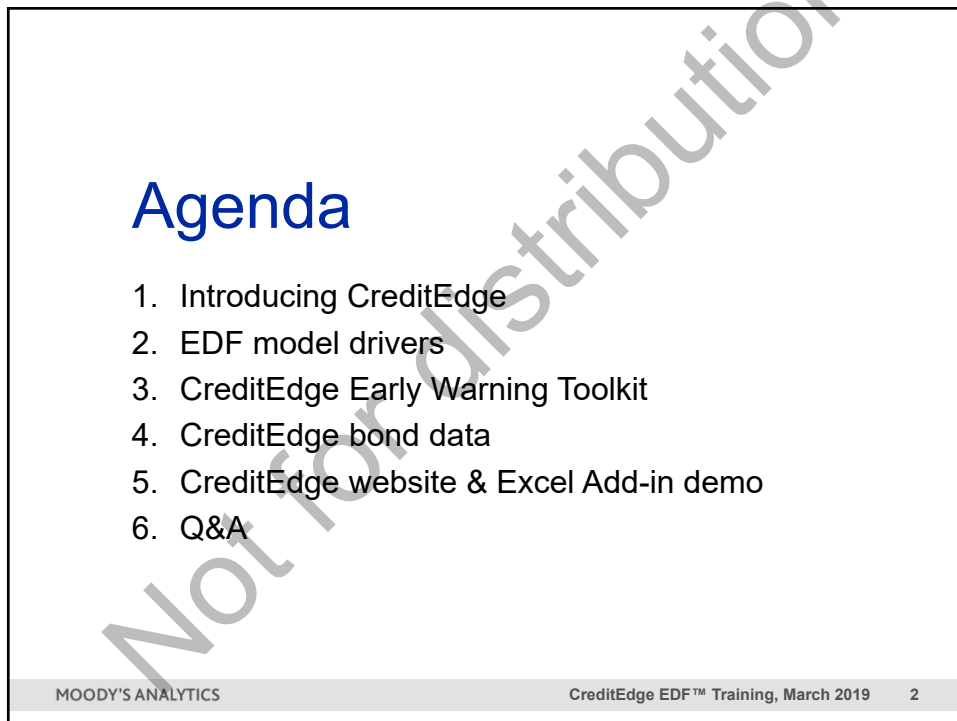




@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.





@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

CreditEdge: A powerful approach for managing credit risk

Market demand for:

- » More **granular measures** of risk into internal risk rating frameworks
- » Understanding **market-based signals** for proactive credit risk exposure management
- » Frameworks that synthesize the relevant information in a **predictive** and **transparent** way
- » Credit risk models that are **statistically calibrated** and validated

CreditEdge/Public Firm EDF meet market demand:

- » **Absolute probability** of default and **consistent** way to measure credit risk across rated or unrated public entities
 - Coverage: **37k+ entities** with traded equity or liquid CDS
- » Combines firm-specific fundamental information with **market-based signals** to provide **early warning** power to risk assessment
- » Provides **statistically calibrated** and validated frameworks for estimating loss

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 4

What is an EDF?

- » **EDF = Expected Default Frequency** → Moody's Analytics brand name for probability of default measure
- » **Forward looking** measure of default risk, with a term structure **up to 10 years**, calculated **daily**
- » EDF ranges between 0.01% to 50% for corporates and 0.01% to 35% for financials

Group of 100
borrowers with
1-year EDF of 5%

→

We would expect 5
members of the group
to default in the
next 1 year

MOODY'S ANALYTICS
CreditEdge EDF™ Training, March 2019
5

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

CreditEdge is the ideal complement for risk managers

Individual Name Assessment

Underwriting & loss provisioning

- » 60k+ entities
- » Highly accurate probability of default & downgrade measures
- » Ratings & key financial ratios
- » Extensive bond & CDS data

Monitor Exposures

Input to internal risk rating

- » Advanced portfolio analytics
- » Robust alerts
- » At-a-glance portfolio movers
- » Timely news & research

Peer & Industry Comparison

Benchmarking & early warning

- » Peer custom peer analysis
- » Industry group percentiles
- » 7k+ industry groups
- » Multiple classification systems

Identify Creditworthiness

Counterparty assessment & limit setting

- » Interactive & exportable charts
- » Extensive reporting
- » Pre-formatted PDF reports
- » Save criteria for re-run

Regulatory Application

CCAR, CECL, IFRS9 compliant

- » PD input to impairment calculation
- » Stressed EDF measures
- » Rating to EDF converter tables
- » Macro stress testing
- » Weighted Stressed EDF

MOODY'S ANALYTICS
CreditEdge EDF™ Training, March 2019
6

CreditEdge metrics used by current clients for a variety of risk management purposes

Large European bank
Stressed EDF as a challenger model for CCAR regulation for independent review, benchmarking and validation purposes under stressed scenarios.

US branch of a large Asian bank
EDF for compliance stress testing C&I loan and bond portfolios; EDF metrics also used in quarterly reports sent to the home office.

Large Asian bank
EDF as an early warning tool to monitor portfolios across Southeast Asia; EDF also used for prequalification of borrowers and ongoing monitoring.

Large US Mutual Insurance Provider
EDF to provide early warning of credit deterioration of corporate bond portfolio, allowing for stress testing and VaR calculation.

Central Bank
Cites EDF metrics in its research papers, highlighting the correlation between bank's EDFs and competition, population decline and monetary easing.

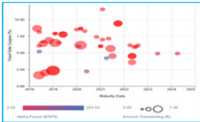
Large American Television Network
EDF & Early Warning Toolkit methodology to monitor credit worthiness of customers as a baseline to negotiate contracts for TV commercial slots.

MOODY'S ANALYTICS
CreditEdge EDF™ Training, March 2019
7

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

Data and analytics to support fund manager investment processes


Portfolio Construction



Evaluate strategies & investment opportunities

- » Pre-screen investments
- » 241k+ bonds
- » EDF metrics in systematic trading strategies & smart beta ETF construction


Bond Level Analysis



Conduct rich/cheap analysis

- » Proprietary Fair Value & Alpha Factor measures to determine over and undervalued bonds


Complement Fundamental Process



Combine quantitative & qualitative data

- » Assess issuer-level information
- » Analyze industry and geography developments

Portfolio Surveillance



Early warning of credit deterioration

- » Input into deciding when to turnover positions & sell "fallen angels"
- » Maintain yield while mitigating downgrade & default risk

MOODY'S ANALYTICS
CreditEdge EDF™ Training, March 2019
8

CreditEdge metrics used by asset managers for investment ideas/bond selection and in credit trading strategies

Large European Hedge Fund
EDF in algorithms to implement systematic credit trading strategies across absolute return fund; Using Fair Value Spread & Alpha Factor in additional trading strategies.

European Specialist Asset Manager
Created an ETF based on EDF metrics and Fair Value Spreads. CreditEdge provided the key quantitative inputs to build the smart beta ETF, emphasizing low credit risk and mispriced assets.

European Asset Manager
Fair Value Spread & Alpha Factor for assessing relative value of bonds and the new Deterioration Probability metric for downgrade risk management; Using these metrics in factor-based strategies for fixed income and equity.

Large US PE & Alternative Asset Manager
Outsourced asset manager mandated to use EDF metrics for portfolio management activities.

US Hedge Fund
EDF in trading strategy that correlates EDF performance with fixed income and equity prices.

Large US Hedge Fund
Utilizing asset volatility and distance to default CreditEdge data points as a means to enhancing an internal model and building a new trading strategy.

MOODY'S ANALYTICS
CreditEdge EDF™ Training, March 2019
9

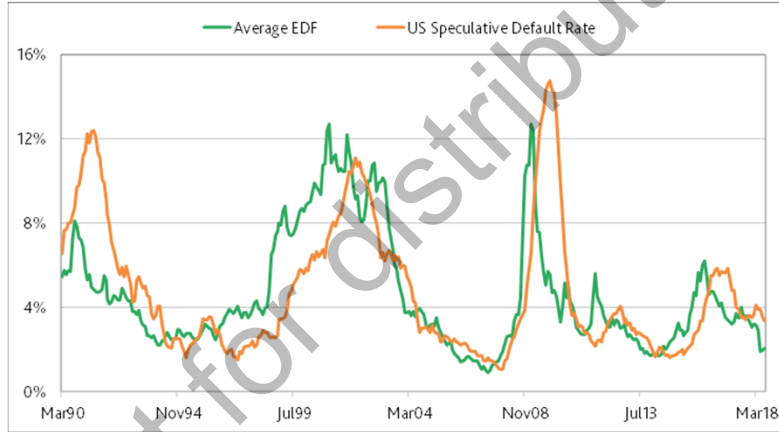
@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

What differentiates CreditEdge?

