MOODY'S
INVESTORS SERVICE

RATING METHODOLOGY
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Rating Methodology

Mining

This rating methodology replaces the *Mining* methodology published in September 2018. We have reordered and have made editorial updates to various sections of the methodology, and we have changed the presentation of the scorecard. These updates do not change our methodological approach.

Scope

This methodology applies to companies globally that are primarily* engaged in the extraction or mining of ore, coal or other minerals, and the subsequent smelting and refining of minerals and ore. For example, an aluminum company that mines bauxite, refines it into alumina and then smelts into aluminum would be rated under this methodology. Some mining companies also have downstream activities, such as packaging and manufacturing.

Companies that are primarily engaged in purchasing metal as a raw material for rolling and further value-added processing (rather than extracting metals from the ground as part of their own operations) and that derive revenue and earnings from a margin-on-metal construct[1] are rated under our methodology for the steel industry.[2]

*The determination of a company's primary business is generally based on the preponderance of the company's business risks, which are usually proportionate to the company's revenues, earnings and cash flows.

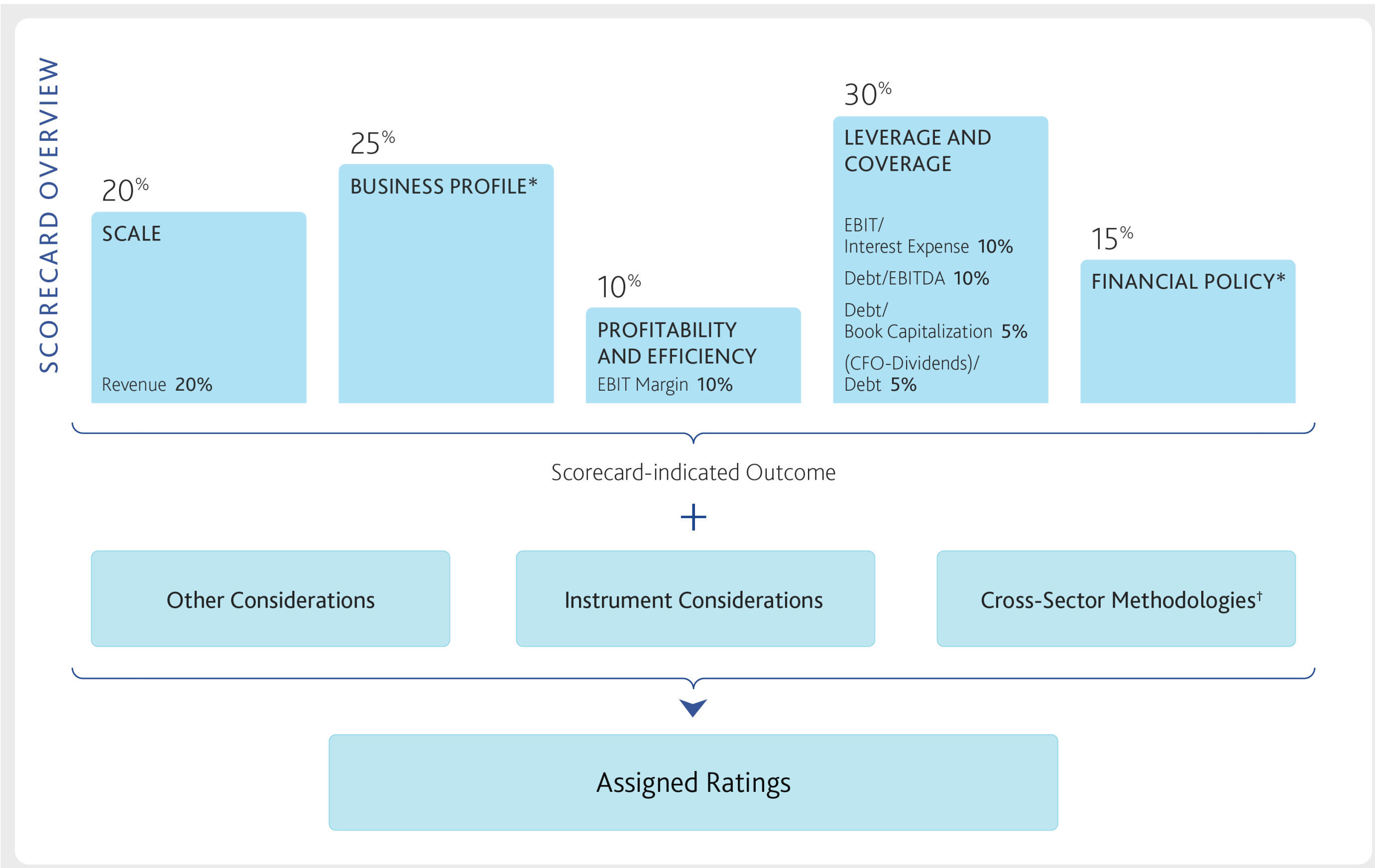
Rating approach

In this rating methodology, we explain our general approach to assessing credit risk of issuers in the mining industry globally, including the qualitative and quantitative factors that are likely to affect rating outcomes in this sector. We seek to incorporate all material credit considerations in ratings and to take the most forward-looking perspective that visibility into these risks and mitigants permits.

The following schematic illustrates our general framework for the analysis of mining companies, which includes the use of a scorecard.[3] The scorecard-indicated outcome is not expected to match the actual rating for each company. For more information, see the "Other considerations" and "Limitations" sections.

Exhibit 1

Illustration of the mining methodology framework



* This factor has no sub-factors.

† Some of the methodological considerations described in one or more cross-sector rating methodologies may be relevant to ratings in this sector. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section.

Source: Moody's Investors Service

Mining scorecard

For general information about how we use the scorecard and for a discussion of scorecard mechanics, please see the "Using the scorecard to arrive at a scorecard-indicated outcome" section. The scorecard does not include or address every factor that a rating committee may consider in assigning ratings in this sector. Please see the "Other considerations" and "Limitations" sections.

