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Research

Criteria | Structured Finance | General:

# Global Framework For Payment Structure And Cash Flow Analysis Of Structured Finance Securities

**December 22, 2020**

## OVERVIEW AND SCOPE

1. These criteria present S&P Global Ratings' methodology for assessing the payment structure and cash flow mechanics ("cash flow analysis") of a structured finance security. In our cash flow analysis, we assess the availability of asset cash flows to meet the promised obligations (including imputed promises) under a variety of stress assumptions, while taking into account the transaction structure, available enhancement, and third-party exposures. In addition, we may use our cash flow analysis in other aspects of our ratings analysis, including the testing of credit stability, review of supplemental tests (e.g., obligor, geographic, and industry concentration), determination of liquidity exposures, estimation of breakage costs, and evaluation of sovereign stress scenarios.

2. This methodology applies to all structured finance securities, including covered bonds. These criteria lay out the foundations of our cash flow approach, which we apply in conjunction with asset-specific cash flow criteria and guidance. For many asset classes, we use a cash flow model to analyze the cash flows of a given transaction. However, there are certain asset and sub-asset classes where the nature of either the underlying assets or the structure (e.g., sequential pay) may reduce the need for model use. In addition, we may opt not to run a cash flow model on each class in a given transaction when we have already captured the structural impact in our analysis. In those cases, we would still assess the sufficiency of the assets to cover the liabilities of the rated notes by analyzing the relevant structural features, such as the transaction waterfall (including amounts senior to or pari passu with debt service), reserves, and external support.

## METHODOLOGY

3. In our cash flow analysis, we assess the availability of asset cash flows to meet the promised obligations, including imputed promises. The cash flow analysis framework is divided into asset-level, structural, and liability-level analyses (see chart below). We consider our ratings definitions when determining stresses commensurate with the liability ratings. When relevant, we apply additional stresses to account for the risks highlighted under our legal, operational, and counterparty risk criteria, including setoff, servicer disruption, and commingling risks, while accounting for structural mitigants.


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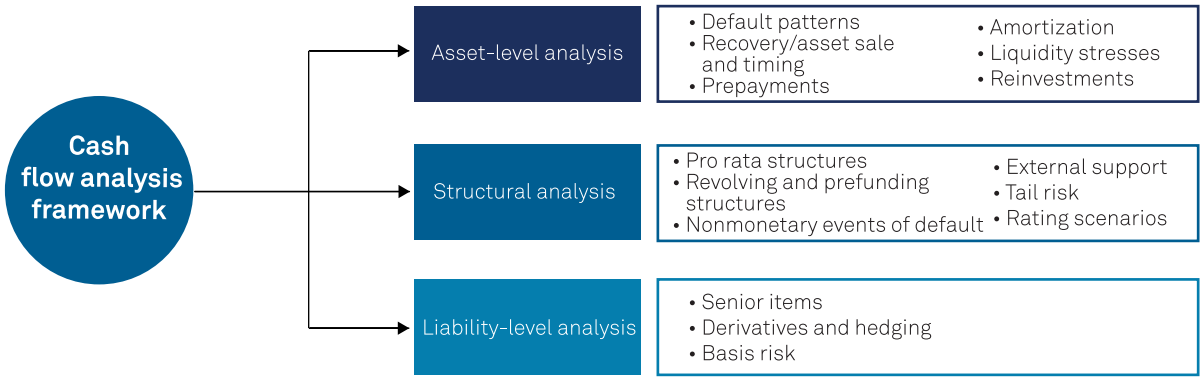
4. In our asset-level analysis, we tailor our asset-level stresses to account for the contractual terms of the assets while considering, where relevant, any modifications that may alter those terms. Where applicable, the asset-level analysis includes different default patterns, various levels and timings of both recoveries and performing asset sales, multiple prepayment assumptions, and liquidity stresses. For transactions backed by nontraditional assets, whose cash flows largely depend on revenue streams from operating assets or a company, we typically supplement our analysis by applying haircuts to the specific factors that drive cash flow generation. In both cases, we account for the unique features of the asset pool that are likely to affect the cash flow analysis (see the Asset Considerations section below).