- » 25+ years of historical data
- » Extensive global database of defaults
- » Transparent model drivers
- » Regular model validation
- » EDF term structure
- » Benchmarking for peers, industry groups & regions
- » Early Warning Toolkit & EDF Trigger
- » Scenario Analysis
- » CDS coverage for 1,800+ entities
- » Satellite models, i.e. Stressed EDF

MOODY'S ANALYTICS
CreditEdge EDF™ Training, March 2019
10

The CreditEdge public firm EDF model predicts default with accuracy and high degree of advanced warning



MOODY'S ANALYTICS

CreditEdge EDF™ Training, March 2019 11

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

The value of the public-firm EDF model in practice



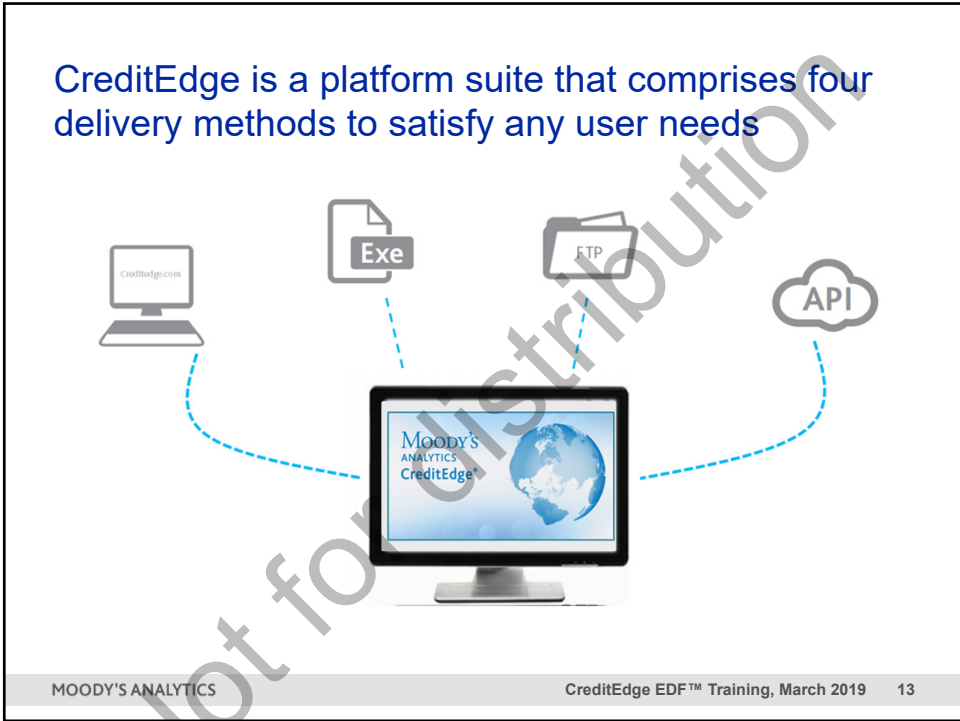
1-Yr EDF vs 1-Yr EDF Implied Rating



- » Absolute default probabilities rather than relative rankings
- » Provides daily updates & aggregate market view
- » Forward-looking signals provide early warning of changes in credit quality

MOODY'S ANALYTICS

CreditEdge EDF™ Training, March 2019 12



©2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

2 | EDF model drivers

The public firm EDF model and large default database differentiate CreditEdge among competitors

- Model**
 - » **Black-Scholes-Merton:** structural model with clear causal interpretation
 - » This approach allows **what-if scenarios** and **counterfactuals**: risk can be updated based on user assumptions, unlike reduced form models
- Database**
 - » **11,700+ defaults** globally since 1973
 - » Daily EDF data dating back to 1980
 - » Manual and machine learning research to expand database of default activity
- Coverage**
 - » **60,000+ public firms** (37k actively traded)
 - » Term structure 1 to 10 years; up to 30 years for rating to EDF
 - » 100 countries: America (29), APAC (18), EMEA (53)
 - » Launched in 1989

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 15

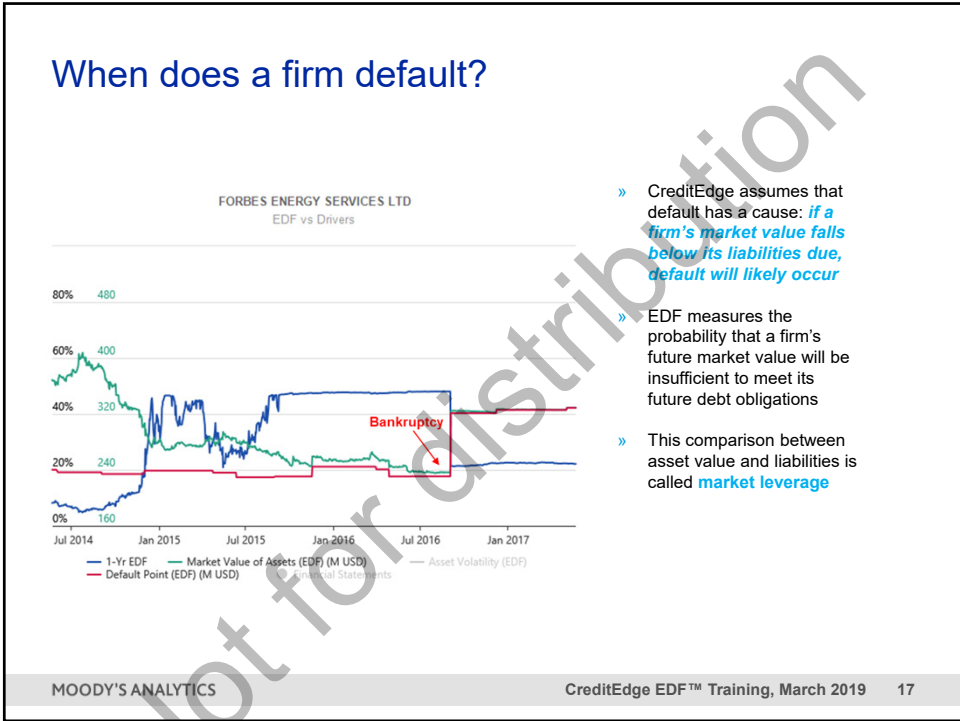
@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

Three key drivers of the public firm EDF model

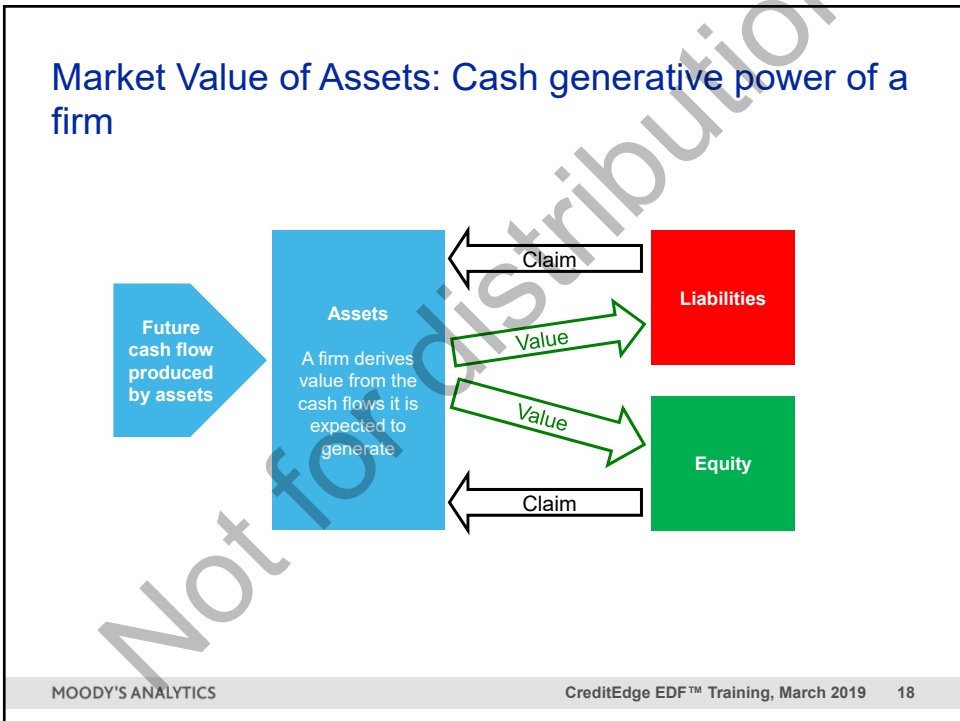
- Market Value of Assets**
Cash Generative Power
Market assessment of the present value of future cash flows of the business
- Default Point**
Liabilities Due
Liabilities due in the event of stress
- Asset Volatility**
Business Risk
The variability of the market value of assets

