

Creditreform Rating AG Rating Sub-Methodology

Aircraft Financings and Securitizations



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1 Introduction

In order to enable involved parties, investors and the interested public to understand a rating opinion of Creditreform Rating AG (hereinafter also "CRA"), this rating sub-methodology concerning aircraft financings and securitizations is disclosed. This document will be updated periodically to reflect changes in the methodology. CRA's rating methodologies and code of conduct are freely available on the website www.creditreform-rating.de.

2 Scope

This methodology describes CRA's approach to rating debt financing instruments used for the (re)financing of single commercial aircraft investments or commercial aircrafts portfolios. This includes indirect investments, such as those made through securitization structures and special purpose entities utilized for refinancing leasing or sale-and-leaseback transactions, as well as direct financing provided to airlines as borrowers. Asset-Backed Financings relating to Aircraft (Aircraft ABF) are typically collateralized by the assets being financed in the form of aircraft mortgages.

This methodology does not apply to equity investments relating to aircrafts. It has no geographical limitations and is globally applicable. This document is a sub-methodology of the overarching "Rating of Financial Instruments (Issue Ratings)". Accordingly, this sub-methodology addresses analytical components that primarily focus on the underlying assets that form the basis for the financing of commercial aircraft or its securitization. In this context, "underlying assets" can refer to both the financed aircraft and purchased loan tranches in commercial aircraft transactions. Components dealing exclusively with structural, operational, and credit risks at the rated entity level are covered under the main methodology.¹

The qualitative and quantitative analysis components of this sub-methodology are considered in CRA's rating process and are subject to ongoing content and method review.

¹ In the subsequent risk analysis, the boundaries may occasionally be less clearly defined, such that both rating-relevant topics at the level of a specific aircraft financing and elements affecting the overall financing structure up to the rating object are explicitly covered in this sub-methodology.

3 Rating Statement and Requirements

3.1 Rating Statement

This methodology addresses whether the debtor in a commercial aircraft transaction can meet its financial obligations from issuing a financial instrument - considering expected capital returns - in full and on time. CRA uses the rating scale published in the CRA document "Rating Criteria and Definitions" for commercial aircraft ratings.

3.2 Data Requirements and Sources

CRA prepares and reviews ratings using robust and systematically compiled data sets. During the due diligence of commercial aircraft transactions, CRA utilizes various data sources to identify, derive, and validate rating-relevant qualitative and quantitative parameters.² Important external data sources include arranger and servicer interviews during the due diligence, credit approval documents from financiers and sponsors, aircraft-specific external appraisal and maintenance reports or forecasts, as well as regular research on market and macroeconomic data. Furthermore, CRA maintains extensive data sets on historical aircraft values (Market Values by Aircraft Type and Vintage) over a period covering multiple economic cycles. This data is obtained by CRA from an internationally established aircraft appraiser and is subject to regular updates.

When receiving a request for a new rating, CRA typically considers two different external appraisals that need to be sufficiently up-to-date, including value forecasts (Base and/or Market Values), to be obtained from the client for each aircraft. These appraisals should specifically address the aircraft to be financed, stating the Manufacturer's Serial Number (MSN) and the engine configuration. If required for the analysis, CRA will also request a technical report to assess the adequacy of provided maintenance reserves.

For details on the typical documents and information required for a CRA commercial aircraft rating, refer to Appendix I.

² Specifically, due diligence involves the review and analysis of all information and documents requested from the client through CRA's data request form for a specific commercial aircraft rating.

4 Rating Methodology

4.1 Methodological Key Aspects

Industry Cyclicity

The global commercial aircraft market is cyclical, influenced by specific global and macroeconomic factors like oil prices, interest rates, and GDP, which can significantly disrupt international air traffic. In its cash flow models, CRA takes into account the aircraft value reductions typically observed in times of crisis, as well as other transaction-relevant stress tendencies (e.g., in leasing conditions or remarketing processes), through stress assumptions.

Rating Cap

In view of the high relevance of unpredictable exogenous risks for the value and value stability of aircraft, CRA generally caps the rating scale for aircraft financings and securitizations at 'A+'. The rating cap reflects CRA's historical observation of risks from geopolitical interdependencies, aerospace-affecting natural disasters, and pandemics that may have effects on aircraft values. CRA reserves the right to deviate from this rating cap in individual cases (e.g., government-related airline as a cash flow-generating entity).

Measurement-Specific Levels of Analysis

In the rating process, CRA combines both quantitative and qualitative analytical elements. Complementing quantitative data with qualitative assessment criteria enables CRA to consider rating-relevant aspects that cannot be operationalized, or can only be operationalized inefficiently, in the CRA cash flow model, particularly due to complex interdependencies or measurement-specific limitations.

PD Approach and Default Simulations

CRA assigns ratings to financial instruments in commercial aircraft transactions based on a probability of default (PD) approach. For this purpose, default risks of cash flow-generating entities (and potentially full recourse entities) and expected losses in the event of default (Loss Given Default) are operationalized at the underlying asset level within numerous default simulations. The resulting cash flow distributions are compared with the applicable transaction-specific payment obligations at the level of the financing instrument. Simulation runs, in which a timely and full repayment of the payment obligations vis-à-vis the financial instrument to be rated is not given, are recorded as defaults. The relative frequencies of the recorded defaults are compared with the CRA PD Term Structure to derive a rating opinion.