5. In our structural analysis, we analyze how asset-level cash flows and external support are allocated to liabilities through the transaction's payment mechanics, which include features such as the priority of payments, credit enhancement targets or floors, performance tests or triggers, early amortization events, and events of default (EODs). We determine whether those features may lead to a reprioritization of the transaction cash flows under a rating stress scenario and consider the potential impact of less stressful scenarios. Where appropriate, we vary our asset-level stress assumptions to test the impact of certain structural elements (e.g., pro rata payment and revolving and prefunding periods) on available credit enhancement, which may include reserve accounts, overcollateralization, excess spread, subordination, and external credit support. Where necessary, we consider the unique aspects of the transaction structure (see the Structural Considerations section below).

6. In our liability-level analysis, we evaluate the transaction liabilities, including amounts paid senior to or pari passu with debt service, while considering potential asset-liability mismatches. The analysis also incorporates unhedged exposures, including those related to interest rates and foreign exchange.

7. During surveillance of rated transactions, we may consider a subset of cash flow scenarios while taking into account actual performance when analyzing cash flows (see the Surveillance section below).

**Cash Flow Analysis Framework**

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# Asset-Level Analysis

8. In calibrating our cash flow stresses, we consider historical data from the relevant asset jurisdiction when available. Where jurisdiction-specific data is not available, we may benchmark to comparable jurisdictions. In many cases, we apply our stress assumptions throughout the life of a given transaction to test the transaction's overall resilience. However, we may concentrate and/or vary our cash flow stresses within a given period to simulate a stressed economic environment. If we apply multiple stress periods, we may vary the length of each period and the assumptions applied both throughout and across the multiple periods.

## Default patterns

9. We vary the timing and distribution of defaults (default patterns), which we project under our relevant credit criteria. The default patterns applied vary by asset class, geographic region, transaction structure, and/or rating scenario while accounting for asset-level characteristics, including credit quality, tenor, loan payment status, debt service coverage ratio (DSCR), and obligor concentration. Where relevant, we evaluate the impact of multiple default timings and distribution scenarios, including the application of front- and back-loaded default patterns. Front-loaded patterns typically apply defaults at rates that are faster than historical default patterns to stress the level of excess spread, and back-loaded default patterns test for releases of enhancement.

10. Generally, we apply default patterns to all the collateral within a given pool without biasing defaults toward a specific population of assets. Nevertheless, we can implement such a bias where a pool exhibits a concentration of assets of similar characteristics, including the potential concentrations outlined in the eligibility criteria of a revolving transaction. For example, we may test the sensitivity of a given transaction to concentration risk by applying default patterns to assets with larger asset values, weaker credit quality, specific currencies, or higher yields.

## Recoveries and performing asset sales

11. We stress asset values related to the disposition or enforcement of defaulted assets (recoveries) and the sale of performing assets (including residuals) to reflect the volatile nature of market prices for those assets. We vary our assumptions by asset class, geographic region, and/or rating scenario, based on several factors, including asset characteristics, collateral type, and historical performance. We can also leverage our recovery ratings or look toward asset type, asset seniority, and asset country grouping to determine recovery values related to defaulted assets. To the extent a transaction relies on the liquidation of financial assets as the primary source of repayment, we would consider our market value criteria (see Related Criteria) while accounting for structural mitigants such as physical delivery of the assets. For sales related to performing assets, which could be realized at the end of their estimated useful life, we may derive stressed liquidation values by applying depreciation curves to valuation estimates. In regards to residuals, we analyze factors such as how the lessor sets the residual values and the lessor's historical experience of realizing those values upon lease expiration. If our recovery assumptions do not account for losses related to repossession expenses and accrued interest, we typically evaluate them separately in the cash flow analysis.

## Recovery and performing asset sale timing

12. We consider the timing of both recoveries and performing asset sales in our cash flow analysis to reflect their uncertainty. We may vary our assumptions by asset class, geographic region,



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transaction structure, and/or rating scenario, based on features such as the presence of collateral, applicable legal framework, historical enforcement and repossession timing, useful life, and secondary market liquidity. When considering secondary market liquidity, we account for whether relevant assets are easily enforced and/or if the collateral manager can sell defaulted assets before the end of the workout period. Separately, we may assume that not all proceeds from recoveries or performing asset sales are received at the same time, but are instead applied over a time horizon. If the recovery or performing asset sale time period exceeds the legal final maturity of the transaction, we typically would not give credit to those recoveries.

