

European Rating House and OK-Score™ Model

Colofon

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Introduction

European Rating House is an independent credit rating agency that provides corporate ratings with regard to European companies. These ratings are provided to issuers, to those charged with governance - Supervisory Board, Auditors - and to other stakeholders such as shareholders and banks. The organization has been established in Brussels in 2013. The shares are privately held. European Rating House works with the OK-Score™ Model as a diagnostic tool in the rating process. This Model has a unique reputation in early warning for Business Failure including fraud.

OK-Score

Definition

The OK-Score™ is a credit score, which is a number that reflects the creditworthiness and the vitality of a company. For listed companies this is normally reflected in the stock price. OK-Scores are reported on a scale from 1 to 10, where Class-1 consists of highly creditworthy and vital companies and Class-10 consists of companies facing a Business Failure.

History

The OK-Score Model has been developed during a PhD research by W.D. Okkerse at the Universiteit van Amsterdam in the 1990s. He has terminated the research in the year 2000 with a dissertation named “Is Ratio Logos or Myth” (unpublished). Okkerse had to end his PhD as he refused to publish the algorithm of the Model, the reason being his fear of abuse of the Model.

The key objective of the PhD research was to demonstrate that the Z-Score of Professor E.I. Altman was based a several false presumptions. The final conclusion of the research of Okkerse was: *“Due to the non-conformity of all the existing accounting ratios to standard distribution schemes, the method of Linear Discriminant Analyses as used in the Z-Score, can never achieve more than 80-85% prediction accuracy. Main cause is the bottom-line assumption that accounting ratios of running companies are expected to be better than those of bankrupted companies. Only a new accounting ratio, like the Ratio of Dissipation, may lead the way to improved results”.*

Methodology

The OK-Score Model requires input from the financial statements of (minimum) five consecutive financial years: balance sheet, profit and loss account, and cash-flow statement.

The Model determines a credit score for every single year but only as from the fifth year this is considered a true OK-Score. The Model is a learning model, which means that the reliability of the annual credit scores improves over time until the fifth year. For this reason the backtracking period is five years.

The OK-Score is based on two separate ratios that are determined by the Model: the first ratio is the *OK-Solvency*, a modified version of the solvency ratio; the second ratio is the *OK-Ratio*, which is the result of an in-depth analysis of the five financial statements. The analysis is based on 125 input fields, 25 per financial year.

One component of the *OK-Ratio* is the *Ratio of Dissipation (ROD)*. This ratio reflects the level of slack (wastage) in the company. The Return on Assets (ROA), from the DuPont model, and the *Ratio of Dissipation* together are 100%, comparable to the first principle of conservation of energy. By applying fuzzy logics, a methodology developed in the 1960s by Professor L.A. Zadeh, Okkerse was able to define a relation between the ROA and the potential for improvement of a company. The OK-Score Model shows for example that a company with a negative ROA and without any potential for improvement will inevitably encounter a Business Failure.

Classification

Both the *OK-Solvency* and the *OK-Ratio* are reported on a scale from 1-9.

OK-Solvency	The best Class (1) consists of companies with an OK-Solvency from 49 - 100%. The next Classes (2-8) have a 0 - 49% solvency. The weakest Class (9) consists of companies with negative shareholders' equity.
OK-Ratio	The best Classes (1-2) have positive ratios of [+0,5] and [0] respectively. The next Classes (3-9) have negative ratios: [-1] [-2] [-4] [-16] [-256] [-65536] [-∞].
OK-Score	The OK-Score is derived from the 81 possible combinations of OK-Solvency and OK-Ratio. There are 10 classes of OK-Scores: Class 1 stands for a perfect certainty about creditworthiness and vitality. Class-10 is a warning for Business Failure within three years.

Companies with an OK-Solvency of more than 49% will not automatically obtain an OK-Score 1. Several companies (for example WorldCom, L&H and Tulip) had a top solvency ratio (>49%) in combination with an OK-Ratio 9. The final judgment must be based on the combination of the OK-Solvency and the OK-Ratio.