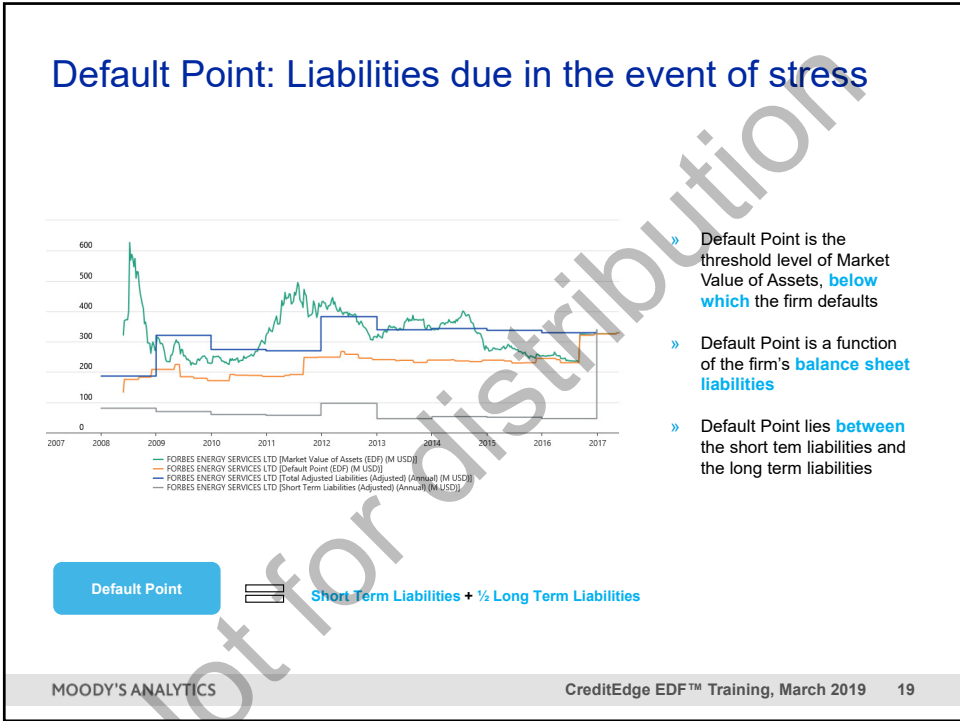
Market Leverage (Financial Risk)

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 16

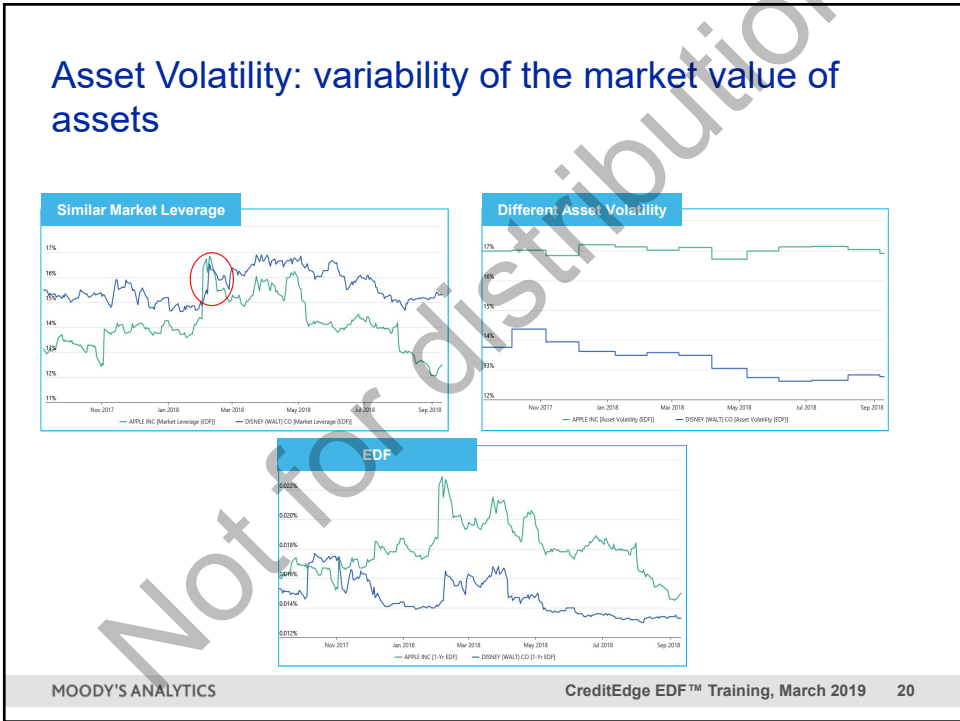


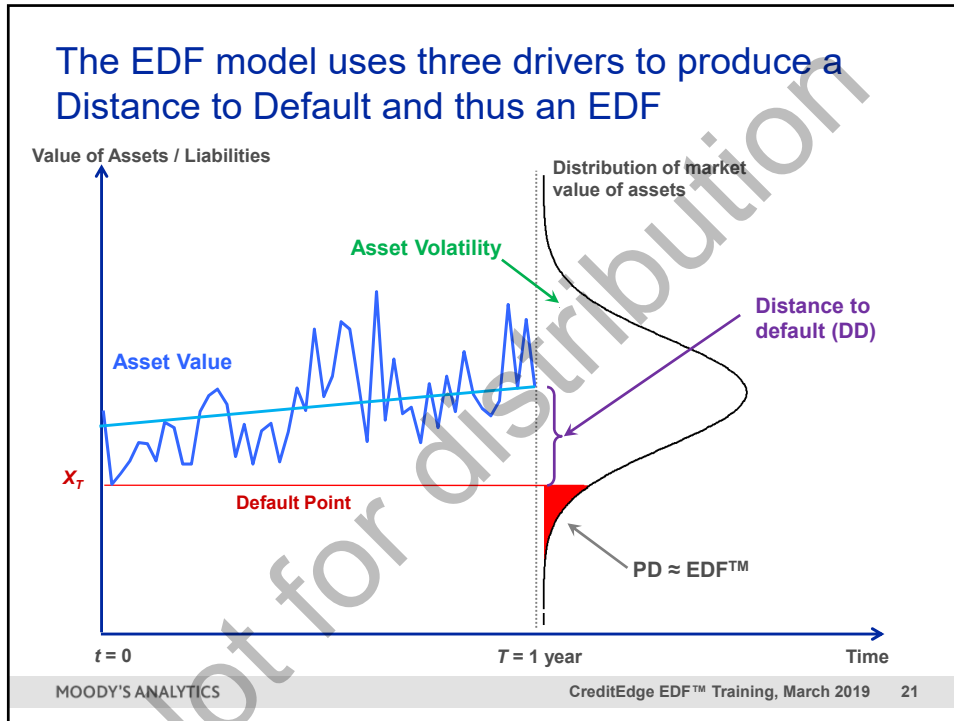
@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.





@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.