## Prepayments

13. We consider both the level and timing of prepayments in our cash flow analysis. The level and timing of prepayments may vary by asset type, geographic region, transaction structure, and/or rating scenario, while taking into account features such as the credit quality, tenor, and historical prepayments of the underlying assets. We typically evaluate the impact of multiple prepayment scenarios. For example, we may run higher prepayment rates to reduce positive excess spread, which shortens the weighted average life of the pool and diminishes the amount of available credit enhancement. Alternatively, in scenarios of negative excess spread, we may run lower prepayment rates to exacerbate the impact of any cash flow drain. We may also use lower prepayment rates to increase the exposure of collateral to our default and recovery stresses, which is more significant in transactions with balloon type risk.

14. Similar to our approach to applying default patterns, we consider how we apply prepayments to the pool of assets. While we typically apply prepayments to all assets within a given pool, we may address the risk of spread compression by biasing prepayments toward higher yielding assets.

## Amortization

15. Our analysis generally incorporates the expected amortization profile or the scheduled maturity date of the underlying assets. However, if we consider a revolving or prefunding period in our analysis (see the Revolving And Pre-Funding Structures section below), we may estimate an amortization pattern by accounting for characteristics such as the historical amortization profile of similar assets, the asset pool's expected maturity, the length of the reinvestment period, and the maximum covenanted weighted-average life. For nontraditional assets, which often do not have a principal component, the principal repayment typically comes from the cash flows generated by the assets and/or asset sales.

## Liquidity stresses

16. We consider liquidity stresses in our analysis to capture potential liquidity risk due to factors such as nonpaying, delinquent, restructured, or defaulted assets; pool concentrations that can raise delinquency or default levels; increases in fee levels; reductions in asset yields; event risk; and/or escalations to the weighted average cost on the notes. We apply additional stresses where relevant, such as in the case of a heightened liquidity event. We typically vary the severity and timing of liquidity stresses by asset type, geographic region, transaction structure, and/or rating scenario while accounting for asset-level features such as credit quality, tenor, and payment status.

## Reinvestments

17. Reinvestment rates refer to yield from cash and/or eligible investments that are typically held in transaction accounts. Where relevant, we stress reinvestment rates, based on features such as



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the tenor of the investment, investment type, rating scenario, and/or investment periods. For additional considerations, including the alignment of the maturity profile of temporary investments with those of transaction obligations, see "Global Investment Criteria For Temporary Investments In Transaction Accounts."

# Structural Analysis

18. We analyze the impact of the transaction structure on the allocation of asset-level cash flows and external support to the transaction obligations while considering potential reprioritizations, acceleration events, enhancement features, and loss allocation mechanisms. The following sections represent key structural elements that we consider in our analysis.

## Pro rata structures

19. Unlike sequential structures, which accelerate the deleveraging of the senior most tranches, payment structures that exhibit both pro rata features and subordination, generally do not confer any deleveraging benefit and are less effective in preserving initial enhancement levels. As a result, these payment structures are susceptible to back-ended defaults, especially regarding products with balloon risk, thereby elevating tail risk (see the Tail Risk section below). We analyze the impact of pro rata structures and related tail risk, including sequential pay structures that switch to pro rata, by considering the release of a transaction's initial credit enhancement before it can be used to offset losses if there are no mitigating structural features. These considerations may include speeding up the amortization of the junior tranches (e.g., high prepayments) while also stressing back-ended defaults and/or increasing the loss severity of products with balloon risk. Alternatively, we address the risk of pro rata structures in other aspects of our ratings analysis.

## Revolving and prefunding structures

20. Revolving structures, which include both stand-alone and master trusts, allow for the reinvestment of funds related to maturing assets, as well as the disposal and replacement of a transaction's assets. Similarly, prefunding structures allow for the delayed purchase of assets after the liabilities are issued. These structures may introduce negative bias because asset characteristics can drift, including those related to yield, maturity profile, and asset type. We typically analyze the impact of an adverse migration of the pool composition under the eligibility criteria and portfolio parameters governing the transaction while accounting for industry and regulation imposed parameters. We may not consider that migration if the collateral manager commits to maintaining the initial pool's credit quality. Similarly, we may not apply this approach to covered bond pools because the collateral analysis in our covered bond criteria assumes the default of the issuing bank, after which we expect the cover pool to remain static. Additionally, if a transaction employs dynamic credit enhancement, in which the credit support levels mimic changes in the underlying credit quality of the assets, then adverse asset composition scenarios may not be necessary.