Rating classes

OK-Scores are expressed on a scale from 1-10 comparable to the scale used by the traditional rating agencies:

OK Class	Rating	Meaning
1	AAA	Almost perfect security. Very large capacity for expansion, also with borrowed capital
2	AA	Excellent security. Large capacity for expansion, also with borrowed capital
3	A	Solid security. Capacity for expansion, also with borrowed capital
4	BBB	Good security, potential for expansion, also with borrowed capital
5	BB	Normal security. Some potential for expansion, however alert in expansion with borrowed capital
6	B	Moderate security. Improvements desirable. Expansion with borrowed capital is not wise
7	CCC	Inadequate security. Improvements necessary. Expansion with borrowed capital dissuaded strongly
8	CC	Worrying security. Improvements urgently needed. Expansion with borrowed capital can be life threatening
9	C	Hazardous security. Substantial improvements needed by return. Expansion with borrowed capital not possible
10	D	Business failure within 3 years. Immediate action required such as recapitalization, asset stripping, forced sale or turnaround required. The situation can become fatal: default, Chapter 11 or bankruptcy.

Not Accounted For

While determining the OK-Score, the Model will flag any values of items in the financial statements that don't make sense. The total of these 'incredible' values is named *Not Accounted For*. Should this be material to the financial statements then further investigation is required: it often corresponds to error, manipulation or fraud in the financial statements.

Manipulation and Fraud

The data base Business Failures (see hereafter) is based on the more than 2,000 credit scores that the OK-Score Institute has determined in the period 2000-2013. It contains several cases where fraud is an important cause of the Business Failure. The Model has flagged these frauds at least one year before they came out in the media. The following three cases will illustrate this: Lernout & Hauspie and WorldCom (backtracking) and Ahold (real life monitoring).

Lernout & Hauspie

Backtracking (5 years) - L&H was a quoted company that has realized a capital increase on fraudulent terms in the year before it failed. The poor financial performance of the company in combination with the fraud led to a Class-10 credit score in the fourth year of the backtracking. The item *Not Accounted For* had grown to € 35 million. After the fraudulent capital increase the OK-Score improved to 9 in the fifth year of the backtracking. For the backtracking of the L&H-case the financial statements of five consecutive years were available. The Score 10 in the fourth year could not be validated under the given procedure. For that reason the L&H case has not been included in the data base Business Failures.

The case L&H illustrates the power of the Model in flagging fraud in financial statements. In a real life monitoring situation the L&H case had required an in-depth investigation in to the fraud, more than one year before the Business Failure.

WorldCom

Backtracking (5 years) - During the last four years of the backtracking the Model has warned for an increased risk of Business Failure by four consecutive credit scores 9. Furthermore the Model has indicated a large *Not Accounted For*, increasing to USD 5 billion on a balance sheet total of USD 100 billion. It turned out to be one of the largest accounting frauds ever. The fraud made the shareholders' equity seem higher and in the fifth year the model computed an OK-Score 9. Here the OK-Model made a Type-2 error: WorldCom encountered a Business Failure in the next year.

The case WorldCom illustrates the strength of the Model in flagging fraud in financial statements. In a real life monitoring situation the WorldCom case had required an in-depth investigation more than four year before the Business Failure due to the high *Not Accounted For*.

Ahold

Real life monitoring - The Ahold-fraud is the largest fraudulent Business Failure in the history of the AEX stock exchange. The OK-Score Model had reported an OK-Score 10 during the two years before the Business Failure and an increasing *Not Accounted For* during these years. In 2003 the Dutch newspaper *Haagsche Courant* reported that the OK-Score Model had estimated the Ahold fraud at € 1 billion, long before Ahold announced this volume of the fraud.

The data base Business Failures (see hereafter) includes the following fraudulent Business Failures: L&H, Moulinex, LCI, Enron, WorldCom, Landis, Ahold, Parmalat and Imtech.

Accountability

The reproduction of research results is a cornerstone of science. Since the OK-Score Model has become operational in the year 2000 regulators, scientists and journalists have had the opportunity to verify all public OK-Scores.

The following conditions apply to all OK-Scores that are included in the public statistics:

- Real life monitoring: the OK-Score can be reproduced and compared to the real events;
- Backtracking: the OK-Score can be reproduced and the back tracking is normally performed under the supervision of qualified external parties.

Performance

Statistics

After the OK-Score Model became operational in 2000, it has warned for 97.8% of the Business Failures by giving an OK-Score 10. In the period 2000-2013 more than 2,000 credit scores have been determined by the Model, a mix of backtracking and real live monitoring. This population included 46 Business Failures. 1,954 times there was no Business Failure. Since the Model became operational it has given an OK-Score 10 on 46 occasions. On 45 occasions a Business Failure occurred within 3 years' time. The moment when the scores were issued has been documented. We refer to the data base Business Failures (see hereafter).

