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# Corporate Credit Rating Methodology

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## Morningstar Credit Ratings

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## Overview of Methodology

Morningstar's Credit Ratings, LLC's methodology builds upon the knowledge that Morningstar has accumulated for more than a decade on companies, industries, and financial markets. Morningstar's credit rating methodology is based on company research including our expectations of future cash flows.

Morningstar's corporate credit rating methodology is both quantitative and qualitative. Four key components drive the Morningstar credit rating methodology and credit ratings model; these are the "pillars" of our methodology:

- (1) Business Risk, which encompasses the proprietary Morningstar Economic Moat™ and Uncertainty assessment, along with six other risk factors.
- (2) Morningstar Cash Flow Cushion™, a set of proprietary, forward-looking measures based on our forecasts of cash flows and financial obligations.
- (3) Morningstar Solvency Score™, a proprietary scoring system that incorporates a company's leverage, liquidity, coverage ratios, and profitability.
- (4) Distance to Default, a quantitative model that uses market-based inputs to rank companies based on their likelihood of financial distress.

A company's scores in each of the four pillars are factored into our final corporate credit rating. The consolidated corporate rating, or CCR, is our estimate of the consolidated corporation's total capacity to meet its financial obligations as they come due and in accordance with their terms. The CCR assumes that all the resources of the consolidated corporation are available to meet those obligations, including the assets of its foreign subsidiaries, its shares in joint ventures, and investments in other entities. The CCR would be the rating of the ultimate parent's senior unsecured debt, assuming that is the only class of debt; that all debt is issued by the ultimate parent level and guaranteed by all subsidiaries; and all domestic and foreign assets of the corporation were available to service that debt.

Underlying this rating are a focused methodology, a robust, standardized set of procedures, and core financial risk and valuation tools. Morningstar utilizes a credit rating model which combines the qualitative and quantitative risk measures of its four key components. The model is a method for consistently integrating Morningstar's fundamental research across industries to produce a sensitivity analysis and model driven credit rating as a key input into a rigorous rating committee process through which the final rating is determined.

## Business Risk Evaluation

Several elements comprise our assessment of a company's Business Risk: Economic Moat analysis and Uncertainty analysis, country risk, size, dependence on capital markets, cyclicity, product or customer concentration, and management quality. Economic Moat and Uncertainty are unique and critical to Morningstar's credit analysis as explained below.

### Morningstar Economic Moat

When it comes to risk, our assessment of a company's Economic Moat is one of the most important considerations. The concept of an Economic Moat plays a vital role in our qualitative assessment of a company's long-term cash generation potential and in the determination of the final credit rating.

According to Morningstar Research Services LLC's equity research methodology, the Morningstar Economic Moat is a term to describe the sustainability of a company's future economic profits (for details, see <http://corporate.morningstar.com/US/>). Morningstar Research Services defines economic profit as returns on invested capital over and above the estimate of a company's cost of capital, or weighted average cost of capital. Competitive forces in a free-market economy tend to chip away at companies that earn profits, because eventually competitors attracted to those profits will employ strategies to capture some of those excess returns. The primary differentiating factor among companies is how long they can hold competitors at bay. Only firms with Economic Moats—something inherent in their business models that rivals cannot easily replicate—can achieve excess returns for a prolonged period. Companies with moats also have a buffer against adverse events such as cyclical downturns or management mistakes. Many highly rated companies have Economic Moats. However, even companies with no moat can achieve investment-grade credit ratings through conservative capital structure and good stewardship of the business.

Morningstar Research Services assigns one of three Economic Moat scores: none, narrow, or wide. There are two major requirements for a company to earn a narrow or wide score: the prospect of earning above-average returns on capital and some competitive edge that prevents these returns from quickly eroding. To assess the sustainability of excess profits, Morningstar Research Services performs assessments of the Morningstar Economic Moat Trend. A company's Moat Trend is positive in cases where its competitive advantage is growing stronger, stable when changes to the moat over the next several years are not anticipated, and negative when signs of deterioration are foreseen. A negative or positive trend does not necessarily signify that a moat will change, but that the company's competitiveness is deteriorating or improving.

