

CreditSpectrum Credit Ratings Framework

I Oath of integrity in Communication

CreditSpectrum (Spectrum) is committed to high standards of integrity in communicating credit information on third parties through ratings, analytics and research, namely—

- Fidelity to the original meanings of the words and the math on which our credit work is founded,
- Clarity on the meaning of our credit ratings and where to draw the line on using them, and
- Traceability and reproducibility on the path from the data to our conclusions.

II Standards for Building Credit Information

As a digital credit pioneer, Spectrum's franchise value is a function of the quality of information we produce. By analogy with the 5-Cs of credit, Spectrum benchmarks itself against five measures credit information quality: the *Five-Eye™* standard:

- 👁️ **INTEGRITY:** Spectrum credit information is used by a wide spectrum of clients from different backgrounds and perspectives. To make our information useful to the entire market, we must be accountable to the highest standards of consistency, accountability and accuracy.
- 👁️ **INSIGHT:** Spectrum's mission is to keep the private capital markets efficient and healthy by shedding light on credit value and risk. We are paid produce actionable insights across the credit spectrum, including sectors characterized by high structural complexity, low data availability or unique credit elements.
- 👁️ **INDEPENDENCE:** To safeguard our independence from political and commercial pressure, Spectrum separates decision-making functions carried out by experts, from complex computations executed by Spectrum-built custom software-based tools to streamline our workflow. Spectrum processes are transparent—the logic of our analysis is mathematical and basis of our inference is fully in the public domain.
- 👁️ **INHERITANCE:** Founders Ann Rutledge and Sylvain Raynes initially came together to address the optionality of credit risk, which the other credit ratings agencies ignored, that led to the Global Financial Crisis. Each brings thirty years of experience working for global institutions in new financial technologies of the late 20C: exchange-traded derivatives, credit scoring, emerging market investments and securitization. Their working style is one of seeking continuous improvement by repurposing well-accepted techniques of analysis and applying them to new challenges.
- 👁️ **INTER-OPERABILITY:** Spectrum credit tools built for collaboration and building. They utilize modular design that can be re-used inside our systems or embedded in third-party monitoring and enterprise risk systems.

III Credit Ratings Framework

Wholesale credit analysis is a standardizing process of producing credit grades. With or without computers, the rating production process is a model, carried out in a framework that has an essential structure of the following form: ***Input—>Logic—>Output—>Calibrate-to-Scale***. This structure links arguments about credit behavior to measures of payment certainty by transforming data into raw, rank-order measures of expected performance. These, in turn, are calibrated to a proprietary scale with standard measures known as credit ratings.

A methodology ("treatment") is an explanation of how these steps proceed. The application of methodology to a specific transaction is an approach. Information filters that CRAs require to rate a credit are rating criteria. These terms are often used interchangeably, but their meanings are not interchangeable.

Spectrum Ratings Framework, Methodologies and Approaches

Spectrum's rating framework follows the above pattern: (1) clean and validate raw performance data inputs, (2) process them in a chain of logical arguments linked to credit health and impairment, (3) output raw measures; and (4) calibrate them to our rating scale.

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Spectrum ratings measure relative payment certainty on a credit scale that runs from "0" (*default, no recovery*) to "1" (*predictably repay on time, in full*). Fundamental ratings are ordinal rankings indicated by the familiar alphanumeric labels, scaled from Aaa to Ca. Ratings are updated annually or quarterly. Structured ratings are a cash-on-cash, option-adjusted measure of the expected shortfall on the contract rate of return. Because structured credit risk undergoes natural transitions, Spectrum revisits and updates its ratings as warranted in the data.

Spectrum does not have rating criteria per se. We will rate, conscientiously and using the available data, any credit presented to us minimally in the form a term sheet based on our methodology and approach. We use these data as proxies of payment strength along multiple dimensions. Qualitatively, the key dimensions are (a) macro-stability, (b) capital quality, (c) cash flow strength, (d) liquidity, and (e) information quality (accuracy, precision, and credibility).