Credit Risk Analysis

CRA examines eligibility and investment criteria according to the financing structures along the relevant financing chain, as well as the specific concentration risks within the portfolios to be analyzed. In preparation for cash flow modeling, CRA makes assumptions about the creditworthiness of the cash flow-generating entities and potential guarantors or recourse-providing entities, depending on data availability and quality, and based on internal and external benchmarks and assessments of historical performance.

Cash Flow Modeling

CRA models relevant cash flows over the transaction's term to assess the default risk of a financial instrument, considering the payment terms agreed upon in contracts. Along the financing chain, CRA also makes assumptions about cash flow-relevant parameters in possible subsequent agreements (e.g., in leasing contracts) in order to generate a consistent set of cash flows.

Rating-Scenario-Conditional Stress

CRA evaluates the stress resistance of analyzed commercial aircraft transactions and the associated default risk by applying rating scenario-conditional stress potentials to the simulated cash flow distributions. An improvement of the rating scenario tested in the course of simulation runs (e.g., from 'BB+' to 'BBB-') will result in an incremental increase of the underlying stress potential applied by CRA for individual model parameters.

Market Data

CRA utilizes historical and forecast market data, including information on aircraft values, lease rates, and remarketing phases to derive and validate analytically relevant model parameters. These regularly updated datasets cover several economic cycles and are applied to the assessment of aircraft at individual and portfolio level, as well as to CRA's cash flow modeling and default simulations.

4.2 Structural Risks

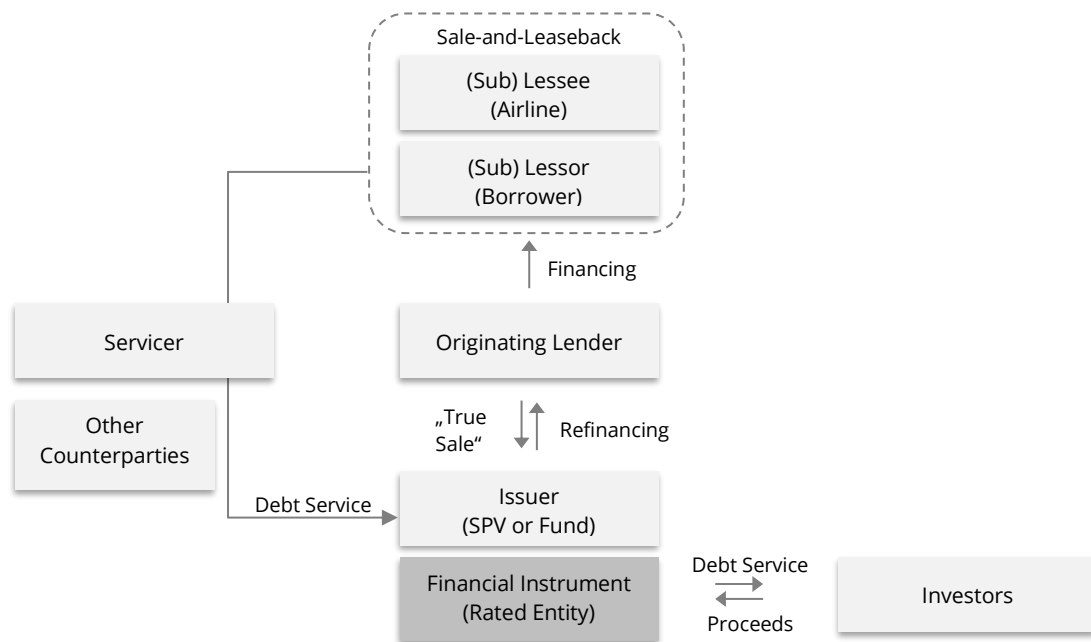
4.2.1 Transaction Types

Typically, a distinction can be made in the aircraft ABF market between single asset and portfolio investments. The contractual documentation and the number of aircraft financed as reflected in the financing structure determine whether a single credit risk exists or a portfolio of aircraft (potentially with specific individual contracts and leasing agreements), that needs to be analyzed. This also involves examining agreements for cross-collateralization and cross-default provisions within the collateral framework.

The spectrum of observable aircraft ABF transaction structures is diverse, ranging from traditional loan financings, where an airline (as borrower) finances a single aircraft or multiple aircraft purchases, to lease financings and sale-and-leaseback transactions, where an airline sells one or more aircraft and leases them back as lessee. In these structures, special purpose vehicles (SPVs) can act as lessors and borrowers, but also as lenders to refinance the purchase of aircraft.

One of the most prevalent structures in the market are securitizations of the partial refinancing of debt, which in turn represents the refinancing source for sale-and-leaseback transactions for commercial aircraft. The focus of this sub-methodology is primarily on commercial aircraft transactions with sale-and-leaseback components, as illustrated in Figure 1.

Figure 1. Securitization Structure with a Sale-and-Leaseback Component (Exemplary).



