

# modeFinance

## The Multi Objective Rating Evaluation Model (MORE)

---

### Introduction

The Multi Objective Rating Evaluation (MORE) model has been developed by modeFinance® in order to assess the level of distress of industrial companies by using data included in financial statements. It provides mainly a creditworthiness opinion (Assessment) by means of a risk class (MORE class) according to the following table:

Macro category	MORE Class	Assessment
Healthy companies	AAA	The company's capacity to meet its financial commitments is extremely strong.
	AA	The company has a strong creditworthiness.
	A	The company has a high solvency.
Balanced companies	BBB	Capital structure and economic equilibrium are considered adequate.
	BB	The company's performances are adequate considering the sector and the country in which it is operating.
Vulnerable companies	B	The company presents vulnerable signals with regard to its fundamentals.
	CCC	The company has a dangerous disequilibrium on the capital structure and on its economic and financial fundamentals.
Risky companies	CC	The company shows signals of high vulnerability.
	C	The company shows considerable pathological situations.
	D	The company has no longer the capacity to meet its financial commitments.

Tab 1: the MORE risk classes

The MORE model is used by modeFinance® analysts as a fundamental base for their rating assessment activities.

The basic idea of the model is to analyze a set of financial and economic ratios in a predictive corporate bankruptcy model with the purpose of creating a fundamental credit scoring model for each industrial sector.

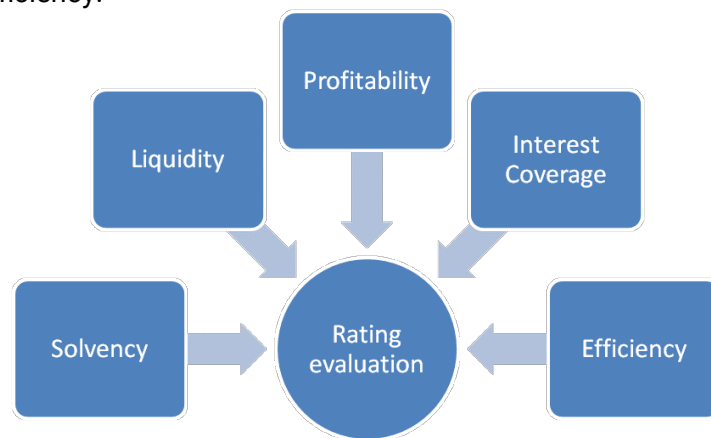
Results of the model are obtained by applying newly developed numerical methodologies, drawing together financial theory, data mining and engineering design methodologies. The heart of MORE is a multi dimensional and multi objective algorithm that produces a classification of each company, by taking into account any attributes (such as sector and country) characterizing a firm.

The model gives the opportunity to assign a risk class to a company even without considering a complete data analysis and allows to process quality information. It induces a better understanding of a company's strength and weakness thanks to sophisticated data mining tools and taking into account the analysts' knowledge.

### MORE rating vision

The MORE rating vision is based on looking at the fundamental economics of the company. The main idea is to assess the creditworthiness by observing every aspect of the economic and financial behavior of the company: the more a company is balanced in terms of its financial position, the better the final class will be. The idea is to reward balanced companies

This is done studying, evaluating and aggregating the most important sections of the financial and economic behavior of a company as: profitability, liquidity, solvency, interest coverage and efficiency.



### MORE model

#### Overview

In order to assess the creditworthiness of a company it is necessary to contextualize the analysis to the specific background the company is working in. Any good credit analyst would point out the attention on:

- The country;
- The sector;
- The available financial figures.

It is obvious that for any ratios, i.e. ROE, the expected values can change according to the variables above.

For example, it is expected that in Sweden, a company in the sector NACE 45.11: "Sale of cars and light motor vehicles", reaches a ROE of 14-15%; in the sector NACE 62.01: "Computer programming activities" may be even higher than 20%.

The same company, if it would operate in Italy in the same sector NACE 45.11: "Sale of cars and light motor vehicles", it would be expected to reach a ROE lower than 4%; in the sector NACE 62.01: "Computer programming activities" may be not higher than 9%.

It is clear that a unbiased analysis of financial figures cannot leave out of consideration the context the company is working in: any ratio must be "interpreted".