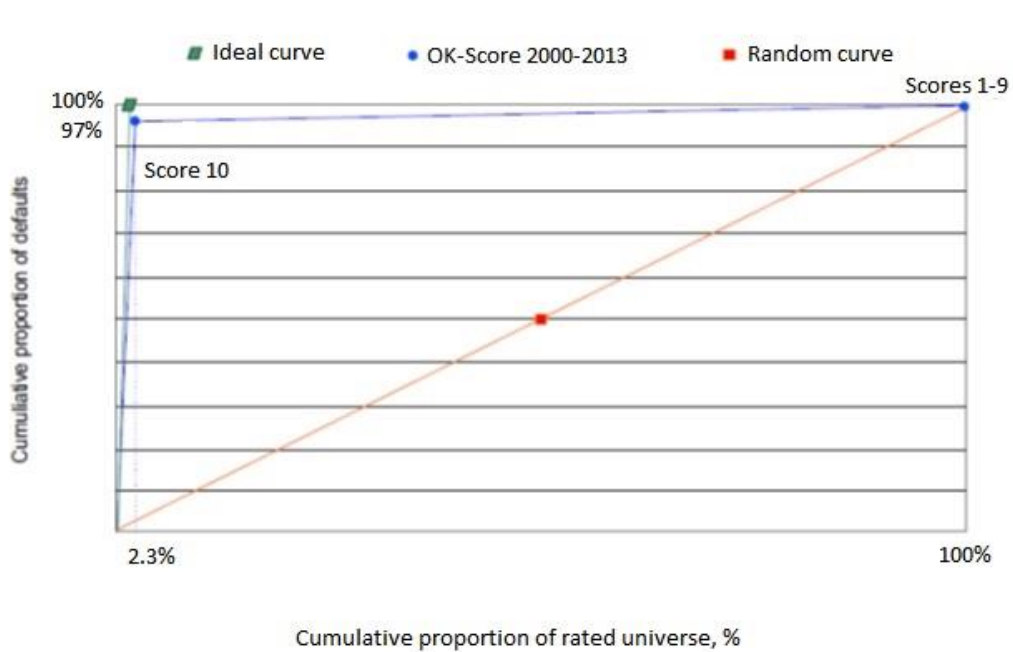
Error	Percentage
False positive / Type-1 error: The likelihood that a company that does not have a Business Failure does have an OK-Score 10 (<i>divided by the number of companies without Business Failure</i>)	1/1,954 = 0.05%
False negative / Type-2 error: The likelihood that a Business Failure has not been preceded by an OK-Score 10 in the three previous years (<i>divided by the number of companies with a Business Failure</i>)	1/46 = 2.2%
False alarm rate: The likelihood that an OK-Score 10 does not lead to a Business Failure within three years (<i>divided by the number of OK-Scores 10</i>)	1/46 = 2.2%

Gini-coefficient

The Gini-coefficient of the OK-Score Model is 97.75% which can be analyzed as follows: 100% minus 2.2% (Type-2 error) minus 0.05% (Type-1 error).

Cumulative Accuracy Profile

The reliability of credit scores and credit ratings can also be expressed by the Cumulative Accuracy Profile, which is based on the Lorenz-curve.



Business Failures

Legend

Abbreviation	Meaning	Abbreviation	Meaning
AS	Asset Stripping	R	Forced recapitalization
B	Bankruptcy	FS	Forced takeover
CH	Chapter 11	SS	State support
FR	Fraud	T	Turnaround
LC	Litigation Claim	#	Confidential
NA	Not available	B	Bankruptcy
NBF	No Business Failure	9,10	OK-Score 9, 10
NVT	Not applicable		