4.2.2 Financing Structure

The analysis of the financing structure of a commercial aircraft transaction includes the identification, classification, and assessment of relevant risk sources and drivers. CRA analyzes the key contractual agreements of the underlying financing. The results of the analysis are incorporated into the cash flow model and provide information about potential cash flow risks.

Depending on the risk profile of the relevant financing components, CRA analyzes distinct and interdependent contractual risks in (individual) loan agreements, credit facility or intercreditor agreements, as well as sub-participations. Determinants of these contractual risks include, in particular, existing interest

and repayment schemes, agreed terms and maturities, maturity matching, cost and fee structures, scope and quality of collateral and insurance coverage, as well as ordinary and extraordinary termination rights. In addition, it is examined whether interest rate and currency risks exist and to what extent hedging instruments are in place, if applicable.

The analysis of the source of funds assesses the individual financing components for a specific aircraft financing. The essential starting point for the risk analysis is the debt-to-equity ratio (or the leverage level) used to finance the purchase price of an aircraft, taking into account specific cost and fee structures. Furthermore, the capital structure determines the rank or seniority of financing instruments, the amount of debt service obligations, as well as the loan-to-value (LTV) ratio within the framework of debt collateralization. Debt financing instruments can be provided through individual and syndicated loans - and in the form of both senior and junior debt or mezzanine financing (or a combination thereof).

The asset analysis examines the expected returns from the investments along the financing chain, including the realization of collateral. In addition, payment priorities, alternative repayment terms (such as prepayments) and any control mechanisms and trigger events in place are recorded. For example, credit deteriorations of the relevant contractual or financing parties, violations of airworthiness directives, or violations of agreed (financial) covenants could trigger a strengthening of existing collateral or additional collateralization. This may involve, in particular, calls upon guarantees or reserve accounts, which usually have to be provided by the head lessor or equity provider of the transaction.

4.2.3 Eligibility and Investment Criteria

For dynamic portfolio investments with a specific blind pool risk during the investment phase CRA analyzes whether suitable or mandatory investment criteria are in place, which may ensure that all investments are made within a comparable structure relating to a specific risk profile during the portfolio development and expansion.

4.2.4 Collateral

CRA isolates relevant debt obligations within the financing structure to assess the existence, extent, and enforceability of collateral. The primary goal is to determine the amount of proceeds from the liquidation of collateral available to meet contractual payment obligations in the event of a default along the relevant financing chain and at the level of the rated financing instrument.

For this, CRA assesses whether substantial, particularly secured collateral (such as aircraft mortgages) exist or whether creditors of the rated object have only contractual claims on cash flows. Since the con-

tractual provisions or structure-relevant characteristics related to collateral can vary across different levels of the financing structure, it is crucial to analyze whether cash flows from the liquidation of collateral are explicitly and sufficiently available to timely service the claims at the level of the rated object.

The commercial analysis includes the review of existing security and trust agreements, aircraft mortgage deeds or registered security interests, and insurance policies. Existing cross-default clauses and cross-collateralization arrangements are identified, as well as contractually agreed recourse rights, covenants, and payment guarantees. Furthermore, CRA analyzes whether and to what extent pledges or assignments of claims along the relevant financing chain are agreed, such as income for maintenance, repair, and bullet reserves, or claims arising from leasing and insurance contracts.

Regarding the risks of enforcing international security interests in movable assets, a fundamental check is conducted to determine whether the Cape Town Convention applies. If the Cape Town Convention has not been ratified by the countries, in which the relevant contracting parties are domiciled, a contingent risk must be considered as the collateralization of the aircraft financing may not be enforceable, or may only be enforceable to a limited extent, under international law. Therefore, in individual cases, it is examined whether additional collateral has been provided to ensure an overall sound collateralization.

The assessment of specific collateral characteristics within the financing structure allows CRA to draw conclusions about the type and extent of existing credit enhancement structures, for example, in the form of over-collateralization, subordinated liabilities, credit lines, or reserve accounts. The findings from the analysis of the collateral structure of a commercial aircraft transaction provide CRA with crucial input for subsequent cash flow and default analyses. If specific collateral characteristics cannot be adequately or sufficiently captured in the quantitative model, they may also be considered qualitatively in the overall assessment.

4.2.5 Counterparty Risks

CRA evaluates dependencies that may exist vis-à-vis parties involved in the transaction. Counterparty risks, such as those arising from the provision of derivatives (currency/interest rate hedging instruments), credit lines, or financial guarantees, are risks that go beyond the credit risk of the loan pool. Key participants, such as managing banks or trustees, insurance companies, and swap counterparties, are examined in the rating process. These risks are incorporated into the overall assessment.

4.2.6 Interest and Currency Risks

CRA analyzes risks that may arise in the future for aircraft financings and the servicing of financial instruments in light of global interest rate developments, based on the contractual basis of a specific commercial aircraft transaction. For example, variable-rate financing carries an interest rate risk or an increasing repayment risk, particularly in a rising interest rate environment. In case of aircraft financings with variable interest rates, CRA examines whether fixed interest rates have been agreed along the relevant financing chain for instance, at the leasing level or the level of the rated financing instrument.