Exhibit 2
Mining scorecard

	SCALE (20%)	BUSINESS PROFILE (25%)	PROFITABILITY and EFFICIENCY (10%)	LEVERAGE and COVERAGE (30%)				FINANCIAL POLICY (15%)
	Revenue (USD Billion)[1] (20%)	Business Profile (25%)	EBIT Margin[2] (EBIT / Revenue) (10%)	EBIT / Interest Expense[3] (10%)	Debt / EBITDA[4] (10%)	Debt / Book Capital-ization[5] (5%)	(CFO - Dividends) / Debt[6] (5%)	Financial Policy (15%)
Aaa	≥ $100	Expected volatility in results is almost non-existent, supported by a commanding market position, entrenched cost-effectiveness, technological leadership and a well-balanced global reach; and essentially no environmental, regulatory or geopolitical risk.	≥ 50%	≥ 20x	≤ 0.5x	≤ 20%	≥ 70%	Expected to have extremely conservative financial policies (including risk and liquidity management); very stable metrics; essentially no event risk that would cause a rating transition; and public commitment to a very strong credit profile over the long term.
Aa	$50 - $100	Very low expected volatility in results, supported by a deeply entrenched and leading market position that is highly defensible through cost-effectiveness and technological leadership and global exposure; and low environmental, regulatory and geopolitical risk.	35% - 50%	15x - 20x	0.5x - 1x	20% - 30%	55% - 70%	Expected to have very conservative financial policies (including risk and liquidity management); stable metrics; minimal event risk that would cause a rating transition; and public commitment to a strong credit profile over the long term.
A	$25 - $50	Low expected volatility in results, supported by a very strong market position in its relevant market, demonstrated and sustainable competitive advantages, insulation from raw material cost fluctuations and solid diversity characteristics; and limited environmental, regulatory and geopolitical risk.	20% - 35%	7x - 15x	1x - 1.5x	30% - 40%	45% - 55%	Expected to have predictable financial policies (including risk and liquidity management) that preserve creditor interests; although modest event risk exists, the effect on leverage is likely to be small and temporary; strong commitment to a solid credit profile.
Baa	$15 - $25	Moderate expected volatility in results, supported by a strong market position in its most important geographic or product markets; vertically integrated with advantageous cost profile; good diversity characteristics provide a buffer against sudden/unexpected shifts in demand; modest but manageable environmental, regulatory and geopolitical risk.	15% - 20%	4.5x - 7x	1.5x - 2.75x	40% - 50%	35% - 45%	Expected to have financial policies (including risk and liquidity management) that balance the interests of creditors and shareholders; some risk that debt-funded acquisitions or shareholder distributions could lead to a weaker credit profile.
Ba	$5 - $15	Products are largely undifferentiated and the marketplace is highly competitive, exposing the company to periods of heightened volatility; established market position, favorable cost profile and fair diversity characteristics, including moderate operational concentration; moderate environmental, regulatory and geopolitical risk.	10% - 15%	3x - 4.5x	2.75x - 3.5x	50% - 70%	20% - 35%	Expected to have financial policies (including risk and liquidity management) that tend to favor shareholders over creditors; above-average financial risk resulting from shareholder distributions, acquisitions or other significant capital structure changes.

	SCALE (20%)	BUSINESS PROFILE (25%)	PROFITABILITY and EFFICIENCY (10%)	LEVERAGE and COVERAGE (30%)				FINANCIAL POLICY (15%)
	Revenue (USD Billion)[1] (20%)	Business Profile (25%)	EBIT Margin[2] (EBIT / Revenue) (10%)	EBIT / Interest Expense[3] (10%)	Debt / EBITDA[4] (10%)	Debt / Book Capital-ization[5] (5%)	(CFO - Dividends) / Debt[6] (5%)	Financial Policy (15%)
B	$2 - $5	Products are undifferentiated, competition is intense and customers are price-sensitive, making results highly volatile; company does not have an advantageous cost profile or other mitigating competitive advantage; high operational concentration; or operations are primarily in countries or sectors with high environmental, regulatory or geopolitical risk.	6% - 10%	1.5x - 3x	3.5x - 4.5x	70% - 80%	10% - 20%	Expected to have financial policies (including risk and liquidity management) that favor shareholders over creditors; high financial risk resulting from shareholder distributions, acquisitions or other significant capital structure changes.
Caa	$1 - $2	Results are expected to be extremely volatile; company has a modest market presence, few competitive advantages, may have higher costs than competitors; high operational concentration (three mines); operations are primarily in countries or sectors with very high environmental, regulatory or geopolitical risk.	2% - 6%	1x - 1.5x	4.5x - 7x	80% - 90%	5% - 10%	Expected to have financial policies (including risk and liquidity management) that create elevated risk of debt restructuring in varied economic environments.
Ca	$0.5 - $1	Near-term results are very difficult to predict and expected to be extremely volatile; no material competitive advantage; very high operational concentration (fewer than three mines); operations are concentrated in countries or sectors with a very high level of environmental, regulatory or geopolitical risk.	-5% - 2%	0.5x - 1x	7x - 9x	90% - 110%	0% - 5%	Expected to have financial policies (including risk and liquidity management) that create elevated risk of debt restructuring even in healthy economic environments.
C	< $0.5	Near-term results are expected to be extremely negative with no expectation of recovery; or no material competitive advantage.	< -5%	< 0.5x	> 9x	> 110%	< 0%	Expected to have financial policies (including risk and liquidity management) that create imminent risk of debt restructuring.

[1] For the linear scoring scale, the Aaa endpoint value is $150 billion. A value of $150 billion or better equates to a numeric score of 0.5. The C endpoint value is zero. A value of zero equates to a numeric score of 21.5.
[2] For the linear scoring scale, the Aaa endpoint value is 60%. A value of 60% or better equates to a numeric score of 0.5. The C endpoint value is -15%. A value of -15% or worse equates to a numeric score of 21.5.
[3] For the linear scoring scale, the Aaa endpoint value is 30x. A value of 30x or better equates to a numeric score of 0.5. The C endpoint value is -1x. A value of -1x or worse equates to a numeric score of 21.5.
[4] For the linear scoring scale, the Aaa endpoint value is zero. A value of zero equates to a numeric score of 0.5. The C endpoint value is 13x. A value of 13x or worse equates to a numeric score of 21.5, as does a negative Debt/EBITDA value.
[5] For the linear scoring scale, the Aaa endpoint value is zero. A value of zero equates to a numeric score of 0.5. The C endpoint value is 140%. A value of 140% or worse equates to a numeric score of 21.5, as does a negative Debt/Book Capitalization value.
[6] For the linear scoring scale, the Aaa endpoint value is 90%. A value of 90% or better equates to a numeric score of 0.5. The C endpoint value is -5%. A value of -5% or worse equates to a numeric score of 21.5.
Source: Moody's Investors Service

Sector overview

Mining companies are a diverse group of issuers. Scale and cost-competitiveness, diversity of commodity exposure and geographic breadth are differentiating qualities. They principally produce base metals, such as copper, nickel, aluminum and zinc; precious metals, such as gold and silver; thermal and metallurgical coal; and other extractive minerals, such as iron ore, uranium, cobalt and tin.