## Nonmonetary events of default

21. A nonmonetary EOD is caused by a reason other than a failure of the transaction's issuer to make timely interest and/or principal payments on the rated notes. In certain transaction structures, a nonmonetary EOD may change the payment priority from pro rata to sequential, or direct all cash flows to a senior class until it is paid off, before any future payments are made to the subordinated classes. It may also result in a collateral sale, the proceeds of which could be



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insufficient to pay the principal and interest due on each class of securities. For transactions in which additional actions are required to change the payment priority or sell the collateral after a nonmonetary EOD, we assess the likelihood that a nonmonetary EOD could occur by considering any applicable EOD remedies, cure periods, investor voting provisions, or additional conditions in the transaction documents. Where relevant, we also consider the creditworthiness, operational capabilities, track records, and incentives of the transaction parties that have an obligation to either minimize the likelihood of a nonmonetary EOD or remedy an event that could lead to a nonmonetary EOD. If, in our view, the likelihood of occurrence is not remote relative to a specific rating, we assume the EOD occurs and assess the impact on the affected class of securities. In these instances, the affected rating may be capped at the level consistent with the risk of reprioritization or a collateral sale--unless, in our view, the transaction documents include features that mitigate these risks.

### External support

22. We typically consider both the size and payment mechanics of related external support (including servicer advances, liquidity facilities, insurance policies, guarantees, and derivative instruments)--to the extent that it complies with our relevant criteria--while taking into account potential liabilities that it may introduce into the structure. We pay specific attention to the timing and duration of external support, which has the potential to introduce negative carry or a mismatch in coverage. Additionally, we consider termination events under a support contract, which can leave the transaction without a key source of support, and related structural mitigants.

### Tail risk

23. Tail risk may emerge as a transaction deleverages when the total number of assets decline together with an increase in pool concentrations. Such pool characteristics increase the sensitivity of the liability structure to the performance of the remaining assets. We typically consider tail risk in our analysis while accounting for relevant transaction features, including pro rata triggers, the maturity profile of both the assets and the liabilities, and mitigating factors such as enhancement floors.

### Rating scenarios

24. Where relevant, we test for the impact of transaction features, including pro rata structures and sequential pay structures that switch to pro rata, by considering additional cash flow scenarios that are less severe than the rating scenarios corresponding to the liability ratings. This additional analysis aids in determining if the early release of enhancement adversely affects the repayment capacity of the notes by removing the benefit that higher rated tranches may receive when performance triggers reallocate funds from junior classes to senior classes during times of economic stress. Furthermore, the likelihood of excess cash flows leaking out of the structure is greater when applying lower rating stress scenarios.

## Liability-Level Analysis

25. We consider asset-liability mismatches that we identify (e.g., uncapped fees and interest rate and currency exposures). The sections below describe our approach to analyzing such risks.



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## Amounts senior to or pari passu with debt service

26. Amounts senior to or pari passu with debt service in the payment waterfall, including senior fees (e.g., servicing, trustee, and management fees), expenses, taxes, external support related payments, indemnifications, and derivative-related breakage costs, have the potential to reduce the available cash flow required to meet debt service obligations. We consider the impact of both capped and uncapped amounts senior to or pari passu with debt service in our cash flow analysis--unless they are addressed in our credit analysis.

27. In our cash flow analysis, we typically assess capped fees at either their maximum allowable amounts or our projected levels. However, with respect to servicing fees, we typically consider the higher of the actual fee and the market rate fee. If a structured finance transaction has amounts senior to or pari passu with debt service that are uncapped and unmitigated through structural features (i.e., subordination of fees) or external support, we may consider additional amounts in the cash flow analysis. These additional amounts may include costs related to the liquidation of assets, (e.g., repossession and remarketing or derivative breakage costs), if they are not included in our recovery haircuts.