For commercial aircraft transactions with leasing components, CRA verifies whether the lease payments made by the lessee cover the lessor's financing costs during the financing term in a consistent manner. This aspect of the analysis is particularly relevant when the lessor is a special purpose entity that has no other sources of income to service the debt. In such financing structures, CRA checks whether specific parties are liable for this risk or whether appropriate interest rate hedging agreements are in place.

At the time of this methodology's publication, global aircraft financing and the purchase and sale of commercial aircraft are conducted predominantly in USD. In principle, CRA assumes that any sale will be made in USD, particularly in a recovery event. Within the overall context and when applying CRA's look-through approach, which involves a methodological and analytical review of the entire financing structure for a specific aircraft financing, down to the cash flow-generating entities (airlines or potential guarantors), currency risks are explicitly taken into account by CRA.

Currency risks arise in particular when rated objects or financial instruments are to be serviced in different currencies than the underlying asset (USD), such as EUR or GBP. In addition, exchange rate risks can arise in commercial aircraft transactions denominated uniformly in USD if cash flow-generating entities generate their revenues primarily in their local currency and therefore potentially not in USD. This can have a negative impact on the timely and full servicing of USD loans or lease obligations and is therefore taken into account by CRA in the analysis.

The examination of currency risks focuses on whether and to what extent suitable hedging instruments have been installed to secure the cash flows needed to meet payment obligations at the rated entity level in a timely and term-congruent manner.

4.2.7 Legal, Regulatory, and Tax Risks

CRA assesses potential structural deficiencies or risks in specific commercial aircraft transactions by taking into account the complexity and the multiplicity of relevant jurisdictions. This assessment is based

on the analysis of contracts and legal opinions provided.³ If construction deficiencies or risks are identified, the analysts provide an assessment of these risks. In particular, for investments with a complex overall financing structure involving various contractual parties across technical, legal, supervisory, tax, and economic dimensions in various legal jurisdictions, CRA notes that corresponding contractual construction risks can only be evaluated from a commercial perspective.

For financings based on tax-optimized conditions, CRA assumes that the tax conditions will remain unchanged for the term of a specific financial instrument, so that, all things being equal, the servicing of the financial instruments should generally be ensured. Any discontinuation or potential adjustment of tax conditions is considered by CRA as a contingent risk in the qualitative analysis. CRA points out that subsequent tax effects, especially those affecting the creditors of the financial instruments or investors, are not part of the analysis.

The discussion of legal, regulatory, and tax aspects does not constitute a legal opinion by CRA, nor does CRA internally create legal reviews as second opinions. CRA forms a commercial opinion on these documents; neither a legal review nor a due diligence review in the traditional sense takes place.

4.3 Operational Risks

CRA evaluates operational risk in commercial aircraft transactions by monitoring the international market and assessing market cyclicity, based on historical, current, and anticipated market factors. The primary objective of this market screening is to identify and anticipate supply and demand dynamics that particularly affect aircraft value performance and secondary market liquidity. In addition to macro-economic indicators and industry KPIs, information on topics such as market regulation and infrastructure is considered periodically. The database underlying this analysis is obtained, on one hand, from publicly available sources (such as the International Air Transport Association, IATA). On the other hand, documents and data on airlines and lessors are requested within the scope of client relationships, which complement the review of market and industry developments. Moreover, observable product strategies and pricing policies of industry-relevant OEMs are considered in CRA's market analysis. The OEMs can fundamentally influence supply and demand behavior and thus price realization in primary and secondary markets of the international aircraft industry.

³ CRA notes that a plausibility check of the contractual documentation can only be conducted on an ad hoc basis and that no legal analysis of the underlying contracts is carried out by CRA.

4.3.1 Market Cycles

Findings from the market analysis are incorporated into CRA's quantitative analysis, in which rating scenario-specific stress tests are performed that include assumptions and forecasts about the future development of the aviation industry cycle and take potential periods of crisis into account. CRA analyzes the extent to which economic downturns can affect and negatively influence the international aviation business. Based on these parameters, CRA evaluates whether secondary market prices for commercial aircraft may develop negatively for a limited period or permanently and, thus, deviate from the statistically measured average values in functioning markets.

4.3.2 Oil Price Development

The development of oil prices, and consequently fuel costs, has a significant global impact on the procurement and operation of commercial aircraft. During periods of historically low oil prices, for example, airlines and lessors tend to operate less fuel-efficient aircraft for comparatively longer periods. This typically has a positive effect on the demand and secondary market prices of those aircraft and temporarily reduces the pressure to procure newer, more energy-efficient aircraft. Furthermore, falling fuel costs can have a positive impact on the operating results and, *ceteris paribus*, the creditworthiness of airlines.

4.3.3 Interest Rate Development

CRA monitors interest rate developments and analyzes their impact on the general supply and demand for aircraft financing. For example, aircraft financing transactions could generally be concluded at comparatively attractive interest rates during periods of low interest rate policies. This favors, *ceteris paribus*, both the market launch of new aircraft models and the global order volume. In a market environment characterized by rising interest rates, particularly variable-rate financing becomes correspondingly more expensive. CRA considers interest-rate-driven effects in its cash flow modeling that could potentially have a negative impact on the servicing of payment obligations at the level of the rated object.