The mining industry is characterized by cyclicality and high earnings volatility. Supply and demand for specific commodities, global economic growth levels and expectations — particularly for China, which generally accounts for at least half of the global production and consumption of a number of base and precious metals — and industrial production levels drive cyclical demand and price volatility. Trading activity also has a meaningful impact on price volatility.

The mining industry is also capital-intensive. The depletion of ore bodies and changes in ore grades over the life of a mine require fairly steady reinvestment in mine development and expansion for companies to sustain and increase production.

These challenges are common across the industry; however, earnings performance can vary widely among companies. Prices for base metals, precious metals, coal, iron ore and other metals move independently, reflecting different fundamental drivers. For example, gold prices are typically influenced by geopolitical risk, investment demand and sentiment toward inflation and other economic factors, whereas industrial production is generally a more significant driver for prices of base metals and other minerals and metals.

Discussion of the scorecard factors

In this section, we explain our general approach for scoring each scorecard factor or sub-factor, and we describe why they are meaningful as credit indicators.

Factor: Scale (20% weight)

Why it matters

Scale provides important indications of a company's revenue-generating capability, its overall market strength and importance to the markets it serves, and its resilience to changes in commodity prices and demand.

Companies with larger scale generally have greater flexibility to manage their businesses under different price and demand scenarios, which is important in an industry that is cyclical. A large revenue base can also lead to economies of scale that lower overall costs for raw materials and to efficiencies for corporate administration of the business, in areas such as finance, legal, tax and accounting. Larger companies also tend to generate higher cash flow for capital reinvestment and debt reduction and have greater access to the capital markets, which can reduce the cost of capital.

How we assess it for the scorecard

REVENUE:

Scale is measured (or estimated in the case of forward-looking expectations) using total reported revenue in billions of US dollars.

Factor: Business Profile (25% weight)

Why it matters

The business profile of a mining company is an indicator of its ability to generate earnings and cash flow and the relative stability and sustainability of that cash flow, which are important considerations in an industry characterized by cyclicality and high price volatility. The business profile also provides an indication of the levers available to a company's management to adjust mining operations when product prices are low or are declining.

Core aspects of a mining company's business profile include the types of commodities it sells and markets it sells into, its competitive position (primarily driven by the company's cost-effectiveness), the locations of its operations, and market demand. Susceptibility to environmental, regulatory and political risk is another important aspect of a company's business profile.

Pricing trends for different metals can vary, so a company concentrated in a single metal is generally more vulnerable to price volatility than one that sells multiple metals. The combination of significant top-line volatility and a limited ability to pass on costs to customers make the quality of a mining company's ore bodies and its cost efficiency essential in order to maintain its competitive position and to better withstand downward price movements.

The location and number of a company's mines is also important because having multiple, discrete assets in different regions typically lessens the impact of strikes, equipment failures, operational event risks, or other events that could curtail production. Geographic diversity also helps mining companies mitigate the impact of trade barriers and tariffs on exports.

Environmental requirements, political concerns and industry regulations are important considerations because they can affect costs and demand. For example, environmental requirements could constrain the production of a domestic mining company to the benefit of a foreign producer. The development of mines in countries lacking a strong rule of law and sufficient infrastructure can result in increased costs and production delays. Also, governments in some regions are more likely to require a greater proportion of local ownership in domestic mines (including a share of the earnings from these resources), which can reduce a mining company's profitability and cash flow and can cause operational disruptions while disputes are resolved. Regulations concerning labor relations, land use, native title, pollution, water scarcity and water quality can all contribute to greater uncertainty and higher costs.

How we assess it for the scorecard

Scoring for this qualitative factor is primarily based on our expectations for earnings and cash flow volatility, which is influenced by the diversity of a company's commodity exposure and operations, its competitive position and its geographic diversity.

In assessing a company's competitive position, which is driven primarily by its mining costs and ability to control other costs, we typically consider the grade, or quality, of its deposits, mineral recovery rates, raw material procurement policies, inventory management and relationships with suppliers. We also may consider any technological advantages that contribute to effective cost-control.

We assess geographic diversity by considering the number and location of a company's mines. Companies with three or fewer mines generally score lower for this factor than companies with a larger number of mines, especially if operations are concentrated in one country or in a limited number of countries. We typically also consider the diversity of the types of mines and the commodities produced.

We consider the environmental and regulatory environment in a given country in both our assessment of geographic concentration and our overall scoring for this factor. We typically assess risks that emanate from regulation, government actions and major events in any jurisdiction that could negatively affect the commercial activities of a mining company, including geopolitical risks that could impede trade or disrupt commodity markets. Such risks include tightening environmental regulations, policies to reduce excess capacity, tariffs or other restrictions on imports or exports, and royalty or tax agreements or carried interest requirements.

Generally, we do not expect a given company's business profile to exactly match the attributes listed for a given scoring category. We typically assign the factor score based on the alpha category for which the issuer has the greatest number of characteristics. However, there may be cases in which one characteristic is sufficiently important to a particular issuer that it has a large influence on the factor score. For example, reliance on three or fewer mines is likely to limit the score for this factor to the B or Caa category, because the operating risk in these cases is typically very high.

Factor: Profitability and Efficiency (10% weight)

Why it matters

Profits matter because they are needed to generate sustainable cash flow through different economic environments, reinvest in strategic growth projects and service debt and other obligations, which are especially important for an industry as capital-intensive as mining.