28. When determining the amount of additional fees and expenses applied in the cash flow analysis, we typically look at the following factors:

- Market norms for fees and expenses in a given sector or country.
- The likelihood of adverse events occurring that would result in extraordinary fees and expenses (e.g., pending lawsuits) or the increased possibility that asset performance could vary, which could result in indemnification obligations and other extraordinary fees and expenses.
- The current market conditions in the sector, including the legal and regulatory environment.
- The nature of the fees (e.g., the fee or indemnification is expected to be an incentive for a transaction party to take actions that would likely benefit investors).
- The rating assigned to the senior-most liabilities in the transaction.

29. In some cases, we may analyze subordinated fees as being senior in the waterfall. For example, if a servicing fee is subordinated in the waterfall we may include that amount ahead of debt service to ensure that there would be sufficient funds to attract a backup servicer in a replacement scenario. Additionally, we may anticipate replacement costs related to key transaction parties and nonderivative counterparties and potential losses related to servicer risks (see counterparty risk criteria and operational risk criteria in Related Criteria).

## Derivatives and hedging

30. Unhedged exposures, including those to interest rates or foreign exchange (FX), can drain resources from a securitization and impair the repayment of debt obligations. We typically stress any unhedged exposures to interest rates and FX in our cash flow analysis, including by estimating their size through deterministic or stochastic approaches. We assess the transaction without the benefit of the hedge if the hedge contract does not satisfy our derivative agreement criteria or if the contract satisfies our derivative criteria, but we are calculating the hypothetical unhedged rating under our counterparty criteria. However, we still take into account potential liabilities due under the contract, such as breakage costs, to the extent that risk is not otherwise mitigated (see the Derivative-Independent Approach section in "Global Derivative Agreement Criteria"). We also consider the impact of hedging instruments that do not amortize in-line with the outstanding balance of the collateral and/or notes (i.e., balance guaranteed). Similarly, if we



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expect that the special-purpose vehicle (SPV) margin reserve used for margin posting could be insufficient at any point in the transaction's life, we would model the transaction as being unhedged at that point (see "Special-Purpose Vehicle Margin Requirements For Swaps--Methodology And Assumptions").

### Basis risk

31. Basis risk occurs when the index and/or reset dates of the assets do not match those of the liabilities. Similar to unhedged interest rate exposures, basis risk can leave a transaction exposed to interest rate fluctuations. We typically consider basis risk in our cash flow analysis by analyzing historical asset yields relative to liability yields or by applying distinct stress curves for the relevant asset and liability indices. We also take into account transaction features that mitigate basis risk while acknowledging the magnitude of any potential exposure.

## Analyzing Cash Flow Results

32. We evaluate the sufficiency of cash flows using either a deterministic or a breakeven approach while taking into account de minimis shortfalls (see "S&P Global Ratings Definitions"). Under our deterministic approach, we apply rating-level or scenario-specific assumptions and determine if the notes in question receive all promised payments when due. In a breakeven approach, we calculate the maximum default or loss that the pool can withstand without defaulting on a given liability ("the breakeven") under a certain stress scenario. To assign a given rating to a tranche, we generally expect the tranche's lowest breakeven to be equal to or higher than the rating scenario default rate or loss rate, considering stresses commensurate with that rating level. However, in certain instances, such as in some structured credit and covered bond transactions, we may assign that rating if most of the breakeven scenarios exceed the rating scenario default rate or loss rate related to that rating level--with higher rated bonds typically needing to pass a greater proportion of breakeven scenarios. In some cases, we use a minimum DSCR to determine if there is sufficient coverage of the rating scenario or the scenario-specific assumptions.

## Additional Considerations

### Asset considerations

33. In our cash flow analysis, where relevant, we address the specific contractual terms or characteristics of the assets, including the application of additional stresses. The following constitute examples of additional asset considerations:

- Applying a haircut to the average historically observed cash inflows while adjusting for risks related to national disasters or world events, obligor and industry exposures, and seasonality for financial future flow assets.
- Considering both base-case and downside operating cash flow projections based on historical performance for corporate securitizations.
- Using asset-specific stresses that are designed to reduce the amount and vary the timing of the cash flows generated in transactions backed by operating assets such as marine cargo containers, aircraft, railcars, solar, or triple-net leases backed by real estate.
- Assuming the assets are sold at distressed prices (calculated as the net present value of the projected cash flows of the assets discounted at a target asset spread over the relevant funding rate) when analyzing an asset-liability mismatch in covered bonds.