4.3.4 Inflation

The level and development of inflation rates are considered in CRA's analyses. The inflation rate, which is regularly published by the IMF for the G7 countries, serves as a measure of inflation trends. On this basis, and taking into account economically relevant framework parameters, CRA reviews the future development of inflation rates on a rolling basis. Based on inflation expectations, CRA examines their impact on the development of forecasted secondary market prices for commercial aircraft.

4.3.5 Asset Manager

In CRA's understanding, the asset manager in the technical and commercial sense – as is the case in the majority of typical aircraft ABF transactions – is the airline, which simultaneously acts as the borrower or lessee, for example, in transactions with a sale-and-leaseback component. As the cash flow-generating entity, the airline operates the financed aircraft or the pool of financed aircraft.

CRA's qualitative analysis of the asset manager considers the airline's business model, strategy and market positioning, as well as its fleet policy.⁴ Depending on whether the transaction is a finance lease or an operating lease, CRA additionally examines, on a case-by-case basis and based on the contractual agreements, the extent to which the airline or lessee is responsible for the maintenance and repair and, thus, for the preservation of the asset's value.

4.3.6 Servicer

In CRA's understanding, the servicer is typically a leasing company, the operating lessor, or the equity provider in a specific aircraft ABF transaction. Depending on data availability and quality, CRA analyzes, among other aspects, the servicer's financial position, track record, functional expertise, order book, and the existing portfolio of leased aircraft assets. In this context, CRA analyzes the portfolio structure, including its composition by aircraft type, age, and technology status. Furthermore, CRA may, on a case-by-case basis, inquire various aspects of the technical management of the aircraft fleet during servicer interviews, as well as further information on the servicer's experience and expertise in the areas of aircraft remarketing and repossession. A sample excerpt of a topic catalog for the servicer review is included in Appendix II of this sub-methodology.

4.4 Credit and Portfolio Risks

The credit quality of an aircraft ABF transaction primarily depends on the ability of the debtor to service the interest and principal payments at the level of the rated object. Cash flows for these obligations come from two sources: operating revenues from airlines acting as borrowers or lessees, and recoveries from collateral or guarantees after defaults or non-performance events. Accordingly, CRA analyzes credit and portfolio risks on two different levels: first, evaluating the creditworthiness of the relevant cash flow-

⁴ It is important to note, in this context, that CRA's analysis for aircraft ABS ratings generally does not involve direct contact with the airlines. Therefore, in addition to due diligence information, publicly available information is utilized.

generating entities (see 4.4.2); second, assessing the value of transaction collateral (individual aircraft assets or aircraft portfolios, see 4.4.3).

4.4.1 Portfolio Structure

In analyzing portfolio structure, CRA assesses whether investments involve static or dynamic portfolios with blind pool risks. Portfolio effects from diversification and granularity are reflected in CRA's cash flow model. CRA also identifies potential concentration risks within the financed aircraft portfolio or counterparty concentration

4.4.2 Probability of Default

CRA identifies cash flow-generating entities, as well as any other parties relevant to the probability of default of an aircraft financing. CRA generally distinguishes the following main financing structures with regard to the probability of default:

- i. Direct financing of airlines within ABF structures, where the borrowing airline primarily drives the aircraft financing's probability of default.
- ii. Financing with a sale-and-leaseback component, where the airline acting as lessee primarily drives the aircraft financing's probability of default. In this context, the lessor (acting as borrower in the transaction) is not analyzed if it is a special purpose entity or a limited liability entity that is not subject to any other risks outside the relevant transaction.
- iii. Financing as described in i. and ii. where additional entities act as cash flow-generating entities (e.g., in the form of guarantors or equity providers) and limited or full recourse rights must be considered.

Based on the existing financing structure and depending on data availability and quality, the creditworthiness of the entities that are subject to credit risk (lessees or borrowers, and potentially guarantors and other recourse-providing entities) is assessed using internal and external benchmarks, analytical tools, and historical performance evaluations.

The creditworthiness determined for the transaction or portfolio is operationalized using probabilities of default (PD) and incorporated into the default simulation of individual exposures within the cash flow model (4.5.1). The PD parameterization performed by CRA is carried out for the entities that are subject to credit risk at the time the rating is assigned.

The PD in an aircraft ABF transaction is additionally influenced by the duration and cost of remarketing and repossession phases.⁵ CRA assumes the commencement of a potential remarketing phase prior to the contractual expiry of the lease agreement and in the event of a lessee default. A repossession phase is additionally assumed in the event of default. As the duration of these phases drives the amount of additional costs incurred, the servicer's ability to minimize these phases is an important factor influencing an aircraft financing's PD. Based on CRA findings from the servicer review and on the basis of expert interviews with industry-specific service providers, a rating-scenario-specific set of stress assumptions is compiled. Table 1 provides examples of CRA's assumptions regarding remarketing phases:

Table 1. CRA Assumptions on Remarketing Durations in Months (Exemplary).

CRA Rating Scenario	No Downturn Period	Downturn Period
A+	3 to 4*	6 to 8
BBB	2 to 3	5 to 6
BB	1 to 2	3 to 4

*The assumed durations are contingent upon factors including the CRA aircraft class, as detailed in Section 4.4.3

In the event of default, CRA may also apply a "repossession penalty" within the framework of quantitative modeling. It describes a percentage reduction on the calculated residual value of an aircraft at the time of default. This reduction assumption depends, among other factors, on the applicable jurisdiction and is therefore case-specific. While the discussed parameter values represent CRA's standard assumptions, deviations from these assumptions are generally possible based on case-specific findings, such as those relating to servicer quality and track record.