Backtracking

Company	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Type	Supervision	Business Failure	Event
Moulinex-FR	10	R	B/FR	†													Backtracking	ABP	1	Bankruptcy
LCI-NL	10	R	B/FR	†													Backtracking	VEB	2	Bankruptcy
Numico-NL	10	10	AS														Backtracking	Auditor	3	AS
Enron-USA		10	B/FR	†													Backtracking	FD	4	Bankruptcy
Parmalat-IT				10	B/FR	†											Backtracking	NRC	5	Bankruptcy
Laurus-NL					10	R	S	†									Backtracking	Laurus	6	Bankruptcy
Neschen-GER					10	R											Backtracking	Everling	7	R
Vilento-NL					10	B	†										Backtracking	Receiver	8	Bankruptcy
Lockheed-USA						10	SS										Backtracking	Dubash	9	SS
Comcast-USA						10	LC			10	LC						Backtracking	Dubash	10/11	LC
Ford-USA						10	SS										Backtracking	Dubash	12	SS
ASR-BE							10	B	†								Backtracking	Triforensic	13	Bankruptcy
Anonymous								10	B	†							Backtracking	PWC	14	Bankruptcy
Anonymous								10	B	†							Backtracking	PWC	15	Bankruptcy
Anonymous								10	B	†							Backtracking	PWC	16	Bankruptcy
Anonymous								10	B	†							Backtracking	PWC	17	Bankruptcy
Sprint-USA									10	R							Backtracking	Dubash	18	R
Weyerhaeuser-USA										10	10	R					Backtracking	Dubash	19	R
Caterpillar-USA											10	R					Backtracking	Dubash	20	R
EastmanKodak-USA											10	10	10	CH	B	†	Backtracking	Dubash	21	Bankruptcy

Real life monitoring

Company	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Type	Supervision	Business Failure	Event
Landis-NL	10	10	B/FR	†													Real Life	NVT	22	Bankruptcy
Getronics-NL	10	AS	AS	R	10	10	10	S	†								Real Life	NVT	23/24	AS / R / S
Unilever-NL	10	T	T	#	#	#	#	#	#	#	#	#	#	#	#	#	Real Life	NVT	25	T
Ahold-NL	10	R	FR	R	10	AS	#	#	#	#	#	#	#	#	#	#	Real Life	NVT	26/27	R / FR / AS
Wolters Kluwer-NL	10	10	AS	AS	10	R	10	10	R	#	#	#	#	#	#	#	Real Life	NVT	28/30	AS / R
KPN-NL		10	10	R	#	#	#	#	#	#	#	#	#	#	#	#	Real Life	NVT	31	R
ASML-NL		10	10	10	R	#	#	#	#	#	#	#	#	#	#	#	Real Life	NVT	32	R
Numico-NL			10	AS	10	10	R	S	†								Real Life	NVT	33/34	AS / R / S
SBM-NL					10	R	#	#	#	#	#	#	10	R			Real Life	NVT	35/36	R
Innoconcepts-NL										10	10	B	†				Real Life	NVT	37	Bankruptcy
Air Berlin-GER										10	10	NA	R	NA			Real Life	NVT	38	R
Anonymous-ESP											10	10	R	NA			Real Life	NVT	39	R
Norske Skog-NO												10	AS	AS			Real Life	NVT	40	AS
Praktiker-GER												10	10	B	†		Real Life	NVT	41	Bankruptcy
Alpine-AUT													10	B	†		Real Life	NVT	42	Bankruptcy
AirFrance-KLM-NL													10	R			Real Life	NVT	43	R
Porr-AUT													10	R			Real Life	NVT	44	R
Imtech-NL													10	R			Real Life	NVT	45	R

Errors

Company	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Type	Error	Business failure	Event
WorldCom-US	9	9	9	†													Backtracking	Type-2	46	Bankruptcy
Anonymous											10	NBF	NBF	NBF			Real Life	Type-1	-	NBF

The data base Business Failures shows all Business Failures and all OK-Scores 10 that can be reproduced and that have been issued since the OK-Score Model became operational in the year 2000.

The figures in this brochure are updated until 31 August 2013.

W.D. Okkerse

Over the years W.D. Okkerse has received increasing recognition for the OK-Score Model. Since 2003 the Model has also been applied by professional investors for their portfolio management. These investors are monitored by Autoriteit Financiële Markten (AFM) the Dutch regulator. The detail and performance of these portfolios has been made public on an annual basis, and can be found at the website of OK-Rating Institute and Het Effectenhuis Commissionairs. It appears from these publications that investors on the Amsterdam Stock Exchange (AEX) that have used the OK-Score Model have made more than 190% return on investment for the period 2003-2012.