@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

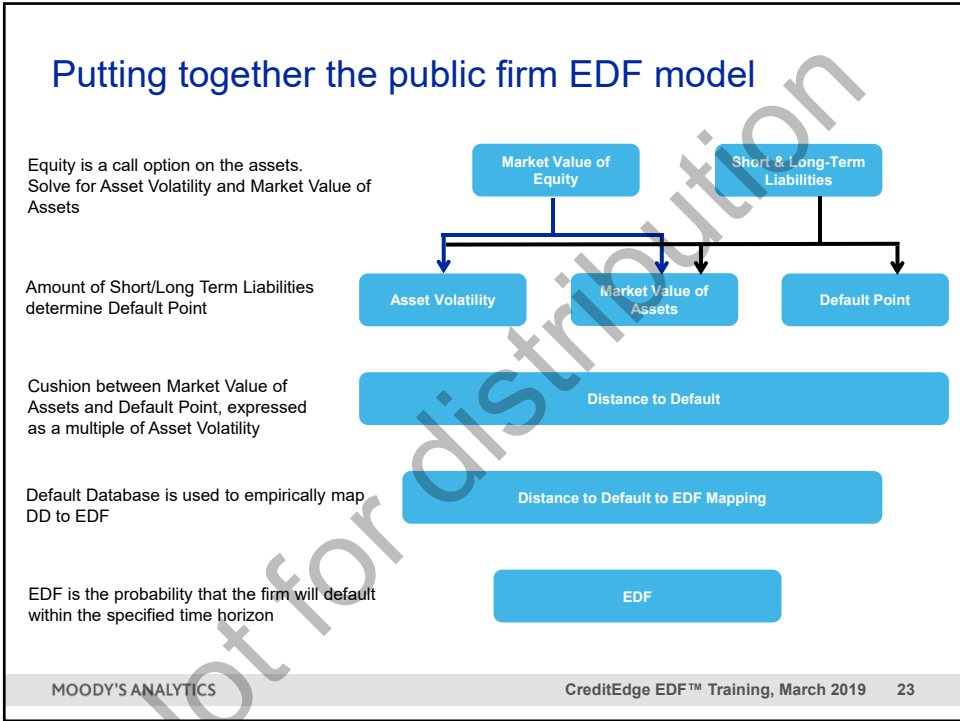
Distance to Default (DD)

Distance to Default = The cushion between Market Value of Assets and Default Point, expressed as a multiple of Asset Volatility

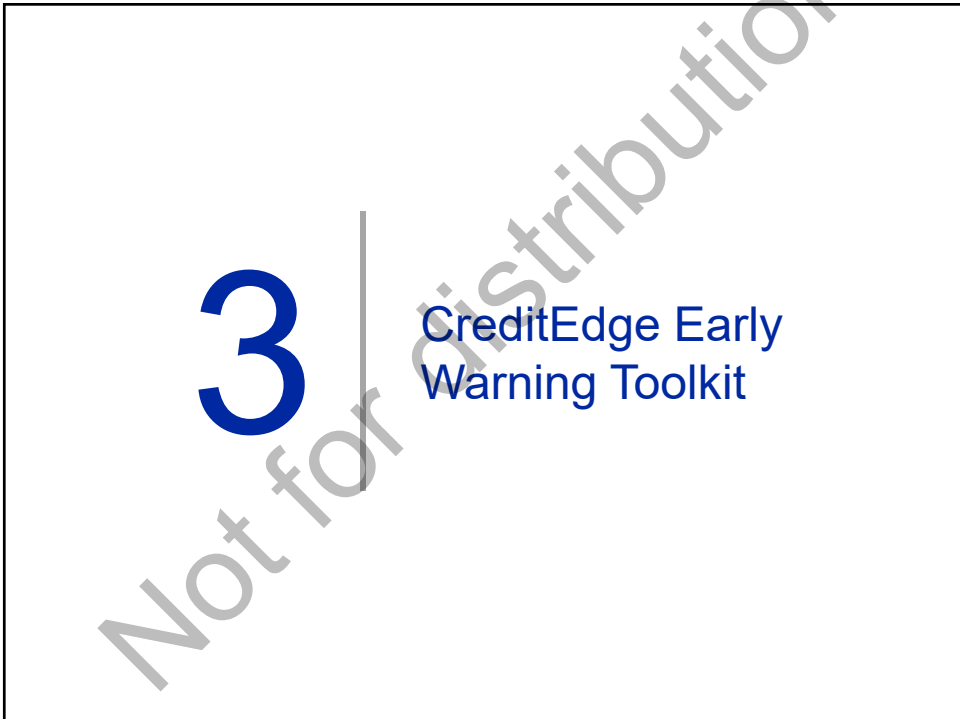
- The larger the DD: The larger the cushion and the **lower** the EDF
- The smaller the DD: The smaller the cushion and the **higher** the EDF

- » EDF moves inversely with DD
- » DD provides a relative rank ordering of default risk
- » We must transform DD into EDF to get an absolute probability of default

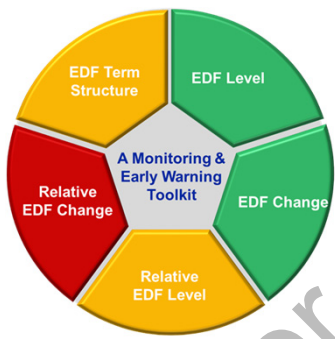
MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 22



©2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.



The Early Warning Toolkit helps uncover additional insight into elevated default risk



CROSS-SECTOR

Moody's
ANALYTICS

SECTOR IN DEPTH
28 April 2016

Rate this Research 25

TABLE OF CONTENTS

- Introduction 2
- Objectives 2
- EDF Levels: Setting the Expected EDF 2
- High EDF 3
- Going Beyond EDF Level: Additional 7
- Aspects of Moody's Credit Stress
- Points to Ask to Work in Practice 10

CONTACTS

- Shelvia Perry 212-853-7781
Sr Director Research
shelvia.perry@moody.com
- Wael Bawab 1-212-853-4007
Associate Director
wael.bawab@moody.com
- David Hamilton 65-8311-4658
MD/AFAC Sales

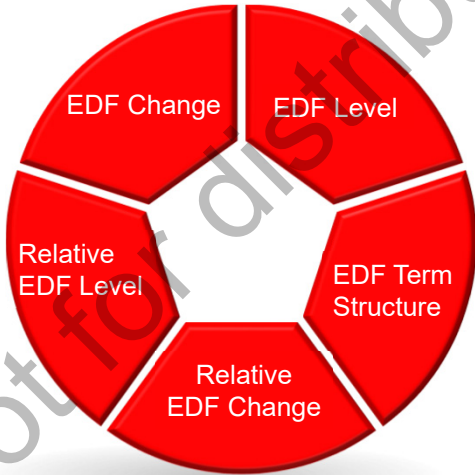
MOODY'S ANALYTICS

CreditEdge EDF™ Training, March 2019 25

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

Carillion demonstrated High Risk for all 5 Early Warning factors

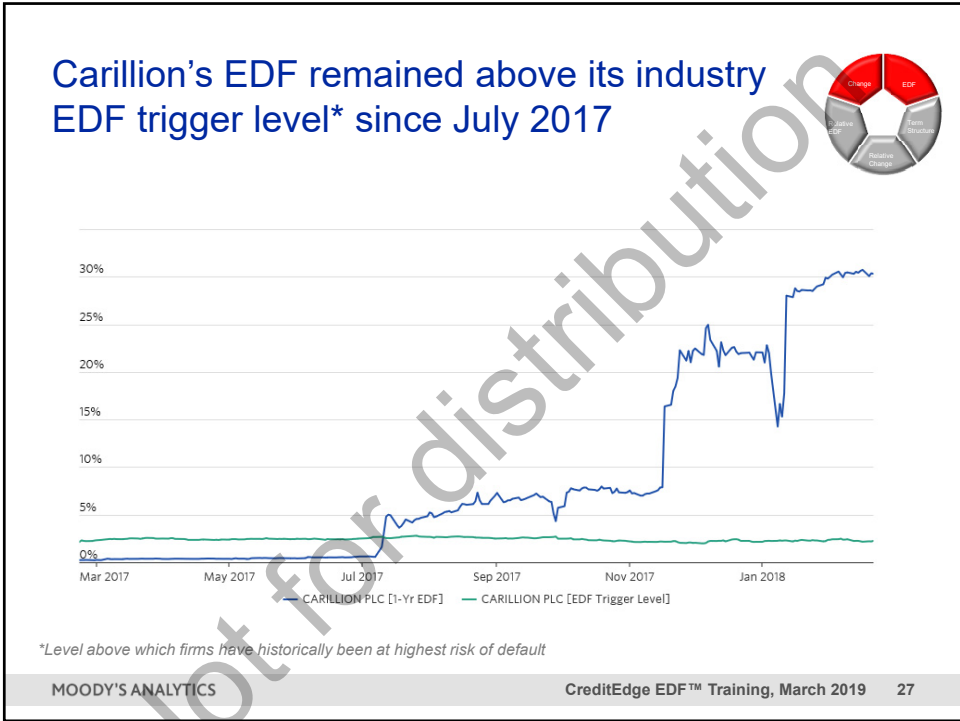
Based in the UK, **Carillion** was a multinational construction company and facilities management provider. It had 43,000 employees globally and held roughly 450 governmental contracts across the UK ministries of education, justice, defense and transportation. In 2016, it had \$7.3B in sales and a market capitalization of nearly \$1.4B. In January 2018, the firm collapsed with more than \$2.1B in outstanding debt, leaving UK taxpayers, subcontractors and suppliers to bear the burden.