4.4.3 Aircraft Assessment and Aircraft Value Projection

The assessment of current aircraft values and expected value development is crucial for cash flow modeling and the formulation of recovery assumptions. CRA classifies individual aircraft based on value-driving factors and attributes in terms of value stability and marketability. Within the quantitative analysis, aircraft are subject to class-specific value reductions, which are regularly reviewed. CRA distinguishes between three aircraft classes (also referred to as CRA Aircraft Classes, AC Classes or Tiers). The classification approach results from data sets obtained by CRA on historical aircraft values (Market Values by

⁵ In CRA's understanding, aircraft remarketing refers to all efforts aimed at finding a follow-on lease. A remarketing phase can therefore be triggered by the contractual expiration of a lease agreement, as well as by performance issues at the financing level or a default by the borrower or lessee. In the latter cases, a repossession phase also begins with the aim of returning the aircraft or regaining possession.

Aircraft Type and Vintage) and value reductions over a period covering several economic cycles. This database forms the basis for class-specific value decline assumptions within the quantitative analysis. Besides, CRA's aircraft tiering is based on individual aircraft parameters and assessments of their secondary market liquidity. The table below lists the underlying class profiles and a non-exhaustive selection of classification-relevant parameters:

Table 2. CRA Aircraft Classes and Class Attributes (Exemplary).

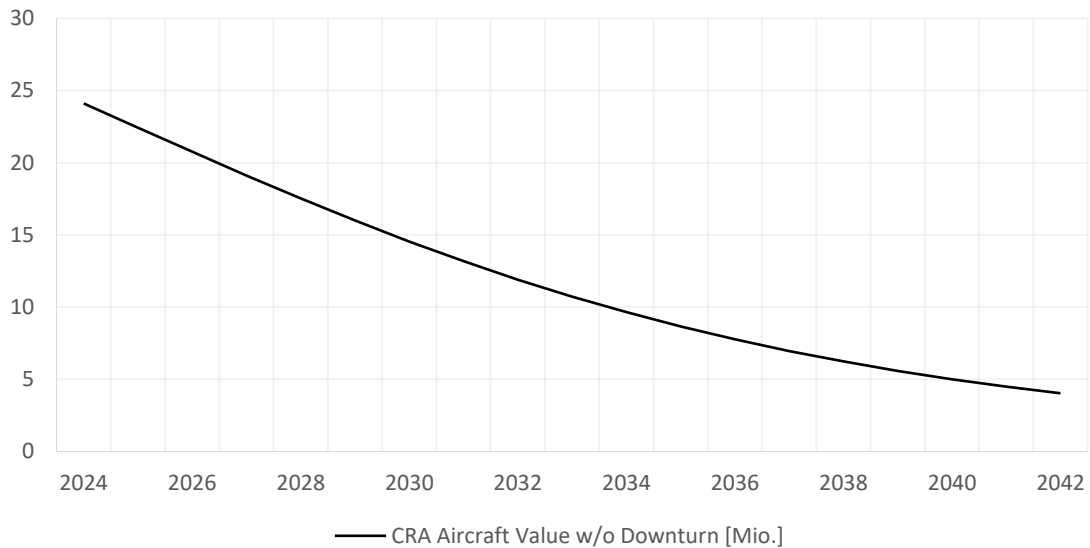
Profile	CRA Aircraft Class 1	CRA Aircraft Class 2	CRA Aircraft Class 3
Aircraft Value Retention	High	Moderate	Low
Aircraft Marketability	Good	Moderate	Poor
Attributes (selection)			
Aircraft Age	Low ◀-----▶ High		
Aircraft Type Age	Low ◀-----▶ High		
(...)	(...)		
Fuel Efficiency	High ◀-----▶ Low		
Market Penetration	High ◀-----▶ Low		
Order Volume & Quantity	High ◀-----▶ Low		

As time-specific aircraft parameters, such as aircraft age or relevant model type, are drivers of the value performance and secondary marketability, it is important to note that an aircraft can migrate from an initially assigned class in later periods.

CRA's assumption for the Day-One value typically results from external aircraft appraisals. As part of the data request, CRA generally uses two independent aircraft appraisals from established industry appraisers that are provided to CRA by the client of the rating. The decision regarding the underlying Day-One aircraft value (Market Value or Base Value; Half-Life Value or Full-Life Value) is made on a case-by-case basis, taking into account observable value dispersion, internal validation, and specific parameters related to the aircraft's maintenance status.

CRA makes periodic value adjustments to the Day-One aircraft value over the assumed useful life, which are derived and validated using historical data sets and external appraisals available to CRA. The aircraft values determined over time represent CRA's assumption of the non-stressed value performance of the aircraft. Figure 2 outlines an exemplary depreciation schedule for a Narrow-Body aircraft.

Figure 2. CRA Aircraft Value Projection without Crisis-related Value Haircuts (Exemplary).