Fixed income valuation entails significant nonlinearity and requires higher-order thinking. Value tradeoffs exist between offsetting credit factors, and the relationship between principal and interest is nonlinear. Until now, that higher-order thinking has been carried out in rating committees, which were patterned after the jury system, made for higher-order problem solving through iterative debate. However, the rise of financial engineering has elevated the computational sophistication of credit work and exacerbated its informational asymmetries. Bankers not only know more now than the average investor about borrowers' financial position—they understand more clearly how a complex funding structure works than an average rating analyst does.

Spectrum's base methodology addresses these challenges head-on with digital technology. We build scalable models of functionals that describe generic credit propositions with quantifiable accuracy. The organizing principle of our system design is mass customization. Digital rating software automates computationally intensive elements of the model, making the analysis transparent and traceable, and bringing mathematical credit arguments back to the level of common sense.

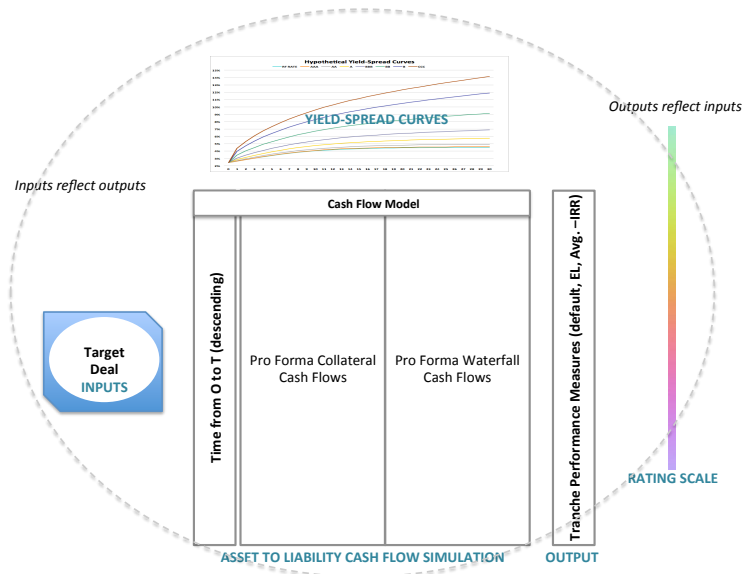
Spectrum refines its methodology for fundamental and structured credits—two different types of analysis. For issuers and balance-sheet issues, **Spectrum's fundamental rating** is a view on borrower repayment capacity. With fundamental credits, operating risk contributes materially to overall financial risk and a spectrum of factors must be considered: competitive strategy, management quality, market power, financial strength and position, operational efficiency, environmental and social awareness, and supply chain risk. Spectrum is currently refining its approach to reflect proprietary "smart variables" that predict default over a defined time horizon.

Factor weighting depends heavily on company stage of development and the quality of data available for the analysis. Lifecycle effects that go unrecognized in a going-concern model silently exert constraints on fundamental credit strength, hence on growth. To filter out this "reverse-Pygmalion effect," Spectrum uses a different methodology for three lifecycle stages. For mature firms, our base rating methodology projects the firm's horizon of default using proprietary smart-variables. For embryonic firms, where survivorship is the paramount concern, Spectrum uses dynamic programming to benchmark the firm's performance on a self-defined trajectory; those ratings measure the distance between the target path and the credit's updated performance and progress. For cash flow positive, small-medium enterprises, Spectrum's method is a hybrid of securitization and traditional financial statement methods. Spectrum further customizes the methodology with industry-specific characteristics for individual firms.