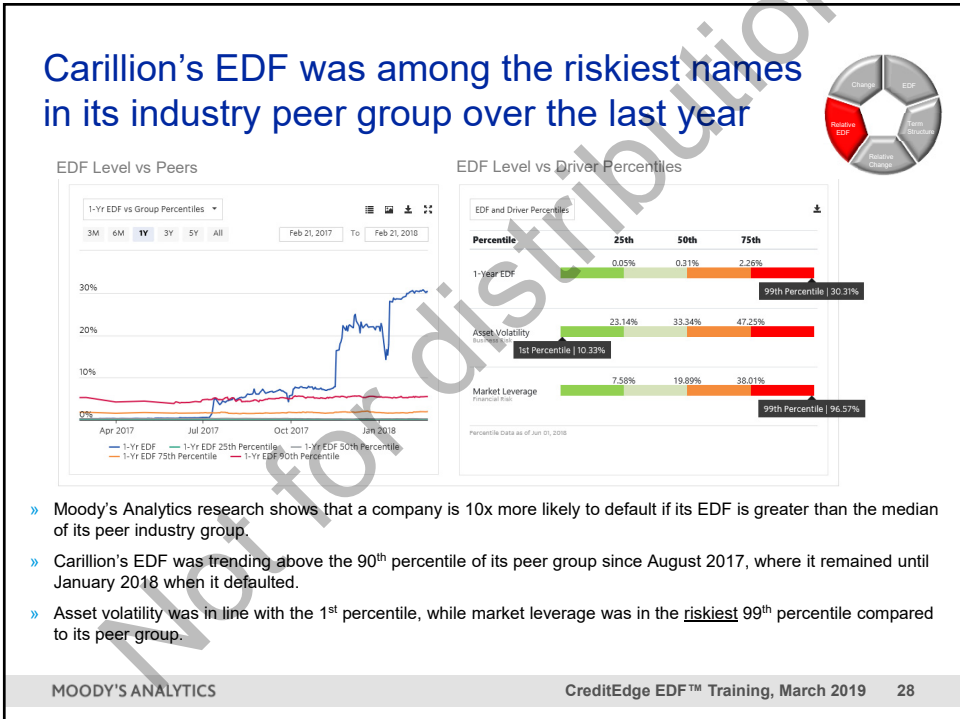
High Risk
Medium-High Risk
Medium-Low Risk
Low Risk

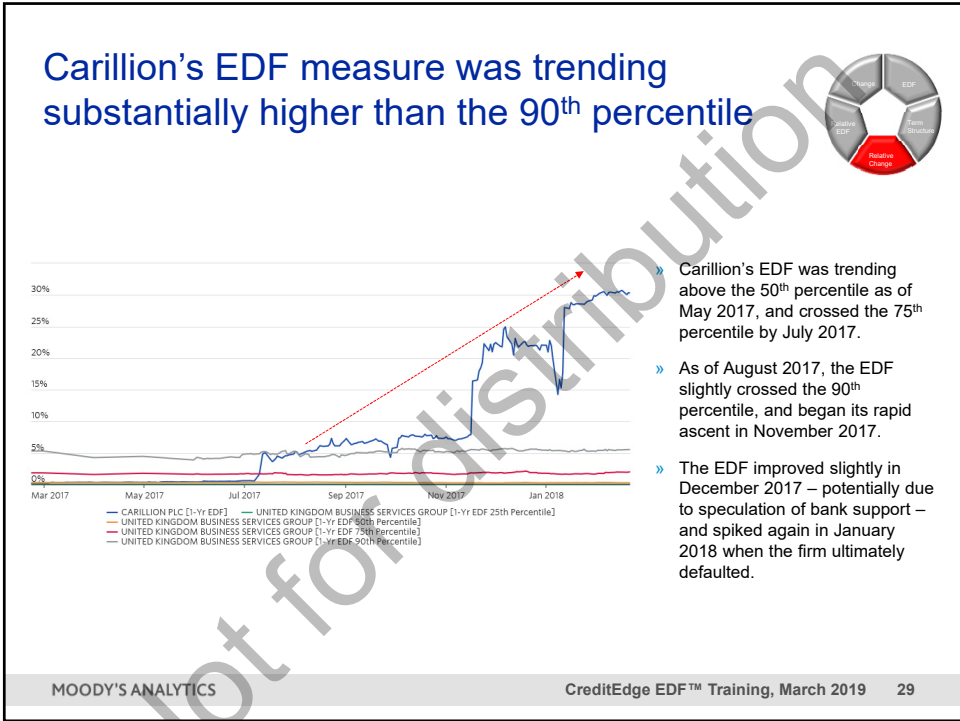
MOODY'S ANALYTICS

CreditEdge EDF™ Training, March 2019 26

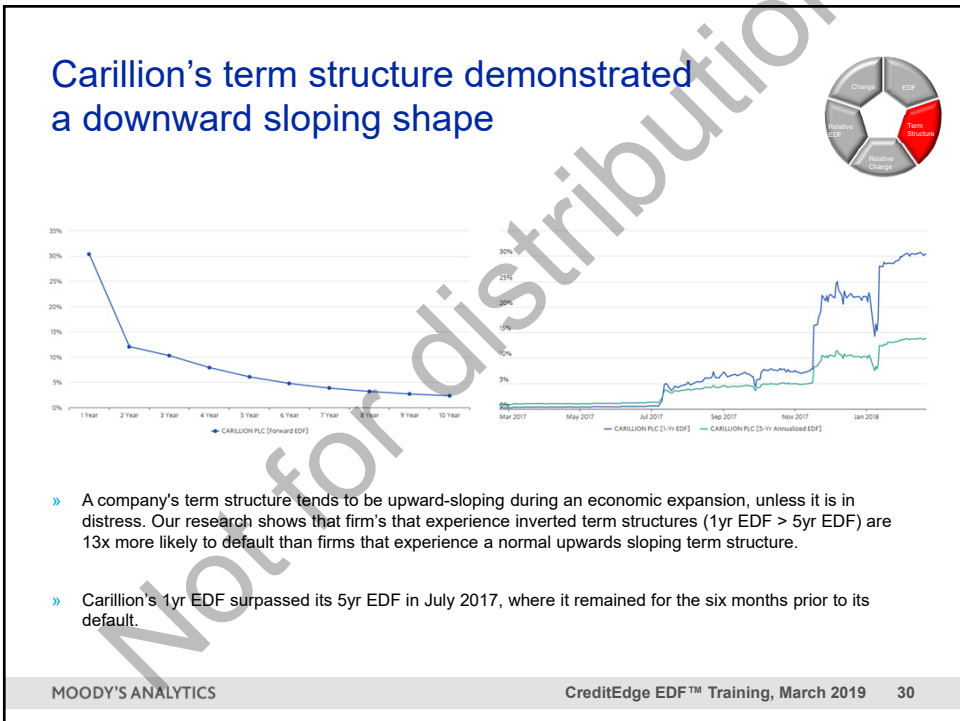


@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

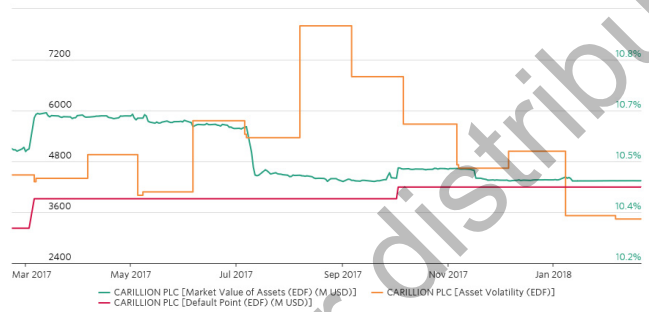




@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.