That's the reason why the MORE model is made by thousands of different models: each model is used to interpret and understand the quality of the company according to the value of each ratio.

## Model selection

In order to assess the creditworthiness of the company, the appropriate model is applied according to the properties of the company. This is done by looking at 3 properties:

1. The country
2. The accounting principles
3. The sector

For every sector, MORE takes into account around 15 ratios.

## The ratios

In Tab 2, it is possible to observe the financial ratios calculated by MORE. The model uses around 15 ratios, changing them between Continental and Anglo-Saxon countries. Inside the different countries, the ratios are calculated with slightly different formulation by taking into account the economic differences.

The ratios are chosen according to 2 criteria:

1. they must be predictive of default (study is done only in the countries where there is enough information about defaulted companies),
2. they must be representative of the financial and economical behaviors of a company (Tab 2). This is because the main idea of the MORE model is: "Give the score class as a picture of the financial and economical equilibrium belonging to the company."

Category	Description	Examples
Solvency ratios	Solvency ratios help investors assess a company's ability to meet its long-term obligations. They also explain how the company has been financed (debt or equity).	Debt to Equity
		Debt to Assets
		...
Liquidity ratios	These ratios are used to determine whether a company is able to pay off its short-term debt obligations.	Quick ratio, Current ratio
		Days Payable Outstanding (DPO), Days Sales Outstanding (DSO), ...
		...
Profitability ratios	The profitability of a company depends not only on the margins generated, but also on the assets that must be employed to generate those profits.	Return on Equity
		Return on Investment
		...
Interest coverage ratios	These ratios are used to determine how easily a company can pay interest on outstanding debt.	EBIT on Interest Paid
		Profits on Interest Paid
		...
Constraints on efficiency	modeFinance set many tests to check if the company is able to generate adequate margins from financial and operating management.	Financial P/L, P/L before or after tax, EBIT, etc.

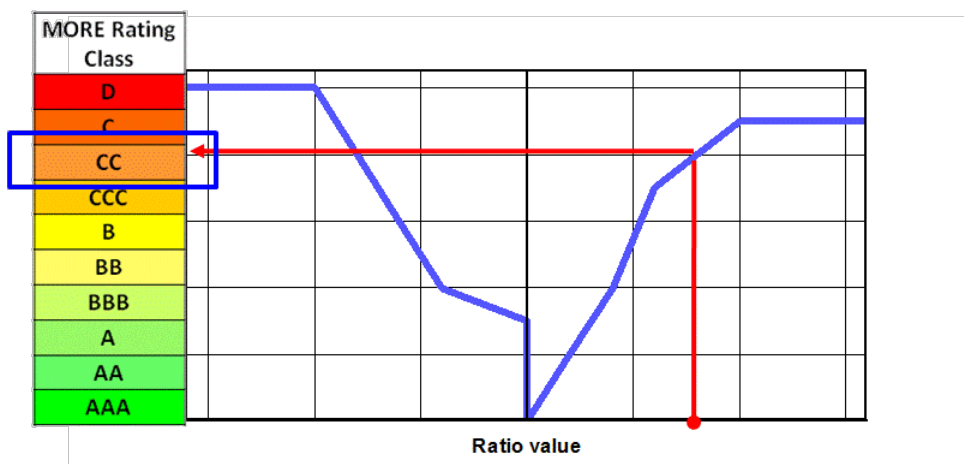
Tab 2: Categories for the financial ratios

## Fuzzy Logic

It exists a different model for the interpretation of every different ratio. It is possible to assert that the MORE rating model is made from up to 40.000 different models (~150 countries x 9 sectors x 2 accounting standards x ~15 ratios).

The interpretation of every ratio has been achieved by using fuzzy logic: the value of a financial ratio is directly translated into a rating class with high non-linearity and without monotone problems.