As part of our determination of the final assigned corporate credit rating, we may adjust the published Economic Moat score as part of our analysis of the sensitivity of the credit risk to potential changes in the Economic Moat. If Morningstar Research Services has not assigned an Economic Moat then Morningstar will determine a score for that corporation's sustainable competitive advantage for input to the Business Risk pillar.

### Morningstar Uncertainty Assessment

Morningstar Research Services' Uncertainty assessment represents our ability to forecast the enterprise value of a company, based on the characteristics of the business. Our framework classifies the uncertainty around company value into four simplified conceptual elements: range of sales, operating

leverage, financial leverage, and contingent events. Some industries require special adjustments to this formula, but the basic framework remains the same: bounding the range of the value of the company determined by long-term cash flows. From a debt holder's perspective, the Uncertainty assessment measures the stability and reliability of the "equity cushion" at the bottom of the capital structure.

As part of our determination of the final assigned corporate credit rating, we may adjust the published Morningstar Research Services Uncertainty assessment as part of our analysis of the sensitivity of the credit risk to potential changes in the Uncertainty assessment. If Morningstar Research Services has not assigned an Uncertainty assessment then Morningstar will determine an Uncertainty assessment score based on the four conceptual elements for input into the Business Risk pillar.

### **Financial Risk Evaluation**

To evaluate financial risk, we score companies on the following three metrics:

#### **Morningstar Cash Flow Cushion**

Our proprietary Morningstar Cash Flow Cushion ratio gives us insight into whether a company can meet its capital obligations well into the future. We adjust our forecasts of a company's operating cash flow to derive its cash available for servicing its obligations and compare our forecasts for that cash with the company's future debt and debt-like obligations.

#### **Morningstar Solvency Score**

We consider several ratios when assessing a company's financial strength, including the amount of a company's debt and debt-like obligations relative to its assets, its total obligations compared with its cash flow over the next five years, and liquidity against near-term obligations. In addition to examining these ratios in past years, we forecast the cash flows we think a company is likely to earn in the future and consider how these balance-sheet ratios will change over time. In addition to industry-standard measures of profitability (such as profit margins and returns on equity), we focus on return on invested capital as a metric when determining whether a company's profits will benefit debt and equity holders. At Morningstar, we have been focusing on returns on invested capital to evaluate companies for more than a decade, and we think it is particularly important to understand a company's ability to generate adequate returns on capital to accurately assess its prospects for meeting debt obligations and other fixed obligations.

#### **Distance to Default**

Morningstar's quantitative distance to default measure ranks companies on the likelihood that they will tumble into financial distress. The measure is a model of the percentile of a company's leverage (ratio of enterprise value/market value), the percentile of a company's equity volatility relative to the rest of the universe, and the interaction of these two percentiles. This methodology is a proxy for the common definition of distance to default calculation, which relies on option-based pricing models. The proxy has the benefit of increased breadth coverage, greater simplicity of calculation, and more predictive power.

#### **Modeling Cash Flows**

Analyzing current and past financial statements is important, but a company's ability to meet its debt obligations can't be determined by gazing in the rearview mirror. That's why Morningstar creates a detailed projection of a company's future cash flows, resulting from Morningstar's independent primary

research. Morningstar makes numerous detailed assumptions about items such as revenue, profit margins, tax rates, changes in working capital accounts, capital spending, financing requirements, and potential cash flow generation. These income-statement, balance-sheet, and cash flow assumptions are fed into our standardized, proprietary discounted cash flow modeling templates. We use scenario analysis and a variety of analytical tools to augment this process.

### **Scenario Analysis**

A core part of our rating process is to perform scenario analysis on each company we cover. Morningstar may consider alternative scenarios, stress-testing the model and examining the distribution of resulting cash flows and credit model ratings. Morningstar may adjust any individual credit rating pillar score to determine its impact on the credit model score. Such scenario analysis incorporates our assessment of both business and financial risks.

### **Assigning the Final Corporate Credit Rating**

We use our assessment of a company's Business Risk, Cash Flow Cushion, Solvency Score, and Distance to Default pillar scores to arrive at a preliminary quantitative "model" credit rating for the firm. We will determine a final rating that may be higher or lower than the model rating. Morningstar monitors company and industry developments to determine if they are material to the credit rating. If a change in the credit rating may be warranted, then we will consider the change.