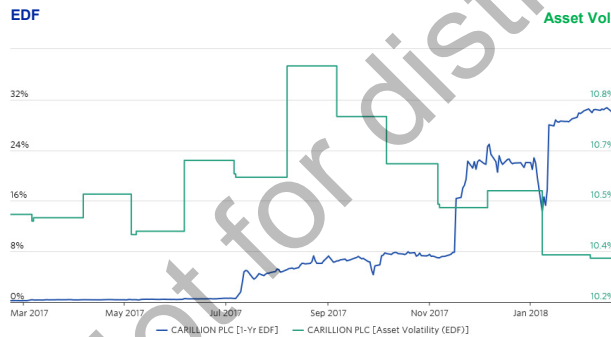
Carillion's high default risk was reflected by its debt levels outpacing its cash flow...



- » Over the last year, Carillion's market leverage worsened by 53%.
- » The main reason for this was added short term and long term liabilities to its books, coupled with a market value of assets lessened by 15%.
- » Over the last year, Carillion lost money on large contracts and accumulated substantial amounts of debt to offset its losses – due primarily to taking on too many high risk projects.

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

...while its slight improvement in business risk was not enough to improve the EDF

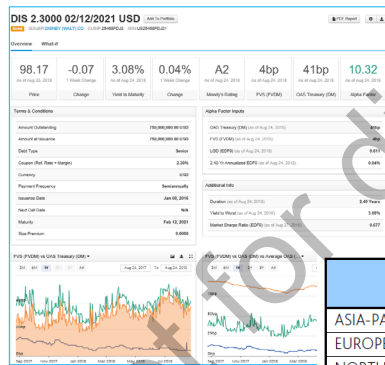


- » A company's business risk can be measured by the volatility of its assets. Higher volatility reflects greater uncertainty about a firm's future cash flows.
- » Over the last year, Carillion's asset volatility improved by nearly 2%, and was trending downward since its high point in September 2017.

4 | CreditEdge bond data

©2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

CreditEdge contains over 249,000 bond issues denominated in 51 currencies



- » Coverage continues to grow globally
- » In 2015, floating rate, discount zero and variable rate coupon bonds were added to CreditEdge
- » Bonds can be **screened** by multiple filters including **Alpha Factor**, plotted on **charts**, displayed in **reports**, and **monitored** via the **movers tool**

Region	Bond	
	Active	Total
ASIA-PACIFIC	21640	73852
EUROPE MIDDLE EAST AND AFRICA	17023	63124
NORTH AMERICA	32864	109207
LATIN AMERICA	1151	3556
Total	72678	249739

CreditEdge proprietary Fair Value Spread (FVS) and Alpha Factor (AF) measures can help asset managers select underpriced bonds

Fair Value Spread (FVS)

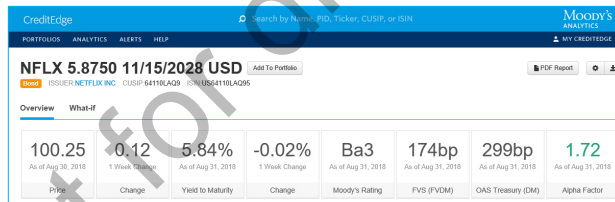


$$(PD \times LGD) + MPR \pm \text{issuer size factor}$$

Alpha Factor (AF)

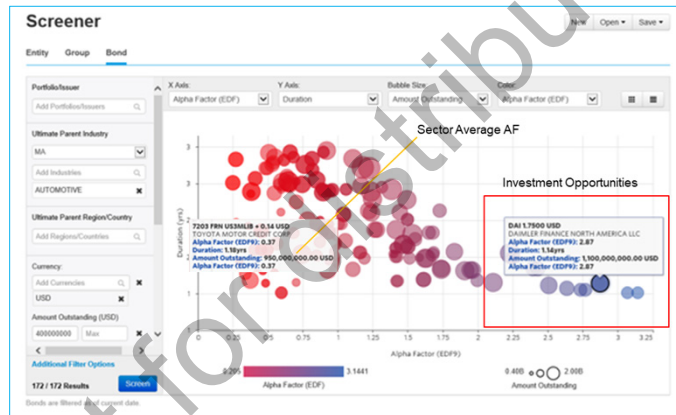


$$\text{Option Adjusted Spread (OAS)} / \text{FVS}$$



©2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

Are you getting paid for the risks you take?



- » Our research shows that portfolios of issues with high Alpha Factors have stronger returns and better credit risk characteristics than bonds with low Alpha Factors
- » Although on aggregate, the automotive sector in this example shows bond over-pricing, there are still several investment opportunities to explore

5 CreditEdge website & Excel Add-in demo

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

The Company Overview page offers a clear, customizable snapshot of company data

Find entities, groups and bonds using the "Type Ahead" Search

Customize and export charts for easy inclusion into your reports

Get a snapshot of the most relevant information

Check how the company performs compared to peers

Item	Sep 30, 2018	Sep 08, 2017	Amount Change	% Change
1-yr EDF	0.03%	0.01%	-0.04%	-37.50%
3-yr EDF	0.03%	0.01%	-0.04%	-37.50%
5-yr EDF	0.03%	0.01%	-0.04%	-37.50%
Market Value of Assets*	176,147.13M	91,604.34M	84,542.79M	92.29%
Share Price	348.68	176.42	172.26	97.64%
Shares Outstanding	499,45M	423,00M	76,45M	18.07%
Annual Capitalization**	10,712.95M	74,189.28M	75,942.28M	99.15%
Default Rate†	12.71% BAA	9.35% BAA	3.35% BAA	35.93%
Short Term Liability**	4,079.84M	5,122.84M	-1,043.00M	-20.36%
Long Term Liability**	12,087.30M	8,281.75M	3,805.55M	45.95%
All Total Liabilities**	16,167.14M	13,404.59M	2,762.55M	20.61%

Compare peers, groups and portfolios utilizing the Peer Analysis tool for additional insight

Select an industry group or portfolio to compare the selected entity

Compare a company's 1-yr EDF and its drivers to the selected group or portfolio

Analyze a company's 1-yr EDF versus the EDF trigger level of its industry group

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 39

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

The Bond Portfolio Overview page offers a clear, customizable snapshot of portfolio performance

Get a snapshot of the most relevant aggregate information

Customize and export charts for easy inclusion into your reports

Access individual bond pages from the scatter plot chart by clicking on any data point

High level overview of individual bonds in the portfolio

ISIN	CUSIP	Am't Outstanding	Price	Coupon (Ref. Rate)	Maturity	YTM	Duration (Yrs)	Alpha Factor (GDEI)	Deterioration Probability
US17081AY70	701081AY7	225.00 M USD	88.50	7.50%	Aug 01, 2020	14.61%	1.79	0.50	87.41%
US17081AX97	701081AX9	380.00 M USD	79.00	6.75%	Jul 15, 2022	13.99%	3.37	0.99	87.41%

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 40

The Bond Page provides in-depth insight for an individual bond

Bond data updated daily

Determine if the bond is over or undervalued

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 41

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

Email alerts are east to create

Set up a Basic Alert (specific for a company), or a Benchmark Alert (for a company compared to its peers)

Monitor your alerts on the website or by checking emails

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 42

Entity Name	Alert Threshold	Change	Trigger Status	Triggered On	Still Valid	Archive
ACACIA MINERS PLC	1-1Y EDF9 == 0.0%	+0.038%	0.31%	0/20/2018	-	-
BANCO ESPRITO SANTO SA	1-1Y EDF9 == 0.0%	No Change	0.00%	0/20/2018	-	-
BAUSCH HEALTH COMPANIES INC	1-1Y EDF9 == 0.0%	-0.037%	0.43%	0/20/2018	-	-
CAMPOR - CAMBOS DE PORTUGAL, SGPS SA	1-1Y EDF9 == 0.0%	-0.002%	12.71%	0/20/2018	-	-
ELIO MOTORS INC	1-1Y EDF9 == 0.0%	+0.224%	10.08%	0/20/2018	-	-
EMAY HOLDINGS INC	1-1Y EDF9 == 0.0%	-0.0009%	47.12%	0/20/2018	-	-
ENRAC GROUP S.A.	1-1Y EDF9 == 0.0%	-0.078%	0.48%	0/20/2018	-	-
FRED. OLSEN ENERGY ASA	1-1Y EDF9 == 0.0%	-0.0088%	28.47%	0/20/2018	-	-
LORMIN PLC	1-1Y EDF9 == 0.0%	+0.002%	21.20%	0/20/2018	-	-
POSTVITEC CORP	1-1Y EDF9 == 0.0%	-0.194%	30.67%	0/20/2018	-	-
ROYAL/BIOTECH NV	1-1Y EDF9 == 0.0%	+0.0342%	37.39%	0/20/2018	-	-
STEM MART INC	1-1Y EDF9 == 0.0%	-0.042%	0.20%	0/20/2018	-	-
ZAF	1-1Y EDF9 == 0.0%	+0.0017%	21.54%	0/20/2018	-	-