Spectrum's structured finance ratings are on a cash-on-cash analysis of securities in tiered capital structures backed by pools or portfolios of future cash flows. After taking into consideration the nature of the investor's claim on the collateral (contingent- or non-recourse, seller bankruptcy risk) Spectrum performs an option-adjusted

analysis of repayment capacity, producing the expected yield shortfall on the contract rate of return. To do this, Spectrum relies on a single, base methodology because the credit problem is generic: *What risk-appropriate discount to apply to future cash flows for the purpose of ascertaining their credit risk.*

Graphically illustrated below, our methodology addresses this nonlinearity self-consistently and frequently, or even continuously, for all and every structured deal. Spectrum then customizes the analysis with collateral-specific approaches to capture the credit dynamics of different collateral types. The approach is fine-tuned to reflect the unique credit dynamics of each transaction:



Spectrum Rating Scale

Spectrum believes that as ratings as we know them are rolled out to new types of credit situations, it is important for its original meaning to be conserved, for credit ratings are standards. Conservation allows credit experts of different backgrounds and perspectives to speak meaningfully about credit distinctions and discourages blatant scale manipulation. Spectrum aligns the meaning of its fundamental and structured ratings in words, symbols and measures, as follows—

Capacity to Repay	Fundamental Rating	Structured Rating
Extraordinary	Aaa	0.025
Very Strong	Aa1	0.250
	Aa2	1.0
	Aa3	2.5
Strong	A1	5
	A2	9
	A3	15
Adequate	Baa1	23
	Baa2	33
	Baa3	50
Uncertain	Ba1	67
	Ba2	100
	Ba3	150
Vulnerable	B1	200
	B2	275
	B3	450

Weak	Caa	1000
	Ca	5000

IV What is Credit?

Credit markets are dynamic and ever changing; but credit fundamentals are perennial and mostly unchanging.

Credit is trust. The word comes from the Latin *credere*, to trust—an association that exists in many or most languages and cultures. People and firms that have the means and the intention to pay their future money obligations are said to be *creditworthy*.

Credit is implicit in all financial transactions. Every commercial transaction involves an exchange of goods or services for payment. When payment coincides with goods (services) changing hands from seller to buyer, there is **market risk**—the risk that the price paid does not represent value. A basic credit risk reduction technique is to require simultaneous payment and delivery. When payment is not simultaneous with delivery, there is also **credit risk**—the risk that the buyer will not deliver the promised money on time and in full.

Good credit analysis requires “hard” and “soft” skills. Because credit is on the clock and fixed, a part of credit analysis is inevitably quantitative. But as it is also human-focused, the most essential credit skill is judgment, an ability to understand human motivation so as to predict the likelihood and timing of repayment.

Credit risk is multi-dimensional. Credit is said to be defined by five factors (the Five C’s): *character, collateral, capital, capacity* and *condition*. **Character** signifies institutional or personal integrity and reliability. SPECTRUM attaches greater weight to character than the other four factors because it is the most active and independent—able to reinforce or undermine the contributions of the other four. **Collateral** refers to financial assets that are pledged or securitized. **Capital** can signify productive resources on both sides of the balance sheet, or it can refer to financing already in place in the capital structure. **Capacity** can imply cash flow strength, or it can mean balance sheet leverage. **Condition** may refer to different economic states that are affecting the borrower, or it can mean covenants imposed on the borrower or the transaction to limit the risk exposure.

V Why do modern capital markets use Credit Ratings?

Credit ratings function as wholesale credit risk measures and consensus pricing benchmarks for large credit exposures backed by private and public capital. Global debt investors use credit ratings (i) when the risk of non-payment is deemed to be greater than zero, or (ii) regulators require their use in capital management.

At the turn of the 20th Century, the rise of credit ratings and credit data coincided with the rise of an institutional investor class and the expansion of private debt for new capital investment globally. A typical credit ratings agency (CRA) was founded by individual entrepreneurs and subsequently acquired by a publishing company. The original rating was published and distributed as a manual. U.S. banking, insurance regulators and security market regulators endorsed the use of ratings after the Crash of 1929. They considered financial information provided by a neutral, third party as a force for market discipline and gave special consideration to regulated entities that consulted ratings in their investment process.

In 1975, the Security & Exchange Commission (SEC) created a special status (NRSRO) for certain well-respected CRAs under the Securities Exchange Act with 17 CFR 240-15c3-1. Subsequently, with the onset of global capital regulatory policies, regulators linked the safety and soundness of banks and broker-dealers expressed in a credit rating, to their required capital and leverage. As capital regulation became more systematic and standardized with the Basel Capital Accord (1988), credit ratings enjoyed regulatory acceptance as *de facto* measures of credit risk.