We place considerable emphasis on using both qualitative and quantitative analysis to arrive at our credit ratings. We apply weightings to each factor we consider, placing sizable weight on some of the proprietary metrics we have honed over time, including Economic Moat. We rate companies on an industry standard scale. See [Morningstar Credit Ratings Definitions and Other Related Opinions and Identifiers](#) for details.

### **Components of Our Credit Ratings Model**

The credit rating model for nonfinancial corporations is described below.

Morningstar Research Services provides the following inputs to our credit rating model: Economic Moat, Uncertainty assessment, and Distance to Default.

#### **Business Risk**

Two separate scores combine to form our Business Risk score: country risk and company risk. Once we assign these two scores, we weight them as follows to determine the Business Risk score for each company: country risk 10%; company risk 90%.

#### **Country Risk**

No matter how solid a company's finances, if it operates in an unstable political or economic environment, it deserves a lower credit rating than a similar company operating under more benign conditions. For those companies that are domiciled outside the United States, or that have significant foreign operations, we incorporate an evaluation of country risk where appropriate. We assign each country a score of 1 to 25 (with 25 the highest), based on Morningstar's assessment of the cost of equity in foreign countries as well as potential credit implications from political instability, legal system, interest

rates, inflation stability, robustness of the financial markets/strength of banking system, and credit history where relevant.

### Company Risk

We score each company on eight risk factors. The emphasis here is on the inherent characteristics of the company regardless of its current capital structure and financial strength (which we capture with other measures). Measures such as the economic moat and uncertainty rating also contain an inherent industry element. Some industries are more conducive to economic moats than others, and some industries have inherently higher levels of uncertainty about future cash flow.

### Morningstar Economic Moat

An essential part of our company analysis is the Morningstar Inc. Economic Moat, which encapsulates our view of a company's competitive advantages and ability to earn excess returns on capital over time. Morningstar Research Services assigns an Economic Moat score based on its assessment of a company's sustainable competitive advantage. As part of the determination of the final assigned corporate credit rating, we may adjust the economic moat score or conduct an analysis regarding the sensitivity of the credit risk to potential changes in the economic moat. If Morningstar Research Services has not assigned an Economic Moat then Morningstar will determine a score for that corporation's sustainable competitive advantage for input into the Business Risk pillar.

Moat	Score
Wide	10
Narrow	5
None	1

### Uncertainty Assessment

We assign a score based on a company's Uncertainty assessment, as determined by Morningstar Research Services, which assigns Uncertainty assessment scores based on the range of possible equity values given "bull" and "bear" forecasts for revenue, the company's operating leverage, financial leverage, and other business fundamentals. As part of the determination of the final assigned corporate credit rating, we may adjust the Uncertainty assessment score as part of our analysis of the sensitivity of the credit risk to potential changes in uncertainty. If Morningstar Research Services has not assigned an Uncertainty assessment, then Morningstar will determine a score for that input into the Business Risk pillar.

We assign the scores as follows:

Uncertainty	Score
Low	10
Medium	7.5
High	5
Very High	2.5
Extreme	1

Smaller companies are inherently less stable and more vulnerable to financial distress than larger firms. We assign companies a score based on revenue as follows:

Annual Revenue	Score
Greater than \$25 billion	10
Between \$13 billion and \$25 billion	9
Between \$7 billion and \$13 billion	8
Between \$4.5 billion and \$7 billion	7
Between \$3 billion and \$4.5 billion	6
Between \$1.8 billion and \$3 billion	5
Between \$1 billion and \$1.8 billion	4
Between \$500 million and \$1 billion	3
Between \$200 million and \$500 million	2
Less than \$200 million	1

We occasionally adjust the size score for special situations in which revenue is not the only relevant measure of size that provides a Cash Flow Cushion. For example, a company with a large top line but razor-thin margins could merit a lower score than its revenue would indicate. Alternatively, a smaller company with large and stable margins may be the equivalent of, in terms of cash flow stability, a larger firm with smaller or variable margins.

### **Product and Customer Concentration**

An important determinant of the stability of a company's future revenue and profits is the diversification of both its product portfolio and its customer base. All else being equal, a company with a variety of products sold to a variety of end markets is less subject to economic or regulatory shocks than is a more narrowly focused company. Morningstar assigns a concentration score to companies on a scale of 1 to 5, with diversified companies scoring a 5, and companies with one product or narrow base of customers scoring a 1.