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- Analyzing the equity component by taking into account features that affect the distribution of payments, such as uncapped junior expenses, subordinated termination payments, and the higher sensitivity of equity cash flows to the availability of excess spread in combination notes.
- Stressing draw rates for use on home equity lines of credit in certain residential mortgage-backed securities (RMBS) transactions.

### Structural considerations

34. In our cash flow analysis, where relevant, we account for unique structural elements, including the application of additional stresses. The following constitute examples of additional structural considerations:

- For European RMBS master trusts, we typically analyze their cross-collateralized nature by applying additional stresses related to liquidity and default timing that address the repayment of principal across various issuances.
- For short-term securities, we address the risk of asset-liability mismatch by increasing our assumptions regarding delinquencies and/or slowing down the receipt of principal into the transaction by varying prepayments, defaults, and/or recovery period timing.
- For certain future flow, operating asset-backed securitizations, and corporate securitizations, we expect liquidity to protect against event risk stemming from events such as new regulation, natural disasters, and corporate stays.
- For repack securitizations, we typically assess them as not eligible for a pass-through rating, based on the credit quality of their supporting cash flows, if an underlying security's payment deferrals could affect the issuer's ability to make timely payments regarding the liabilities, counterparty contracts, or fees payable to key third-party service providers--unless there are structural features that mitigate deferral risks.
- For U.S. RMBS transactions, we typically assess the treatment of modified loans in loss allocations and performance triggers.

## Surveillance

35. In our surveillance analysis, we may focus on a subset of cash flow scenarios that we believe would drive the rating analysis for a given class of notes, based on transaction-specific characteristics. For example, if a class of notes relies on excess spread for repayment, we could reach the conclusion that low prepayment scenarios are less likely to affect the analysis and instead focus on the impact of our high prepayment scenarios. We also often augment our cash flow analysis to reflect available performance information. Alternatively, we may perform an alternative analysis, such as a parity test, to obtain additional insight into the sufficiency of the existing enhancement to support the currently assigned rating.

# CHANGES FROM PREVIOUS CRITERIA

36. These criteria aim to increase transparency of the methodology and assumptions we use when analyzing cash flows while consolidating existing criteria articles that cover payment structures and cash flow mechanics. Additionally, they facilitate the creation of guidance at the asset-specific level to provide further detail on the application of the criteria.



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# REVISIONS AND UPDATES

Changes introduced after original publication (other than to the contact list or criteria cross-references):

- On Nov. 17, 2025, we republished this criteria article to make nonmaterial changes. We removed text that was related to the initial publication and was no longer relevant.
- On Nov. 22, 2022, we republished this criteria article to make nonmaterial changes to add the "Revisions And Updates" section.

# RELATED PUBLICATIONS

## Fully superseded criteria

- Global Framework For Cash Flow Analysis Of Structured Finance Securities, Oct. 9, 2014
- Criteria For Global Structured Finance Transactions Subject To A Change In Payment Priorities Or Sale Of Collateral Upon A Nonmonetary EOD, March 2, 2015
- Criteria Methodology Applied To Fees, Expenses, And Indemnifications, July 12, 2012

## Related criteria

- Counterparty Risk Methodology
- Methodology To Derive Stressed Interest Rates In Structured Finance
- Foreign Exchange Risk In Structured Finance--Methodology And Assumptions
- U.S. Structured Finance Asset Isolation And Special-Purpose Entity Criteria
- Asset Isolation And Special-Purpose Entity Methodology
- Methodology For Rating Structured Finance Securities Above The Sovereign
- Global Framework For Assessing Operational Risk In Structured Finance Transactions
- Global Derivative Agreement Criteria
- Methodology And Assumptions For Market Value Securities
- Special-Purpose Vehicle Margin Requirements For Swaps--Methodology And Assumptions
- Global Investment Criteria For Temporary Investments In Transaction Accounts
- Principles Of Credit Ratings

A complete list of S&P Global Ratings' criteria articles can be found on https://disclosure.spglobal.com/ratings/en/regulatory/ratings-criteria.

## Other publications

- S&P Global Ratings Definitions, updated from time to time
- RFC Process Summary: Global Framework For Payment Structure And Cash Flow Analysis Of Structured Finance Securities, Dec. 22, 2020

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