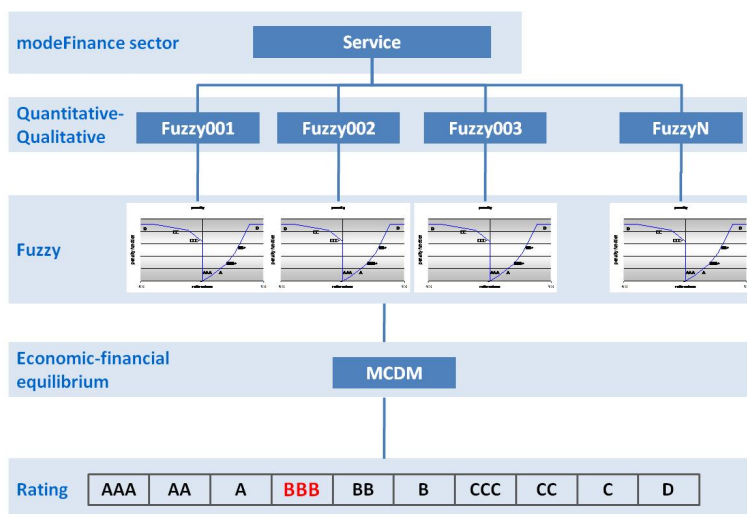
Fuzzy theory is a mathematical model that expresses qualitative terms into quantitative values: this theory is used in order to associate to each ratio an opinion on its value, translating the ratio values (numerical information) into rating class (qualitative information).



The result of this phase is to produce a fuzzy index that defines 10 fundamental rating classes.

### The core of MORE

The collection of the analysis of every single ratio (fuzzy transformations) gives the final MORE class.



The core of the MORE model is a “Decision Support” algorithm that collects all of the different opinions about the ratios and assess the final rating. The principle is to award a company if it has a good financial equilibrium between the different financial figures (which represent different financial and economic aspects of the company behavior).

## MORE outputs

The MORE model produces many outputs in order to ease the credit risk assessment of the user. To be more precise the main output are:

1. The risk class
2. The probability of default
3. The confidence level
4. The opinion about the ratios’ values

## The risk class

The risk class is the main output: it is the modeFinance’s opinion about the creditworthiness of the company. It is expressed according to the scale of Tab 1: the MORE risk classes

The MORE model is used by modeFinance® analysts as a fundamental base for their rating assessment activities.

The basic idea of the model is to analyze a set of financial and economic ratios in a predictive corporate bankruptcy model with the purpose of creating a fundamental credit scoring model for each industrial sector.

Results of the model are obtained by applying newly developed numerical methodologies, drawing together financial theory, data mining and engineering design methodologies. The heart of MORE is a multi dimensional and multi objective algorithm that produces a classification of each company, by taking into account any attributes (such as sector and country) characterizing a firm.

The model gives the opportunity to assign a risk class to a company even without considering a complete data analysis and allows to process quality information. It induces a better understanding of a company’s strength and weakness thanks to sophisticated data mining tools and taking into account the analysts’ knowledge.

MORE rating vision.

There is a risk class evaluation for every filed account: it is a picture of the financial and economic equilibrium of the company.

### The probability of default

The probability of default (PD) is the degree of certainty (in quantitative terms) that the company will go into default.

The Probability of Default (PD) is computed by using the Transition Matrix theory. modeFinance® defines as (technical) default the state of a company rated CC or lower (that means the company is distressed). By observing the evolution of every rating class in every country it is possible to assess the “probability of being distressed” PD.

As the probability of default is strongly affected by the economic climate the company is operating in, companies in the same MORE class will not necessarily have the same probability of default.

### The confidence level

This does not indicate financial confidence in the company. It is a reflection of the variations in availability of financial data across Europe due to filing regulations, and suggests the degree of financial detail the MORE evaluation is able to take into account for each company.

$$Confidence = \frac{\sum Available\ Information}{\sum Total\ Information}$$

For companies with fully populated records a confidence level of 100 would be applied: companies where no financial data is provided, 0. This puts the MORE evaluation in a context for the user and aids interpretation.

### The opinion about the ratios' values

By the means of colored dots, every risk assessment is explained. The colors of the dots correspond to the opinion about the ratio's value (fuzzy transformation).

The dots allow the user two different readings: vertical and horizontal. By looking at the dots in the same column (vertical) it is possible to interpret the rating assessment; by looking at the dots on the same row (horizontal) it is possible to investigate the evolution of the ratios' quality throughout the years.

### The comparison group analysis

Twice a year, modeFinance® collects all of the last ratings assessed in every sector and in every country and evaluates the “average of ratings and PDs”. Those values are useful for comparing the analyzed company with its own peer group.