How well a company can control its costs is an important consideration because of the industry's price volatility, limited pricing power and vulnerability to fluctuations in input costs. A strong cost position is an important indicator of a company's ability to maintain profitability during a downturn.

How we assess it for the scorecard

EBIT MARGIN:

We use the ratio of earnings before interest and taxes to revenue (EBIT Margin). We use EBIT margin, rather than earnings before interest, taxes, depreciation and amortization (EBITDA) margin, as an indicator of profitability to take into account the ongoing need of mining companies to reinvest in property, plant and equipment (deprecation is a proxy for maintenance capital spending) in order to maintain their production profiles and competitiveness.

Factor: Leverage and Coverage (30% weight)

Why it matters

Leverage and cash flow coverage measures provide important indications of how much financial risk a mining company is willing to undertake. These metrics are also important indications of the company's ability to sustain its competitive position, invest in growth opportunities and service debt.

Mining companies are generally less tolerant of a high degree of financial leverage than companies in industries with lower price volatility and more-stable cash flow generation. Mining companies that maintain lower leverage typically have greater operational flexibility to manage changes in competitive and economic conditions and to invest in their businesses, either through organic growth or acquisitions.

This factor comprises four quantitative sub-factors:

EBIT / Interest Expense

The ratio of earnings before interest and taxes to interest expense (EBIT/Interest Expense) is an indicator of a company's ability to meet its interest obligations. Given a mining company's typical need to roughly match or exceed depreciation expenses over time with outlays on maintenance and development capital expenditures, EBIT is generally a reasonable proxy for its ability to cover interest expense over time.

Debt / EBITDA

The ratio of total debt to earnings before interest, taxes, depreciation and amortization (Debt/EBITDA) is an indicator of debt serviceability and financial leverage. The ratio is commonly used in this sector as a proxy for comparative financial strength.

Debt / Book Capitalization

The ratio of total debt to book capitalization (Debt/Book Capitalization) is a measure of balance sheet leverage that indicates how much of a company's capital structure is composed of debt and debt-like obligations. Companies frequently use this ratio to set the range of leverage in which they choose to operate, so this ratio also provides an indication of management's risk tolerance and a reference point for comparing the capital structures of companies within the industry.

(CFO - Dividends) / Debt

The ratio of cash flow from operations minus dividends to debt (CFO - Dividends/Debt) is an indicator of a company's ability to repay its debt. It is a measure or estimate of cash flow generation after working capital movements and dividends in relation to total debt.

How we assess it for the scorecard

Scoring for this factor is based on four sub-factors: EBIT/Interest Expense; Debt/EBITDA; Debt/Book Capitalization; and (CFO - Dividends)/Debt.

EBIT / INTEREST EXPENSE:

The numerator is EBIT, and the denominator is interest expense.

DEBT / EBITDA:

The numerator is total debt, and the denominator is EBITDA.

DEBT / BOOK CAPITALIZATION:

The numerator is total debt, and the denominator is book capitalization.

(CFO - DIVIDENDS) / DEBT:

The numerator is cash flow from operations minus dividends, and the denominator is total debt.

Factor: Financial Policy (15% weight)

Why it matters

Financial policy encompasses management and board tolerance for financial risk and commitment to a strong credit profile. It is an important rating determinant, because it directly affects debt levels, credit quality, the future direction for the company and the risk of adverse changes in financing and capital structure.

Financial risk tolerance serves as a guidepost to investment and capital allocation. An expectation that management will be committed to sustaining an improved credit profile is often necessary to support an upgrade. For example, we may not upgrade the ratings of a company that has built flexibility within its rating category if we believe the company will use that flexibility to fund a strategic acquisition, cash distribution to shareholders, spin-off or other leveraging transaction. Conversely, a company's credit rating may be better able to withstand a moderate leveraging event if management places a high priority on returning credit metrics to pre-transaction levels and has consistently demonstrated the commitment to do so through prior actions. Liquidity management[4] is an important aspect of overall risk management and can provide insight into risk tolerance.

How we assess it for the scorecard

We assess the issuer's desired capital structure or targeted credit profile, its history of prior actions, including its track record of risk and liquidity management, and its adherence to its commitments. Attention is paid to management's operating performance and use of cash flow through different phases of economic and industry cycles. Also of interest is the way in which management responds to key events, such as changes in the credit markets and liquidity environment, legal actions, competitive challenges or regulatory pressures. Considerations include a company's public commitments in this area, its track record for adhering to commitments and our views on the company's ability to achieve its targets.

When considering event risks in the context of scoring financial policy, we assess the likelihood and potential negative impact of M&A or other types of balance-sheet-transforming events. We assess management's appetite for M&A activity, with a focus on the type of transactions (i.e., core competency or new business) and funding decisions. We also evaluate frequency and materiality of acquisitions and previous financing choices. A history of debt-financed or credit-transforming acquisitions will generally result in a lower score for this factor. We may also consider negative repercussions caused by shareholders' willingness to sell the company.

We also consider a company's and its owners' past record of balancing shareholder returns and debtholders' interests. A track record of favoring shareholder returns at the expense of debtholders is likely to be viewed negatively in scoring this factor.

Other considerations

Ratings may reflect consideration of additional factors that are not in the scorecard, usually because the factor's credit importance varies widely among the issuers in the sector or because the factor may be important only under certain circumstances or for a subset of issuers. Such factors include financial controls and the quality of financial reporting; corporate legal structure; the quality and experience of management; assessments of corporate governance as well as environmental and social considerations; exposure to uncertain licensing regimes; and possible government interference in some countries. Regulatory, litigation, liquidity, technology and reputational risk as well as changes to consumer and business spending patterns, competitor strategies and macroeconomic trends also affect ratings.

Following are some examples of additional considerations that may be reflected in our ratings and that may cause ratings to be different from scorecard-indicated outcomes.

Regulatory Considerations

Companies in the mining sector are subject to varying degrees of regulatory oversight. Effects of these regulations may entail limitations on operations, higher costs, and higher potential for technology disruptions and demand substitution. Regional differences in regulation, implementation or enforcement may advantage or disadvantage particular issuers.