Okkerse	Willem Dingeman
Born	Rotterdam (1946)
Training	MBA cum laude (1990) PhD research (1995-2000, not-published)
Professional career	Various functions especially in Logistics (1962-1975) CxO various organizations (1975-1989) Chairman ITLC Associates (1989-2002) CFO Green Cross Netherlands (1995-2002) Chairman OK-Rating Institute (2003- today) Chairman Rating Committee, European Rating House (2013-today)
Other	Advisor OK-AEX portfolio (2003-2013), Advisor Magnificent Twenty portfolio (2011-2013) Advisor OK Wereld Fonds (2013-today) Columnist, De Financiële Telegraaf (2012- today)
Lecturing	Guest speaker <i>Congress Basel II/III</i> , Theodor-Heuss-Akademie, Gummersbach, 2013 Guest speaker symposium <i>Recognizing bankruptcy and fraud in financial statements</i> , Institute of Forensic Auditors, Brussels, 2013 Guest speaker <i>Accountantsdag</i> , NBA, Amsterdam, 2012 Guest professor of Forensic Accounting at KU Leuven, 2007-2011.

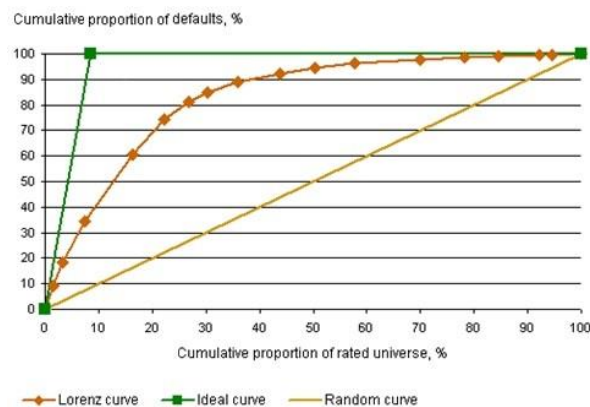
Terminology

Backtracking - The computation of a credit score over a period of time lying one or more years in the past. After computing the credit score it can be compared directly to real developments since. Example: today credit scores could be computed for Enron over the five years preceding the Business Failure (2001). With hindsight one can then assess whether these credit scores reflect the increased risk timely and accurately.

Business Failure - The situation of Default, Chapter 11 or Bankruptcy or strong measures such as asset stripping, forced recapitalization, turnaround or forced take-over, in combination with a substantial decline of the stock price of the company. Such strong measures are the responsibility of the Executive Board and the Supervisory Board and they are usually forced by the shareholders and other stakeholders. A timely warning will be of importance. The OK-Score Model warns up to three years in advance. The substantial decline of the stock price which that comes with any Business Failure, can cause serious damage to shareholders, bondholders and other stakeholders. In some cases fraud can be identified as the main cause of the Business Failure as many accounting scandals have shown.

Cumulative Accuracy Profile - This profile is based on the Lorenz-curve and is calculated as follows:

- The horizontal (X) axis shows the cumulative amount of credit scores, as a percentage. Counting from the center it starts with the Business Failures.
- The vertical (Y) axis shows the cumulative amount of Business Failures, as a percentage. Counting from the center it starts with the poorest credit scores.
- The curve shows in which zone of the credit scores the Business Failures can be found. Conclusion: 100% of the Business Failures can be found in 2.2% of the population.



Lorenz-curve: rating accuracy

OK - Refers to the first letters of the family name of W.D. Okkerse, the person who has developed the OK-Score Model, with a wink to the sounding 'Okay!'.

Real time monitoring - The computation of a credit score over a recent period of time. The accuracy of the credit score cannot yet be assessed as the rating period has ended only recently. Real time monitoring is usually performed as a part of the global monitoring of an organization by shareholders, bondholders or credit suppliers.

Reproduction - The re-computation of a credit score by using the same information and credit scoring model as in the past. If one can determine that the credit scoring model is unchanged (via hash totals or other checks) one can assess whether the first credit score had been computed accurately. Reproduction is normally performed by or in presence of another person than the credit rating analyst. Reproduction can be real time (self-control, internal control, etc.) or via backtracking (regulatory compliance, due diligence, etc.).

Scope - The OK-Score Model can be applied to all sorts of companies, except financial institutions and real estate companies. The main reason is that the structure of the financial statements of companies in these industries is too different.

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