But by the early 2000s, NRSRO ratings began to be used simultaneously as risk measures and pricing benchmarks in certain sectors. Problems arose, and it was difficult for external bodies to validate the effectiveness of ratings as risk measures. This is how Spectrum gained traction in the market, as an expert on credit rating agency processes, and how we understand the role of putting our yardsticks of performance in public view, to support liquid, orderly markets. In our understanding of the role of CRAs in the modern debt capital market, Spectrum is not the transactor. We are not there to take haircuts or transform the value proposition of securities into something we

“underwrite” in-house. Spectrum exists to provide stable measures of capital quality and leaves the transacting to transactors.

VI Data Issues—Ordinality vs. Cardinality

There are categorical differences in the best practices for using data to make ratings that compare capital quality and to make ratings that are cash flow performance estimates. Rating corporations as users and producers of financial accounts is an ordinal (comparative) analysis. Rating re-financings of their financial accounts at fair value is a cardinal (expected cash flow impairment) analysis. The definition of credit does not change between the two, but data will not always be the same, and the same data may not be used the same way. Information communicated *via* the two rating types will not be the same. In a nutshell—cardinal ratings are more precise and informative than ordinal ratings.

In the classic on-balance sheet ordinal analysis, the borrower is assumed to operate forever (a “going concern”). Financial strength is evaluated every reporting period on a rolling basis relative to an arbitrary baseline. Present and future are defined by value proxies of the recent past, like financial statement ratios. Factors leading to wind-down, and terminal value itself, are outside the model. This is both logically necessary and also the canonical weakness of on-balance sheet ordinal analysis.

In the classic off-balance sheet cardinal analysis, the borrower’s accounts receivable is used to raise capital based on their estimated future value in a non-recourse, bankruptcy-remote issuance, where the capital structure may also be tiered. The payment status of the receivables is monitored with the frequency of payment, and the analysis of capacity to repay notes in the capital structure is frequently updated until the collateral has fully amortized and (hopefully) the notes have been repaid.

Case Example: A street vendor sells cups of coffee for \$1.00. An on-balance sheet lender would reasonably ask for data on demand, competitor sales, production, storage costs and maybe other risk dimensions. *Ceteris paribus*, the more favorable the numbers, the better the credit. The lender will compare the vendor’s business to other similar businesses. This is an ordinal analysis.

How the vendor understands the business comes closer to an off-balance sheet analysis: Clients come for the coffee given the price point and the taste. The coffee seller’s business is a projection of future expected cash inflows from a historical time series, where the exchange value of money-for-coffee is compared to the cost of financing these cash flows (the exchange value of money-for-money). This is a cardinal analysis.

To sum up, on-balance sheet ordinal analysis is anchored to the balance sheet (stocks). Off-balance sheet cardinal analysis is anchored to the business (flows). Each has a place in credit analysis, but they are different. It is vitally important to respect these differences because of their differences in precision and resolution. The fact that credit information quality obtained from a cardinal rating analysis has the potential to be higher than for an ordinal rating analysis is itself justification for higher ratings in the cardinal case. It would therefore be wrong to substitute an ordinal rating for a cardinal rating without adjusting the rating itself.

VII Rating Scales—Ordinal vs. Cardinal

A credit rating scale represents the endpoints and distances between the set of credit grades giving them meaning. If ordinal and cardinal ratings are substantially different, ordinal and cardinal rating scales must also be different, even if superficially they share the same nomenclature.

On an ordinal credit scale, there is no “zero (impossible to default)” end point because every borrower has a propensity to default. Distances from the origin represent “relative goodness” or payment certainty; and post-Basel, it is conventional also to say they represent distance to default. But the distances do not represent exchange value.

On a cardinal rating scale, distances from the origin are dollars-and-cents measures of expected credit impairment where the “zero” point represents zero expected credit impairment—fair value is highly likely to be obtained by the exchange. Assigning a rating that means “zero” is not only logically possible—in some sense, it is the goal for a wide spectrum of the investing market.