Our view of future regulations plays an important role in our expectations of future financial metrics as well as our confidence level in the ability of an issuer to generate sufficient cash flows relative to its debt burden over the medium and longer term. Regulatory considerations also play a role in our assessment of an issuer's business profile. In some circumstances, regulatory considerations may also be a rating factor outside the scorecard, for instance when regulatory change is swift.

Environmental, Social and Governance Considerations

Environmental, social and governance (ESG) considerations may affect the ratings of issuers in the mining sector. For information about our approach to assessing ESG issues, please see our methodology that describes our general principles for assessing these risks.[5]

The mining industry faces numerous environmental risks across a broad array of its operations. Regulations are becoming increasingly complex and stringent, and can include environmental stewardship and reclamation requirements, air and water quality and emissions standards, as well as native title issues, which can restrict land use and have other impacts. Changes in regulations can increase costs, extend project timelines and add uncertainty to the level of reserves that can be economically mined. All operations, including changes to existing operations, require numerous permits and licenses. Additional environmental considerations include litigation, reputational risks, product replacement risks and competitor strategies.

Environmental and regulatory risks that we may assess include the following:

» Reclamation and remediation requirements, which are typically spread out over many years. Various jurisdictions may require letters of credit or surety bonds, or may set financial performance metrics for self-bonding.

» Air pollution requirements, relating to emissions from mining equipment, smelting operations, or in the end-use of the commodity, for example.

» Soil, water and waste management requirements (for building tailings dams or disposing of hazardous or toxic substances, for example).

» Limits on carbon dioxide emissions. The aluminum smelting industry, for example, is highly energy-intensive, and the aluminum production process also has fairly high greenhouse gas emissions. The ability to reduce energy intensity can lower costs as well as carbon dioxide emissions, which can improve a company's competitive position.

» Increasing competition with local communities and agriculture for limited water resources. Smaller, less-diversified companies are the most vulnerable to competition for water because they lack the resources available to larger, lower- cost producers. Additionally, the use of water by mining companies is increasingly subject to objections from local communities.

» Natural and human-made disasters such as tailings dam and pit wall collapses, seismic activity and structural risks in deep underground mining activity.

Resource nationalism and the value of natural resources to the countries in which they are located increase the likelihood of government interference or unfavorable changes in taxes, royalties, mining regulations, or agreements.

Other considerations may include safety records and a mining company's focus on safety, which also can boost productivity. The mining industry presents a number of operating risks, particularly in underground mines but also in surface mines and processing facilities. Companies with the financial capacity to invest in and use more advanced technology, such as autonomous haul trucks and haulage systems, are likely to see improvement in safety records and productivity.

Environmental risks are considered in our scoring of the Business Profile factor. In addition, our view of existing regulations and the potential for further regulatory changes relating to the environment, ownership, new mine development and mine operating environment as well as safety and health also play an important role in our expectations of future financial metrics as well as our confidence level in the ability of an issuer to generate sufficient cash flows relative to its debt burden over the medium and longer term. In some circumstances, environmental considerations may also be a rating factor outside the scorecard, for instance when regulatory change is swift, or when a material breach of regulations is disclosed by the issuer, alleged by a regulator or the subject of litigation. In addition, where these risks are very long-term in nature, they may be considered qualitatively outside of the scorecard.

We also consider social issues that could materially affect the likelihood of default and severity of loss, for example through adverse impacts on business reputation and government and employee relations.

Audit committee financial expertise, the incentives created by executive compensation packages, related party transactions, interactions with outside auditors, and ownership structure are among the areas we may consider in our assessment of how corporate governance affects the issuer's credit profile.

Reserves

The level of proven and probable reserves[6] is an estimate of the amount of ore that can be economically and legally extracted. It therefore gives a sense of the likely longevity of the production profile, which can be an important credit consideration, especially for lower speculative-grade companies (typically single B or below) with few operating mines. Key characteristics affecting reserve quality include ore grade and recovery rates, metal price assumptions, geological data obtained and whether the reserves are associated with existing mining operations or require greenfield development. The underlying geology of a deposit is also important because it significantly affects mineral recovery rates and grades as well as development and operating costs. The location of reserves, including whether the deposit is a surface or underground mine, as well as altitude and proximity to existing infrastructure and end-markets may also be considered.

However, given the number of assumptions involved, the varying time requirements for permitting and development and the potential for changing permit requirements, the level of reserves is not necessarily a good predictor of future cash flow. Also, the levels of proven and probable reserves, grades, recovery rates and reserve life vary greatly among base metals, precious metals, iron ore, coal and other minerals. In addition, various reserve-testing requirements apply to the industry depending on the country of domicile. Consequently, we typically consider reserve quality within the context of a specific mineral, the company's reporting requirements and peer comparisons.

Although the scorecard does not have a factor that directly assesses proven and probable reserves, a company's ability to develop reserves into mineral production and to maintain or grow production levels ultimately affects its earnings performance and cash flow generation and can therefore have an impact on scorecard metrics such as EBIT margin and (cash flow from operations less dividends)/ debt. Reserve levels in themselves do not generally differentiate credit profiles, but they can be a more important consideration for companies with few operating mines or if reserve life is limited for the key producing mines. In these cases, weakness in reserve levels may be considered outside the scorecard and can potentially limit a rating's upward movement.

Management Strategy

The quality of management is an important factor supporting a company's credit strength. Assessing the execution of business plans over time can be helpful in assessing management's business strategies, policies and philosophies and in evaluating management performance relative to the performance of competitors and our projections. Management's track record of adhering to stated plan, commitments and guidelines provides insight into management's likely future performance, including in stressed situations.

Financial Controls

We rely on the accuracy of audited financial statements to assign and monitor ratings in this sector. The quality of financial statements may be influenced by internal controls, including the proper tone at the top, centralized operations, and consistency in accounting policies and procedures. Auditors' reports on the effectiveness of internal controls, auditors' comments in financial reports and unusual financial statement restatements or delays in regulatory filings may indicate weaknesses in internal controls.