Monitor a portfolio by watching the biggest movers

Biggest Movers

Show: EDF For: All Entity Portfolios Previous: Three Months

Improving Movers

Name	Current	Previous	Change	% Change
BROOKFLD DTLA OFFICE TR INV	0.03%	35.00%	-34.97%	-99.90%
VITRO DIAGNOSTICS INC	13.53%	46.45%	-32.92%	-70.87%
EVEGATE PHARMACEUTICALS INC	5.53%	15.51%	-9.98%	-64.34%
EDGE THERAPEUTICS INC	8.41%	17.09%	-8.68%	-50.78%
HORNBECK OFFSHORE SVCS INC	16.13%	23.51%	-7.38%	-31.42%
MUSCOPHARM CORP	11.42%	18.80%	-7.38%	-39.25%
ONCOBIOLOGICS INC	6.30%	13.80%	-7.24%	-53.21%
ONCOMED PHARMACEUTICALS	3.32%	10.18%	-6.87%	-67.52%
RESVERLOXK CORP	2.30%	8.89%	-6.80%	-74.18%
MEDICURE INC	0.25%	6.37%	-6.12%	-96.05%
GLOBEMMUNE INC	28.34%	34.28%	-5.92%	-17.28%
AVANT DIAGNOSTICS INC	14.64%	20.15%	-5.51%	-27.34%

Deteriorating Movers

Name	Current	Previous	Change	% Change
ARQUR ANIMAL HEALTH INC	28.01%	1.08%	24.95%	2358.28%
CLD	32.07%	11.81%	20.27%	171.67%
BIOTECH PRODS SVCS RESEARCH	30.83%	13.23%	17.60%	133.04%
DS HEALTHCARE GROUP INC	44.80%	28.11%	16.68%	59.35%
LANNETT CO INC	22.55%	6.12%	16.44%	269.81%
CYTORI THERAPEUTICS INC	25.51%	12.50%	13.02%	104.15%
MBIVAX THERAPEUTICS HLDGS	24.19%	11.42%	12.77%	111.89%
GEMPHIRE THERAPEUTICS INC	14.42%	2.57%	11.84%	460.23%
REGULUS THERAPEUTICS INC	22.77%	12.01%	10.76%	89.61%
ACURA PHARMACEUTICALS INC	18.54%	7.88%	10.66%	135.79%
VIVUS INC	20.93%	10.38%	10.55%	101.57%

Annotations:

- Select the EDF measure, portfolio, and time frame
- For bonds, ability to see biggest movers by Alpha Factor
- Sort the table by absolute level or by percent change

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 43

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

Powerful screening and benchmarking functionalities at company, group and bond level

Screener

Entity: Group Bond

Portfolio: Add Portfolios

Industry: MA

Region/Country: UNITED STATES & CANADA

1-Yr EDF (%): Min Max

Moody's Rating: [Dropdown]

1-Yr EDF As of Date: [Dropdown]

Additional Filter Options

409 / 419 Results

X Axis: Market Leverage (EDF) Y Axis: Asset Volatility (EDF) Bubble Size: Net Sales Color: 1-Yr EDF

0.0117% 50% 0.00M USD 34,018,00M USD

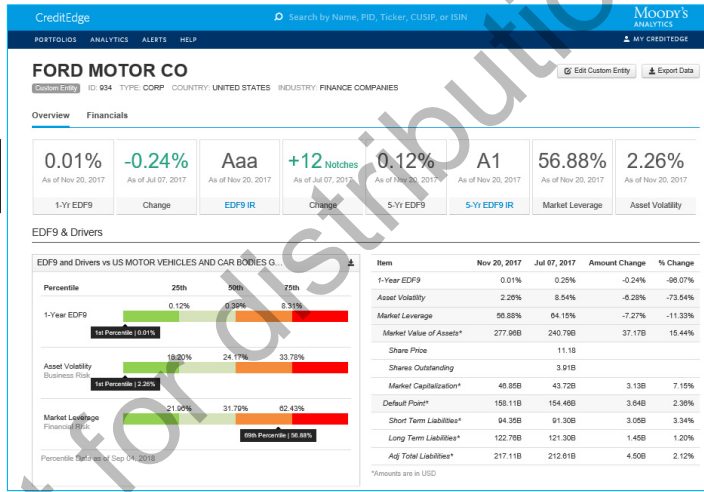
Annotations:

- Define search criteria for entities or bonds
- For bonds, ability to search by Alpha Factor range
- Analyze results using up to 4 different dimensions

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 44

Easily create a Custom Entity by inputting market and financial data to product an EDF value

Use to conduct in-depth pro forma and M&A analyses

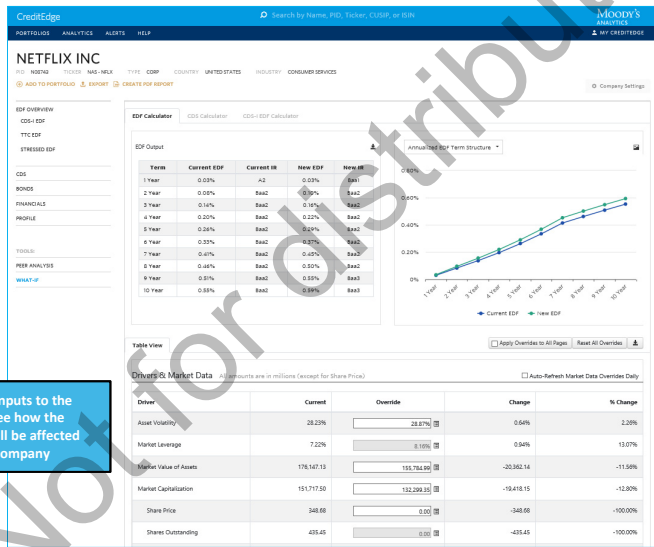


@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

Conduct "What-If" calculations for scenario analysis

Change the inputs to the model and see how the credit risk will be affected for a public company

Compare current and new EDF term structures



Best-in-class charting and reporting functionalities

Report Builder

PID	Name	EDF Date	1-Yr EDF (%)	Asset Volatility (EDF) (%)	TTC EDF Data
G10227	VOLKSWAGEN AG	2018-09-03	0.1629	8.9000	2018-09-03
G13317	TOYOTA MOTOR CORPORATION	2018-09-03	0.0822	11.0500	2018-09-03
G13284	NISSAN MOTOR CO LTD	2018-09-03	0.0007	8.1600	2018-09-03
G10010	BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT	2018-09-03	0.1205	0.1500	2018-09-03
34537A	FORD MOTOR CO	2018-09-03	0.2051	12.0000	2018-09-03

Chart Builder

Plot your data & customize your chart by changing color, style, scale, legend, etc.