### **Management**

Morningstar assigns each company we cover a management score of 1 to 5. The score captures our view of a company's transparency, financial prudence, and management credibility. We emphasize how conservatively a management team is managing its balance sheet, its policies regarding share buybacks and dividends, its tendency toward mergers and acquisitions activity, and other factors affecting bondholders. We also consider whether the company does what it says it is going to do with respect to the balance sheet: has it negatively surprised bondholders in the past? Is management willing to make hard choices (for example, cut the dividend or dilute equity) to maintain its financial health?

Companies of which our view of management is neutral receive a score of 3. Modestly positive or negative views result in a score of 4 or 2, respectively, while we reserve scores of 5 or 1 for the best and worst cases of good or bad creditor treatment.

### **Dependence on Capital Markets**

Morningstar scores each company on its need to access the capital markets over our five-year forecast, using the Cash Flow Cushion model to estimate its need for external financing in each of the five years of

our forecast. We determine the Dependence on Capital Markets score by the minimum of the annual cash flow coverage ratios used to calculate the Cash Flow Cushion. Because capital markets are unpredictable, a company whose survival depends on them is more at risk than a company that could easily continue to operate if all capital markets closed for five years. Scores range from 1 if the minimum annual coverage ratio is less than 1 up to 5 if the minimum annual ratio is over 4.

### **Cyclical**ity of Operations

The greater the economic sensitivity of a company, the more likely it is to go bankrupt, all else being equal. We assess the cyclical

ity of each company's operations and assign a score to those companies on a scale of 1 to 5. A highly cyclical company may receive a score of 1, while a company with stable revenue may receive a score of 5.

### **Other Company Risk Factors**

For factors that are not adequately captured within one of the other Business Risk metrics, we may make an entry into the "other company risk factor" score.

### **Morningstar Cash Flow Cushion**

The Cash Flow Cushion ratio is a fundamental indicator of a company's future financial health and is a component of the Morningstar credit rating. The measure reveals how many times over a company's internal cash generation plus liquid assets will cover its debt-like contractual commitments over the next five years. At its core, the Cash Flow Cushion acts as a predictor of financial distress, bringing to light potential refinancing, operation, and/or liquidity risk inherent to the firm.

Summing cash flows over the next five years implicitly assumes that financial markets are functioning, so that a solvent company has sufficient short-term flexibility to refinance a temporary liquidity shortfall (such as a large single maturity exceeding free cash flow plus cash on hand) at its existing cost of capital. However, we also look at the yearly Cash Flow Cushion to test the vulnerability of the company to capital markets' disruption in any single year of the forecast period.

The advantage of the Cash Flow Cushion ratio, relative to other fundamental indicators of credit health, is that the measure focuses on the future cash-generating performance of the company via Morningstar's proprietary cash flow model. By reclassifying fixed or contractual cash expenses as liabilities to reflect their debt-like characteristics, we compare future projected free cash flows with debt-like cash commitments coming due in any single year. The forward-looking nature of this metric allows Morningstar to anticipate changes in a company's financial health and pinpoint when and how often cash shortfalls are likely to occur. Here is the formula for the Cash Flow Cushion ratio used as a component of the Morningstar credit rating:

$$\frac{\text{Total Liquid Cash}_{Yr0} + \sum_{Yr1}^{Yr5} \text{Adjusted Free Cash Flow}}{\sum_{Yr1}^{Yr5} \text{Debtlike Contractual Commitments}}$$

The Cash Flow Cushion focuses on the timing of interest and principal payments (including the debt of joint ventures, if necessary) and considers other debt-like (off balance-sheet) mandatory cash contractual commitments, including lease payments, pension/postretirement contributions, guarantees, legal contingent obligations, and so on, that if left unpaid, may ultimately lead to financial distress and/or

bankruptcy. The sum of a company's total cash obligations and commitments during the next five years forms the denominator in the calculation of the company's Cash Flow Cushion, and Adjusted Free Cash Flow is the numerator.