Liquidity

Liquidity is an important rating consideration for all mining companies, although it may not have a substantial impact in discriminating between two issuers with a similar credit profile. Liquidity can be particularly important for companies in highly seasonal operating environments where working capital needs must be considered, and ratings can be heavily affected by extremely weak liquidity. We form an opinion on likely near-term liquidity requirements from the perspective of both sources and uses of cash. For more details on our approach, please see our liquidity cross-sector methodology.[7]

Excess Cash Balances

Some companies in this sector may maintain cash balances (meaning liquid short-term investments as well as cash) that are far in excess of their operating needs. This excess cash can be an important credit consideration; however, the underlying policy and motivations of the issuer in holding high cash balances are often as or more important in our analysis than the level of cash held. We have observed significant variation in company behavior based on differences in financial philosophy, investment opportunities, availability of committed revolving credit facilities and shareholder pressures.

Most issuers need to retain some level of cash in their business for operational purposes. The level of cash required to run a business can vary based on the region(s) of operation and the specific sub-sectors in which the issuer operates. Some issuers have very predictable cash needs and others have much broader intra-period swings; for instance, related to mark-to-market collateral requirements under hedging instruments. Some companies may hold large levels of cash at times because they operate without committed, long-term bank borrowing facilities. Some companies may hold cash on the balance sheet to meet long-term contractual liabilities, whereas other companies with the same types of liabilities have deposited cash into trust accounts that are off balance sheet. The level of cash that issuers are willing to hold can also vary over time based on the cost of borrowing and macroeconomic conditions. The same issuer may place a high value on cash holdings in a major recession or financial crisis but seek to pare cash when inflation is high. As a result, cash on the balance sheet is most often considered qualitatively, by assessing the issuer's track record and financial and liquidity policies rather than by measuring how a point-in-time cash balance would affect a specific metric.

Across all corporate sectors, an important shareholder-focused motivation for cash holdings, sometimes over very long periods, is cash for acquisitions. In these cases, we do not typically consider that netting cash against the issuer's current level of debt is analytically meaningful; however, the cash may be a material mitigant in our scenario analyses of potential acquisitions, share buybacks or special dividends. Tax minimization strategies have at times been another primary motivation for holding large cash balances. Given shareholder pressures to return excess cash holdings, when these motivations for holding excess cash are eliminated, we generally expect that a large portion of excess cash will be used for dividends and share repurchases.

By contrast, some companies maintain large cash holdings for long periods of time in excess of their operating and liquidity needs solely due to conservative financial policies, which provides a stronger indication of an enduring approach that will benefit creditors. For instance, some companies have a policy to routinely pre-fund upcoming required debt payments well in advance of the stated maturity. Such companies may also have clearly stated financial targets based on net debt metrics and a track record of maintaining their financial profile within those targets.

While the scorecard in this methodology uses leverage and coverage ratios with total (gross) debt rather than net debt, we do consider excess cash holdings in our rating analysis, including in our assessment of the financial and liquidity policy. For issuers where we have clarity into the extent to which cash will remain on the balance sheet and/or be used for creditor-friendly purposes, excess cash may be considered in a more quantitative manner. While we consider excess cash in our credit assessment for ratings, we do not typically adjust the balance sheet debt for any specific amount because this implies greater precision than we think is appropriate for the uncertain future uses of cash. However, when cash holdings are unusually large relative to debt, we may refer to debt net of cash, or net of a portion of cash, in our credit analysis and press releases in order to provide additional insight into our qualitative assessment of the credit benefit. Alternatively, creditor-friendly use of the cash may be factored into our forward view of metrics, for instance when the cash is expected to be used for debt repayment. We may also cite rating threshold levels for certain issuers based on net debt ratios, particularly when these issuers have publicly stated financial targets based on net debt metrics.

Even when the eventual use for excess cash is likely to be for purposes that do not benefit debtholders, large holdings provide some beneficial cushion against credit deterioration, and cash balances are often considered in our analysis of near-term liquidity sources and uses. Such downside protection is usually more important for low rated companies than for highly rated companies due to differences in credit stability and the typically shorter distance from potential default for issuers at the lower end of the ratings spectrum.

Additional Metrics

The metrics included in the scorecard are those that are generally most important in assigning ratings to companies in this industry; however, we may use additional metrics to inform our analysis of specific companies. These additional metrics may be important to our forward view of metrics that are in the scorecard or other rating factors.

For example, free cash flow is not always an important differentiator of credit profiles. Strong companies with excellent investment opportunities may demonstrate multiyear periods of negative free cash flow while retaining solid access to capital and credit, because these investments will yield stable cash flows in future years. Weaker companies with limited access to credit may have positive free cash flow for a period of time because they have curtailed the investments necessary to maintain their assets and future cash-generating prospects. However, in some cases, free cash flow can be an important driver of the future liquidity profile of an issuer, which, as noted above, can have a meaningful impact on ratings.

Non-wholly owned subsidiaries

Some companies in the mining sector choose to dilute their equity stake in certain material subsidiaries, for example through an initial public offering, which may in some cases negatively impact future financial flexibility. While improving cash holdings on a one-off basis, selling minority interests in subsidiaries may have a negative impact on cash flows available to the parent company that may not be fully reflected in consolidated financial statements.[8] The parent's share of dividend flows from a non-wholly owned subsidiary is reduced, and minority stakes can increase structural subordination, since dividend flows to minority interest holders are made before the cash flows are available to service debt at the parent company. While less frequent, sale of a minority stake may be accompanied by policies protective of the subsidiary that further limit the parent's financial flexibility; for instance, restrictions on cash pooling with other members of the corporate family, limitations on dividends and distributions, or arms-length business requirements. Minority stakeholders may have seats on the board of the subsidiary. In many cases, we consider the impact of non-wholly owned subsidiaries qualitatively. However, in some cases we may find that an additional view of financial results, such as analyzing cash flows on a proportional consolidation basis, may be very useful to augment our analysis based on consolidated financial statements. When equity dilution or structural subordination arising from non-wholly owned subsidiaries is material and negative, the credit impact is captured in ratings but may not be fully reflected in scorecard-indicated outcomes.

For companies that hold material minority interest stakes, consolidated funds from operations typically includes the dividends received from the minority subsidiary, while none of its debt is consolidated. When such dividends are material to the company's cash flows, these cash flows may be subject to interruption if they are required for the minority subsidiary's debt service, capital expenditures or other cash needs. When minority interest dividends are material, we may also find that proportional consolidation or another additional view of financial results is useful to augment our analysis of consolidated financials. We would generally also consider structural subordination in these cases.[9] When these credit considerations are material, their impact is captured in ratings but may not be fully reflected in scorecard-indicated outcomes.