Aircraft Manufacture	Aircraft Type	As-is Aircraft Value	(Initial) CRA Aircraft Class
June 2017	Narrow-Body	USD 24.2 Mio.	2

AC Age	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
AC Depreciation	4 to 7% p.a.							7 to 10% p.a.							10 to 11% p.a.					

For the majority of aircraft types analyzed, CRA typically assumes a maximum useful life of 25 years. Deviations from this assumption are possible on a case-by-case basis, for example, when passenger aircraft are converted into freighters towards the end of their product life cycle and are fully maintained or overhauled in the process. Any residual value haircuts at the end of the aircraft's useful life may be considered in sensitivity analyses.

4.4.4 Inflation Adjustments

Since CRA's data set for historical sales prices (Market Values) of commercial aircraft already incorporates historical inflation rates and their development, no separate inflation adjustment is applied to the values when projecting future sales prices for specific aircraft. CRA reviews this approach periodically in light of observed inflation rate developments and applies adjustments to it if necessary.

4.4.5 Aircraft Maintenance Status

CRA analyzes the maintenance status or maintenance cycles of commercial aircraft. The maintenance status has a significant impact on the value performance and value retention of aircraft, especially when offered for sale in the secondary market or a subsequent financing or lease is planned. CRA assumes that maintenance efforts and the associated costs increase disproportionately with aircraft age, and that the aircraft relevant for the analysis are typically between maintenance cycles, i.e., in so-called Half-Life status. Depending on the maintenance status or based on separate contractual agreements, the Half-Life status assumption can be relaxed in individual cases, and a maintenance status that is closer to Full-Life status, i.e., a fully maintained aircraft, can be assumed.

In CRA's understanding, the majority of contractual agreements within the framework of an operating lease stipulate that the lessee bears the ongoing costs of the prescribed maintenance of an aircraft and may be liable for them. If an aircraft is repossessed due to an airline default, there is a corresponding risk that significant investments will have to be made for any outstanding maintenance work. Against this background, CRA examines on the basis of annual financial statements and current quarterly or half-yearly financial information whether airlines have generally met their maintenance obligations or are in a position to do so. Depending on the creditworthiness of a lessee or an airline, maintenance reserves, security deposits, or alternatively, end-of-lease compensations may be agreed upon on a contractual basis.

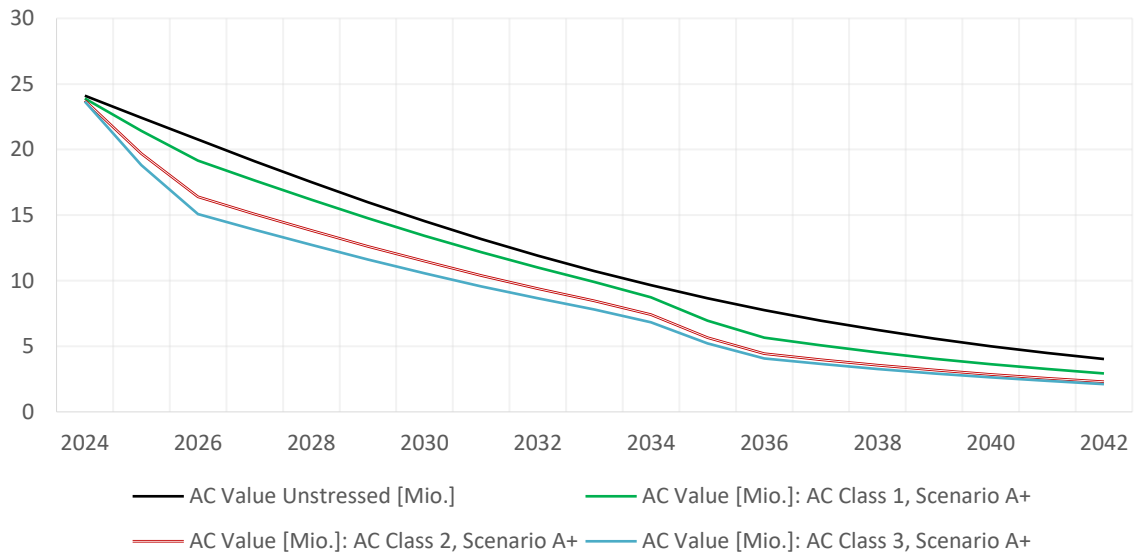
In particular, maintenance reserves serve to mitigate credit risk and are typically imposed on airlines with weaker credit quality. For the assessment of aircraft values, maintenance reserves, security deposits, and end-of-lease compensations may be included in the derivation of expected recovery rates on a case-by-case basis, if the financing parties have concluded corresponding agreements.

4.4.6 Crisis-Related Aircraft Value Adjustments

In addition to the class-specific *base depreciation*, aircraft values are subject to rating scenario-specific stress or *crisis depreciation* within the modeling framework. CRA concludes this additional value stress from observed aircraft value reductions during market downturns or periods of crisis. Value reductions extracted from historical data during crises in the aviation industry serve as a reference point for CRA's 'B' rating scenario.