Morningstar calculates Adjusted Free Cash Flow by adding back the cash components of expense items included in net income from continuing operations that resemble debt-like contractual cash commitments. This may include rent expense, pension expense, and other operating items, but not maturing debt or other items that were not initially in net income. For example, if a debt-like expense item is originally included in net income from continuing operations, the cash components of that item are added back to net income from continuing operations before including it in total cash obligations and commitments to avoid double-counting. These adjusted items are then tax-effected to arrive at the adjusted net income from continuing operations.

Our forecast of adjusted net income from continuing operations is then used to arrive at adjusted cash flow from operations. We subtract out the dividends we expect a company to pay over the forecast period. Dividends are a discretionary cash outlay, but once they're paid, the money is unavailable to service or retire debt. Therefore, our typical assumption is to subtract projected dividends to arrive at adjusted cash flow from operations.

We then subtract the company's total capital expenditures, asset sales/dispositions, acquisitions, and cash flows related to investments in long-term operating assets from adjusted cash flow from operations to arrive at our assessment of the company's adjusted free cash flow.

### **Morningstar Solvency Score**

Any credit scoring system would be remiss to ignore a company's financial health as described by key financial ratios. In our effort to create a ratio-based metric, we employed binary logistic regression analysis to evaluate the predictive ability of several financial ratios commonly believed to be indicative of a company's financial health. We refer to it as the Morningstar Solvency Score.

Financial ratios can describe four main facets of a company's financial health: liquidity (a company's ability to meet short-term cash outflows), profitability (a company's ability to generate profit per unit of input), capital structure (how the company finances its operations), and debt-service capability (how much profit is earned per dollar of interest payments). The Solvency Score includes one ratio from each of these four categories.

Morningstar continually forecasts these accounting values for future time periods. No testing of forecasts has been possible because of data limitations, but it is reasonable to assume that using estimates of future accounting values will yield more-predictive results than previously reported ratios. As a result, the Solvency Score uses some estimates of future ratios.

#### Morningstar Solvency Score Formula

$$5 * \sqrt{PR\left(\frac{TL_0 + CLO_0}{TA_0 + CLO_0}\right) * PR\left(\frac{EBITDAR_1}{IE_1 + 0.333 * RE_1}\right)} + (4 * PR(ROIC_1)) + (1.5 * PR(QR_0))$$

The raw value for each ratio is converted to a percentile score (PR) to have a comparable range of values for each.

Where

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$TL_0$	Total Liabilities of Most Current Year (Year 0)
$CLO_0$	Capitalized Operating Leases in Year 0
$TA_0$	Total Assets in Year 0
$IE_1$	Interest Expenses in First Projected Year (Year 1)
$RE_1$	Rent Expenses in Year 1
$EBITDAR_1$	Earnings Before Interest, Taxes, Depreciation, and Rent in Year 1
$ROIC_1$	Return on Invested Capital in Year 1
$QR_0$	Quick Ratio in Year 0

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and

$$ROIC_1 = \frac{EBI_1}{IC}$$

and IC is average invested capital defined as

$$IC = Working\ Capital + Net\ PPE + NetGW + IA + LTOA + COL + CRD + COE - Other\ CL - LTOL$$

Where

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$EBI_1$	Earnings Before Interest in the first projected year
$IC$	Invested Capital
<i>Working Capital</i>	Current Operating Assets - Current Operating Liabilities
<i>Net PPE</i>	Net Property, Plant, and Equipment
<i>Net GW</i>	Net Goodwill
<i>IA</i>	Intangible Assets
<i>LTOA</i>	Long-Term Operating Assets
<i>COL</i>	Capitalized Operating Leases
<i>CRD</i>	Capitalized Research and Development
<i>COE</i>	Capitalized Other Expenses
<i>Other CL</i>	Other Current Liabilities
<i>LTOL</i>	Long-Term Operating Liabilities

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Part of the attractiveness of the Solvency Score is its intuitiveness. A practitioner of financial analysis will recognize that each of the ratios included has its own ability to explain default risk. In addition, the weighting scheme and ratio interaction appeal to common sense. For instance, it is logical to assume that a declining interest coverage ratio would be highly predictive of default. Even healthy companies, however, can have odd years in which profits may suffer and interest coverage is poor. For this reason, we observed that a multiplicative combination of the interest coverage ratio and the capital structure ratio is more explanatory than either ratio individually or even a linear combination of the two. This is

because interest coverage is not highly important for companies with healthy balance sheets (because of low debt levels, sufficient cash on hand to endure downturns, or both). However, we find that interest coverage tends to become a more important credit factor as a company's liabilities increase as a percentage of its total capital structure.