Event Risk

We also recognize the possibility that an unexpected event could cause a sudden and sharp decline in an issuer's fundamental creditworthiness, which may cause actual ratings to be lower than the scorecard-indicated outcome. Event risks — which are varied and can range from leveraged recapitalizations to sudden regulatory changes or liabilities — can overwhelm even a stable, well-capitalized firm. Some other types of event risks include operational disasters such as a pit wall collapse or tailings dam collapse, as well as M&A, asset sales, spin-offs, litigation, pandemics, significant cyber-crime events and shareholder distributions.

Parental Support

Ownership can provide ratings lift for a particular company in the mining sector if it is owned by a highly rated owner(s) and is viewed to be of strategic importance to those owners. In our analysis of parental support, we consider whether the parent has the financial capacity and strategic incentives to provide support to the issuer in times of stress or financial need (e.g., a major capital investment or advantaged supply agreement), or has already done so in the past. Conversely, if the parent puts a high dividend burden on the issuer, which in turn reduces its flexibility, the ratings would reflect this risk.

Government-related issuers may receive ratings uplift due to expected government support. However, for certain issuers, government ownership can have a negative impact on the underlying Baseline Credit Assessment.[10] For example, price controls, onerous taxation and high distributions can have a negative effect on an issuer's underlying credit profile.

Other Institutional Support

In some countries, large corporate issuers have received government or banking support in the event of financial difficulties because of their overall importance to the functioning of the economy. In Japan, our corporate ratings consider the support that has operated there for large and systemically important organizations. Over the years, this has resulted in lower levels of default than might otherwise have occurred. Our approach considers whether the presence of group and banking relationships may provide support when sytemically important companies encounter significant financial stress.

Using the scorecard to arrive at a scorecard-indicated outcome

1. Measurement or estimation of factors in the scorecard

In the "Discussion of the scorecard factors" section, we explain our analytical approach for scoring each scorecard factor or sub-factor,[11] and we describe why they are meaningful as credit indicators.

The information used in assessing the sub-factors is generally found in or calculated from information in the company's financial statements or regulatory filings, derived from other observations or estimated by Moody's analysts. We may also incorporate non-public information.

Our ratings are forward-looking and reflect our expectations for future financial and operating performance. However, historical results are helpful in understanding patterns and trends of a company's performance as well as for peer comparisons. Financial ratios,[12] unless otherwise indicated, are typically calculated based on an annual or 12-month period. However, the factors in the scorecard can be assessed using various time periods. For example, rating committees may find it analytically useful to examine both historical and expected future performance for periods of several years or more.

All of the quantitative credit metrics incorporate our standard adjustments[13] to income statement, cash flow statement and balance sheet amounts for items such as underfunded pension obligations and operating leases. We may also make other analytical adjustments that are specific to a particular company.

2. Mapping scorecard factors to a numeric score

After estimating or calculating each factor or sub-factor, each outcome is mapped to a broad Moody's rating category (Aaa, Aa, A, Baa, Ba, B, Caa, Ca or C, also called alpha categories) and to a numeric score.

Qualitative factors are scored based on the description by broad rating category in the scorecard. The numeric value of each alpha score is based on the scale below.

Exhibit 3

Aaa	Aa	A	Baa	Ba	B	Caa	Ca	C
1	3	6	9	12	15	18	20	21

Source: Moody's Investors Service

Quantitative factors are scored on a linear continuum. For each metric, the scorecard shows the range by alpha category. We use the scale below and linear interpolation to convert the metric, based on its placement within the scorecard range, to a numeric score, which may be a fraction. As a purely theoretical example, if there were a ratio of revenue to interest for which the Baa range was 50x to 100x, then the numeric score for an issuer with revenue/interest of 99x, relatively strong within this range, would score closer to 7.5, and an issuer with revenue/interest of 51x, relatively weak within this range, would score closer to 10.5. In the text or table footnotes, we define the endpoints of the line (i.e., the value of the metric that constitutes the lowest possible numeric score, and the value that constitutes the highest possible numeric score).

Exhibit 4

Aaa	Aa	A	Baa	Ba	B	Caa	Ca	C
0.5-1.5	1.5-4.5	4.5-7.5	7.5-10.5	10.5-13.5	13.5-16.5	16.5-19.5	19.5-20.5	20.5-21.5

Source: Moody's Investors Service

3. Determining the overall scorecard-indicated outcome

The numeric score for each sub-factor (or each factor, when the factor has no sub-factors) is multiplied by the weight for that sub-factor (or factor), with the results then summed to produce an aggregate numeric score. The aggregate numeric score is then mapped back to a scorecard-indicated outcome based on the ranges in the table below.

Exhibit 5
Scorecard-indicated outcome

Scorecard-indicated outcome	Aggregate numeric score
Aaa	x ≤ 1.5
Aa1	1.5 < x ≤ 2.5
Aa2	2.5 < x ≤ 3.5
Aa3	3.5 < x ≤ 4.5
A1	4.5 < x ≤ 5.5
A2	5.5 < x ≤ 6.5
A3	6.5 < x ≤ 7.5
Baa1	7.5 < x ≤ 8.5
Baa2	8.5 < x ≤ 9.5
Baa3	9.5 < x ≤ 10.5
Ba1	10.5 < x ≤ 11.5
Ba2	11.5 < x ≤ 12.5
Ba3	12.5 < x ≤ 13.5
B1	13.5 < x ≤ 14.5
B2	14.5 < x ≤ 15.5
B3	15.5 < x ≤ 16.5
Caa1	16.5 < x ≤ 17.5
Caa2	17.5 < x ≤ 18.5
Caa3	18.5 < x ≤ 19.5
Ca	19.5 < x ≤ 20.5
C	x > 20.5

Source: Moody's Investors Service

For example, an issuer with an aggregate numeric score of 11.7 would have a Ba2 scorecard-indicated outcome.

