 | 1,855.13 | 2,428.71 | 2,878.87 |
| Total Liabilities($DEM$) | 7,794.67 | 9,477.41 | 10,579.01 | 12,624.91 | 14,284.55 |
| Current Assets | 2,524.42 | 4,384.43 | 6,336.60 | 8,745.19 | 5,497.80 |
| Total Assets ($VEM$) | 7,794.67 | 9,477.41 | 10,579.01 | 12,624.91 | 14,284.55 |

Source (Eicher Motors Ltd, https://ticker.finology.in/company/EICHERMOT)

Table 3. Liabilities and Asset values for Adan Enterprises Ltd

| Time ( $T$ ) | Mar 2018 | Mar 2019 | Mar 2020 | Mar 2021 | Mar 2022 |
|---|---|---|---|---|---|
| Current Liabilities | 9,090.71 | 10,375.77 | 8,985.24 | 7,431.43 | 14,172.50 |
| Total Liabilities( $DAE$ ) | 15,196.65 | 14,505.22 | 13,807.33 | 12,992.26 | 21,651.88 |
| Current Assets | 8,184.75 | 10,384.61 | 9,131.34 | 8,049.60 | 15,453.49 |
| Total Assets ( $VAE$ ) | 15,196.65 | 14,505.22 | 13,807.33 | 12,992.26 | 21,651.88 |

Source (Adani Enterprises Ltd, https://ticker.finology.in/company/ADANIENT)

Table 4. Distances to Default (DD) and Probabilities of Defaults (PD) ( $\sigma = 0.2$ and $r = 0.05$)

| Time ( $T$ ) in years | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| $DDHA$ | 2.1690 | 1.6400 | 1.4255 | 1.3095 | 1.2383 | 1.1917 | 1.1600 | 1.1381 | 1.1230 | 1.1128 |
| $PDHA$ | 0.0150 | 0.0505 | 0.0770 | 0.0952 | 0.1078 | 0.1167 | 0.1230 | 0.1275 | 0.1307 | 0.1329 |
| $DDEM$ | 4.5791 | 3.3440 | 2.8169 | 2.5145 | 2.3161 | 2.1756 | 2.0709 | 1.9902 | 1.9264 | 1.8749 |
| $PDEM$ | 2.33e-06 | 4.13e-04 | 2.42e-03 | 5.96e-03 | 1.03e-02 | 1.48e-02 | 1.92e-02 | 2.33e-02 | 2.70e-02 | 3.04e-02 |
| $DDAE$ | 0.3499 | 0.3534 | 0.3752 | 0.3999 | 0.4248 | 0.4490 | 0.4724 | 0.4949 | 0.5166 | 0.5375 |
| $PDAE$ | 0.3632 | 0.3619 | 0.3538 | 0.3446 | 0.3355 | 0.3267 | 0.3183 | 0.3103 | 0.3027 | 0.2954 |

Table 5. Shows the yields and credit spreads for three companies

| Time (T) in years | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| $yHA$ | 0.0510 | 0.0527 | 0.0535 | 0.0538 | 0.0539 | 0.0539 | 0.0538 | 0.0536 | 0.0535 | 0.0533 |
| $sHA$ | 0.0010 | 0.0027 | 0.0035 | 0.0038 | 0.0039 | 0.0039 | 0.0038 | 0.0036 | 0.0035 | 0.0033 |
| $yEM$ | 0.0500 | 0.0500 | 0.0501 | 0.0502 | 0.0503 | 0.0504 | 0.0505 | 0.0505 | 0.0506 | 0.0506 |
| $sEM$ | 9.05e-08 | 1.4e-05 | 7.6e-05 | 1.7e-04 | 2.7e-04 | 3.7e-04 | 4.5e-04 | 5.2e-04 | 5.7e-04 | 6.1e-04 |
| $yAE$ | 0.0956 | 0.0810 | 0.0739 | 0.0696 | 0.0665 | 0.0643 | 0.0626 | 0.0613 | 0.0601 | 0.0592 |
| $sAE$ | 0.0456 | 0.0310 | 0.0239 | 0.0196 | 0.0165 | 0.0143 | 0.0126 | 0.0113 | 0.0101 | 0.0092 |