Once we have calculated a raw Solvency Score, we rank it relative to all calculable U.S.-domiciled stocks, transforming the score into a ranking. A Solvency Score of 10 represents poor financial health, while 1 represents strong financial health.

### Distance to Default

The Distance to Default metric, or DtD, is a market-based measure of financial health provided by Morningstar Research Services. Both inputs, equity volatility and the enterprise value to market value ratio, are calculated using daily updated market data on equity volatility and market value of equity (market capitalization). Enterprise value is market value of equity plus book value of debt minus cash. The DtD allows us to compare new data on financial market valuations with accounting-based measures of financial health. As a result, our credit rating can be more responsive to early signs of financial distress.

- Step 1: Calculate annualized trailing 300-day equity volatility (EQVOL)
- Step 2: Calculate current enterprise value/market value ratio (EVMV)
- Step 3: Transform EQVOL into a percentile (0, 1) by ranking it relative to all other stocks in the calculable universe (EQVOLP). One represents high equity volatility, 0 represents low equity volatility.
- Step 4: Transform EVMV into a percentile (0, 1) by ranking it relative to all other stocks in the calculable universe (EVMVP). One represents high-leverage companies, 0 represents low-leverage companies.
- Step 5: Calculate new raw DtD =  $1 - (EQVOLP + EVMVP + EQVOLP \times EVMVP) / 3$
- Step 6: Transform new raw DtD into a decile (1, 10) by ranking it relative to all calculable U.S.-domiciled stocks. A DtD of 10 represents poor financial health, while 1 represents strong financial health.

### Deriving the Model Rating

The four components of an issuer's numerical model credit score--Business Risk, Morningstar Cash Flow Cushion, Morningstar Solvency Score, and Distance to Default--are combined, as shown in the equation below, to determine the credit model score.

$$\text{Credit Score} = (3.5 \times DD) + (3.5 \times SS) + (8 \times BR) + (\text{MAX}(DDSSBR) \times CC)$$

where

<i>DD</i>	Distance to Default Score
<i>SS</i>	Solvency Score
<i>BR</i>	Business Risk Score
<i>CC</i>	Cash Flow Cushion Score

Our back-testing results suggest that the Morningstar Solvency Score and Distance to Default score have enhanced predictive ability when combined in equal weights. Business Risk holds greater weight than

these quantitative measures, given the significant influence that country, company, and industry risks have on a company's credit health and ability to meet future obligations. We constructed the equation with the Morningstar Cash Flow Cushion having a coefficient dependent on the values of the other variables to place greater importance on the Cash Flow Cushion in leveraged scenarios. In situations deemed "safe" by the Distance to Default, Solvency Score, and Business Risk, the Cash Flow Cushion will have less weight. In situations not deemed "safe" by Distance to Default, Solvency Score, and Business Risk, cash flows represent the actual ability of a firm to repay its obligations, and the Cash Flow Cushion becomes a more important predictor of financial distress.

The four raw pillar scores are transformed into ranking scores from 1 to 10 (10 being worst). For Business Risk, Cash Flow Cushion, and Solvency Score the breakpoints used to assign the 1 through 10 scores are static and set to produce a relatively smooth distribution over historical business cycle data. Because the breakpoints across these three metrics are static, the scores are not relative measures. At any time, significantly more than 10% of companies could have the same score for any particular component. For Distance to Default, we assign the scores on a relative basis versus the broad universe of companies for which we calculate the measure.

### **Mapping Scores to Preliminary Credit Ratings**

We map the credit score resulting from the equation above to a corresponding model-driven credit rating. Morningstar considers the model-driven issuer credit rating and any other pertinent information and will determine a final corporate credit rating as described above. When assigning ratings to individual bonds or classes of debt, we will determine the issuer rating of each obligor within the corporate family that issues debt, and the issue rating of each debt instrument or class of debt. See the [Methodology for Rating Parents, Subsidiaries, and Issues](#) for details. ■■■

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