In general, the scorecard-indicated outcome is oriented to the corporate family rating (CFR) for speculative-grade issuers and the senior unsecured rating for investment-grade issuers. For issuers that benefit from rating uplift from parental support, government ownership or other institutional support, we consider the underlying credit strength or Baseline Credit Assessment for comparison to the scorecard-indicated outcome. For an explanation of the Baseline Credit Assessment, please refer to *Rating Symbols and Definitions* and to our cross-sector methodology for government-related issuers.[14]

Assigning issuer-level and instrument-level ratings

After considering the scorecard-indicated outcome, other considerations and relevant cross-sector methodologies, we typically assign a CFR to speculative-grade issuers or a senior unsecured rating for investment-grade issuers. For issuers that benefit from rating uplift from government ownership, we may assign a Baseline Credit Assessment.[15]

Individual debt instrument ratings may be notched up or down from the CFR or the senior unsecured rating to reflect our assessment of differences in expected loss related to an instrument's seniority level and collateral. The documents that provide broad guidance for such notching decisions are the rating methodology on loss given default for speculative-grade non-financial companies, the methodology for notching corporate instrument ratings based on differences in security and priority of claim, and the methodology for assigning short-term ratings.[16]

Key rating assumptions

For information about key rating assumptions that apply to methodologies generally, please see *Rating Symbols and Definitions*.[17]

Limitations

In the preceding sections, we have discussed the scorecard factors and many of the other considerations that may be important in assigning ratings. In this section, we discuss limitations that pertain to the scorecard and to the overall rating methodology.

Limitations of the scorecard

There are various reasons why scorecard-indicated outcomes may not map closely to actual ratings.

The scorecard in this rating methodology is a relatively simple tool that can be used in most cases to approximate credit profiles of companies in this sector and to explain, in summary form, many of the factors that are generally most important in assigning ratings to these companies. Credit loss and recovery considerations, which are typically more important as an issuer gets closer to default, may not be fully captured in the scorecard. The scorecard is also limited by its upper and lower bounds, causing scorecard-indicated outcomes to be less likely to align with ratings for issuers at the upper and lower ends of the rating scale.

The weights for each factor and sub-factor in the scorecard represent an approximation of their importance for rating decisions across the sector, but the actual importance of a particular factor may vary substantially based on an individual company's circumstances.

Factors that are outside the scorecard, including those discussed above in the "Other considerations" section, may be important for ratings, and their relative importance may also vary from company to company. In addition, certain broad methodological considerations described in one or more cross-sector rating methodologies may be relevant to ratings in this sector.[18] Examples of such considerations include the following: how sovereign credit quality affects non-sovereign issuers, the assessment of credit support from other entities, the relative ranking of different classes of debt and hybrid securities, and the assignment of short-term ratings.

We may use the scorecard over various historical or forward-looking time periods. Furthermore, in our ratings we often incorporate directional views of risks and mitigants in a qualitative way.

General limitations of the methodology

This methodology document does not include an exhaustive description of all factors that we may consider in assigning ratings in this sector. Companies in the sector may face new risks or new combinations of risks, and they may develop new strategies to mitigate risk. We seek to incorporate all material credit considerations in ratings and to take the most forward-looking perspective that visibility into these risks and mitigants permits.

Ratings reflect our expectations for an issuer's future performance; however, as the forward horizon lengthens, uncertainty increases and the utility of precise estimates, as scorecard inputs or in other considerations, typically diminishes. Our forward-looking opinions are based on assumptions that may prove, in hindsight, to have been incorrect. Reasons for this could include unanticipated changes in any of the following: the macroeconomic environment, general financial market conditions, industry competition, disruptive technology, or regulatory and legal actions. In any case, predicting the future is subject to substantial uncertainty.

Moody's related publications

Credit ratings are primarily determined through the application of sector credit rating methodologies. Certain broad methodological considerations (described in one or more cross-sector rating methodologies) may also be relevant to the determination of credit ratings of issuers and instruments. A list of sector and cross-sector credit rating methodologies can be found here.

For data summarizing the historical robustness and predictive power of credit ratings, please click here.

For further information, please refer to *Rating Symbols and Definitions*, which is available here.

Moody's Basic Definitions for Credit Statistics (User's Guide) can be found here.

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Endnotes

1 In a margin-on-metal construct, a company converts a metal into a higher-margin product.

2 A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section.

3 In our methodologies and research, the terms "scorecard" and "grid" are used interchangeably.

4 Liquidity management is distinct from the level of liquidity, which is discussed in the "Other considerations" section.

5 A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section.

6 We generally focus on proven and probable reserves rather than possible or inferred reserves given the greater uncertainty around possible or inferred reserves.

7 A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section.

8 For example, in the case of an equity stake reduction in a subsidiary down to 75%, in the parent's financial statements, all revenue and EBITDA of the subsidiary would typically still be consolidated at the group level.

9 Proportional consolidation brings a portion of the minority subsidiary's debt onto the balance sheet, but this debt is structurally senior to debt at the parent company, because it is closer to the assets and cash flows of the minority subsidiary.

10 For an explanation of the Baseline Credit Assessment, please refer to *Rating Symbols and Definitions* and to our cross-sector methodology for government-related issuers. A link to a list of our sector and cross-sector methodologies and a link to *Rating Symbols and Definitions* can be found in the "Moody's related publications" section.

11 When a factor comprises sub-factors, we score at the sub-factor level. Some factors do not have sub-factors, in which case we score at the factor level.

12 For definitions of our most common ratio terms, please see *Moody's Basic Definitions for Credit Statistics (User's Guide)*. A link can be found in the "Moody's related publications" section.

13 For an explanation of our standard adjustments, please see the cross-sector methodology that describes our financial statement adjustments in the analysis of non-financial corporations.

14 A link to a list of our sector and cross-sector methodologies and a link to *Rating Symbols and Definitions* can be found in the "Moody's related publications" section.

15 For an explanation of the Baseline Credit Assessment, please refer to *Rating Symbols and Definitions* and to our cross-sector methodology for government-related issuers. A link to a list of our sector and cross-sector methodologies and a link to *Rating Symbols and Definitions* can be found in the "Moody's related publications" section.

16 A link to a list of our sector and cross-sector rating methodologies can be found in the "Moody's related publications" section.

17 A link to *Rating Symbols and Definitions* can be found in the "Moody's related publications" section.

18 A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section.

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on www.moodys.com for the most updated credit rating action information and rating history.

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