Create your report for entities, bonds and groups (aggregate data)

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 47

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

PDF reports available for all companies and bonds in CreditEdge

FORD MOTOR CO

0.21% 1-Yr EDF
+0.02% 1 Week Change
Baa3 Implied Rating
Baa3 Moody's Rating

F 4.2000 09/20/2025 USD

1.93% Yield to Maturity
Baa2 Moody's Rating
165bp OAS Treasury (EM)
7bp FVS (FVOM)

Fully customizable Company PDF reports, including EDF measures, Moody's Rating, Financial data, peer analysis

Easy to export Bond PDF reports, including terms and conditions, Alpha Factor, Fair Value Spread vs Option Adjusted Spread, issuer details

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 48

Easily integrate CreditEdge data into your workflow through Excel Add-In

Easy to use template with extensive filtering options for customized analysis

Portfolio view of top default risks and downgrade risks for public and private names

Filter Type	1Y EDF Above Trig...	1Y EDF Change	Relative 1Y EDF Co...	Region	Industry	Exposure Amt	1Y EDF	1Y EDF %	Deterioration Probability	1Y EDF % Change	1Y EDF Change	Term Structure Invest...	Relative 1Y EDF	Relative 1Y EDF Change	COPI	EDF %
Private	Yes	Deteriorating	Deteriorating	Japan	Automobile & No	256,922.00	22.51%	84.55%	19.09%	Deteriorating	Yes	Above 90th Pct	Deteriorating	57.6%	13.51%	
Public	No	Improving	Improving	China	Foodstuffs	18,614.00	12.89%	21.35%	1.41%	Deteriorating	Yes	Above 90th Pct	No Change	45.00%	5.85%	
		No Change	No Change	China	Consumer Durables		22.85%	20.86%	46.60%	Deteriorating	No	Above 90th Pct	No Change	45.00%	5.21%	
				China	Consumer Durables		10.18%	22.67%	-53.88%	Improving	Yes	75th Pct -< 90th Pct	Improving	57.68%	5.82%	
				China	Consumer Durables		7.14%	20.55%	29.35%	Deteriorating	Yes	75th Pct -< 90th Pct	No Change	45.00%	3.21%	
				China	Consumer Durables		6.10%	19.57%	0.00%	No Change	Yes	75th Pct -< 90th Pct	No Change	45.00%	2.75%	
				China	Consumer Durables		6.10%	19.57%	0.00%	No Change	Yes	75th Pct -< 90th Pct	No Change	45.00%	2.75%	
				China	Consumer Durables		6.10%	19.57%	0.00%	No Change	Yes	75th Pct -< 90th Pct	No Change	45.00%	2.75%	
				China	Consumer Durables		5.50%	18.02%	-2.03%	Improving	Yes	50th Pct -< 75th Pct	No Change	45.00%	2.99%	
				China	Consumer Durables		4.64%	21.13%	19.75%	Deteriorating	Yes	Above 90th Pct	No Change	45.00%	3.07%	
				China	Consumer Durables		3.93%	18.65%	15.93%	Deteriorating	Yes	75th Pct -< 90th Pct	No Change	45.00%	1.77%	
				China	Consumer Durables		3.84%	16.99%	0.00%	No Change	Yes	50th Pct -< 75th Pct	No Change	45.00%	1.73%	
				China	Consumer Durables		3.64%	18.16%	20.91%	Deteriorating	Yes	50th Pct -< 75th Pct	No Change	45.00%	1.64%	
				China	Consumer Durables		3.62%	17.86%	0.00%	No Change	Yes	50th Pct -< 75th Pct	No Change	45.00%	1.63%	
				China	Consumer Durables		3.49%	17.90%	-12.88%	Improving	No	75th Pct -< 90th Pct	No Change	45.00%	1.57%	
				China	Consumer Durables		3.34%	16.11%	-2.62%	Improving	No	50th Pct -< 75th Pct	Improving	45.00%	1.50%	
				China	Consumer Durables		3.07%	26.25%	-4.63%	Improving	No	50th Pct -< 75th Pct	Improving	56.97%	1.75%	
				China	Consumer Durables		3.04%	16.20%	0.99%	Improving	No	50th Pct -< 75th Pct	No Change	45.00%	1.38%	
				China	Consumer Durables		2.96%	16.55%	27.64%	Deteriorating	No	50th Pct -< 75th Pct	Deteriorating	45.00%	1.33%	
				China	Consumer Durables		2.94%	17.05%	0.00%	No Change	Yes	75th Pct -< 90th Pct	No Change	45.00%	1.32%	
				China	Consumer Durables		2.88%	17.84%	0.00%	No Change	No	75th Pct -< 90th Pct	No Change	45.00%	1.30%	
				China	Consumer Durables		2.75%	17.43%	0.00%	No Change	Yes	50th Pct -< 75th Pct	No Change	45.00%	1.24%	
				China	Consumer Durables		2.74%	25.47%	25.54%	Improving	Yes	50th Pct -< 75th Pct	No Change	45.00%	1.23%	
				China	Consumer Durables		2.49%	17.61%	-24.50%	Deteriorating	Yes	50th Pct -< 75th Pct	No Change	45.00%	1.12%	
				China	Consumer Durables		2.41%	32.12%	-31.04%	Improving	No	50th Pct -< 75th Pct	Improving	57.68%	1.99%	

Color and qualitative coding helps users spot important names quickly

MOODY'S ANALYTICS

CreditEdge EDF™ Training, March 2019 49

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

6 Q&A

Not for Distribution

CreditEdge by the numbers

50 <i>Years of default data</i>	1989 <i>When the first EDF measure was calculated</i>	60,000+ <i>EDF measure for publicly traded firms</i>
250+ <i>Data fields</i>	11,700+ <i>Defaults in our global data base</i>	76,000+ <i>Active CUSIPs in our database</i>

Thank You!

MOODY'S ANALYTICS CreditEdge EDF™ Training, March 2019 51

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.

MOODY'S ANALYTICS

Ryan Donahue
Product Strategist
212.553.3903 tel
Ryan.Donahue@moodys.com

Ryan O'Malley
Engagement Manager
212.553.2798 tel
Ryan.Omalley@moodys.com

Client Services
Americas: +1.212.553.1653
clientservices@moodys.com

EMEA: +44.207.772.5454
clientservices.emea@moodys.com

APAC: +852.3551.3077
clientservices.asia@moodys.com

Japan: +81.3.5408.4100
clientservices.japan@moodys.com

© 2019 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S INVESTORS SERVICE, INC. AND ITS RATINGS AFFILIATES ("MIS") ARE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MOODY'S PUBLICATIONS MAY INCLUDE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL, FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO, LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS AND MOODY'S OPINIONS INCLUDED IN MOODY'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S PUBLICATIONS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. CREDIT RATINGS AND MOODY'S PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. NEITHER CREDIT RATINGS NOR MOODY'S PUBLICATIONS COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS AND PUBLISHES MOODY'S PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS OR MOODY'S PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing the Moody's publications.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers are advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY SUCH RATING OR OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any rating, agreed to pay to Moody's Investors Service, Inc. for appraisal and rating services rendered by it fees ranging from \$1,500 to approximately \$2,500,000. MCO and MIS also maintain policies and procedures to address the independence of MIS's ratings and rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold ratings from MIS and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted online at www.moody.com under the heading "Investor Relations — Corporate Governance — Director and Shareholder Affiliation Policy."

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657 AFSL 330700 and/or Moody's Analytics Australia Pty Ltd ABN 64 105 138 972 AFSL 383660 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is a reflection as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors. It would be reckless and inappropriate for retail investors to use MOODY'S credit ratings or publications when making an investment decision. If in doubt you should contact your financial or other professional adviser.

Additional terms for Japan only: Moody's Japan K.K. ("MJJK") is a wholly-owned credit rating agency subsidiary of Moody's Group Japan G.K., which is wholly-owned by Moody's Overseas Holdings Inc., a wholly-owned subsidiary of MCO. Moody's SF Japan K.K. ("MSF.J") is a wholly-owned credit rating agency subsidiary of MJJK. MSF.J is not a Nationally Recognized Statistical Rating Organization ("NRSRO"). Therefore, credit ratings assigned by MSF.J are Non-NRSRO Credit Ratings. Non-NRSRO Credit Ratings are assigned by an entity that is not a NRSRO and, consequently, the rated obligation will not qualify for certain types of treatment under U.S. laws. MJJK and MSF.J are credit rating agencies registered with the Japan Financial Services Agency and their registration numbers are FSA Commissioner (Ratings) No. 2 and 3 respectively.

MJJK or MSF.J (as applicable) hereby disclose that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by MJJK or MSF.J (as applicable) have, prior to assignment of any rating, agreed to pay to MJJK or MSF.J (as applicable) for appraisal and rating services rendered by it fees ranging from JPY200,000 to approximately JPY500,000,000.

MJJK and MSF.J also maintain policies and procedures to address Japanese regulatory requirements.

MOODY'S ANALYTICS

CreditEdge EDF™ Training, March 2019 53

@2019 Moody's Analytics, Inc., its licensors and affiliates. All rights reserved.