The rating scenario-specific stress on individual aircraft values increases incrementally, *ceteris paribus*, with an improvement of the rating scenario being run (e.g., from 'BB+' to 'BBB-'). Similarly, CRA applies

Figure 3. Unstressed and Stressed Value Curves for the Rating Scenario 'A+' and AC Classes 1, 2 and 3 (Exemplary).



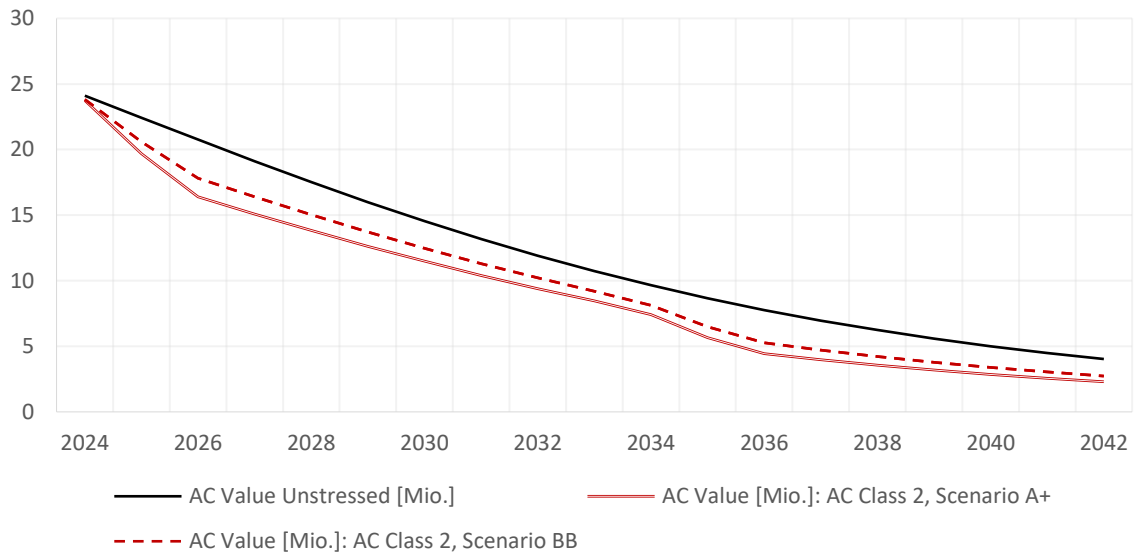
relatively higher stress, ceteris paribus, to aircraft classified as relatively inferior according to CRA's aircraft classification (e.g., CRA Tier 2 compared to CRA Tier 1). The data sets underlying CRA's assumptions regarding base and stress haircuts are updated regularly.

Figure 3 illustrates, using the rating scenario 'A+' as an example, both unstressed and stressed value curves of the Narrow-Body aircraft specified in Figure 2. Moreover, it shows additional value curves to demonstrate the impact of aircraft categorization into *different* CRA aircraft classes. Figure 4 shows an exemplary set of *scenario-specific* value curves for a CRA Class 2 aircraft, specifically the one specified in Figure 2.

CRA makes assumptions about the frequency and duration of crises based on historical data and taking into account the findings from market analyses. CRA typically models two to three crisis periods during the aircraft's useful life, each with an effective crisis-related stress increase lasting for 24 months.

During the rating process, CRA generally does not physically inspect the financed aircraft. CRA assumes that the financing parties - especially banks and lead arrangers - will perform this task as part of their collateral due diligence and verify on-site that the financed aircraft match the contractually designated aircraft. Once the aircraft are operational, CRA may use publicly available information, such as live flight trackers, to monitor where the assets are located in flight operations.

Figure 4. Unstressed and Stressed Rating Scenario-Specific Value Curves for a CRA Class 2 Aircraft (Exemplary).



4.5 Cash Flow Modeling

Based on the findings from the structural analysis, specific and quantitatively measurable characteristics of the current commercial aircraft transaction, such as operational cash flows, interest and amortization terms, costs and fees (at the level of the issuance and investment vehicle), as well as trigger mechanisms and payment priorities, are incorporated into cash flow modeling.⁶ Additionally, risk buffers provided by collateral elements, liquidity and cost reserves, and other sources for credit enhancement or impairment are considered in the quantitative analysis. Modeling these mechanisms enables the examination of cash flows generated from the assets in relation to the debtor's payment obligations. In various rating scenarios, specific stress factors are applied to assess the stability and adequacy of the cash flows and to evaluate the risk of incomplete or untimely fulfillment of investor claims for a specific financial instrument, particularly in crisis situations. The CRA cash flow model also processes and analyzes various scenarios regarding the timing of expected defaults and losses and the impact of early repayments.

4.5.1 Cash Flow Simulation and Default Modeling

As part of its quantitative analysis, CRA models the cash flows underlying the commercial aircraft transaction. While the initial lease program (i.e., lease rates, payment dates) is derived from the contractual

⁶ CRA explicitly reserves the right to make simplifications, particularly in the case of waterfall structures with multiple payment tiers and reference metrics.

agreements, CRA makes assumptions regarding cash flows that may arise from subsequent lease agreements during the aircraft's useful life. These assumptions are based, on one hand, on data sets on historical aircraft values (Market Values by Aircraft Type and Vintage) and the corresponding lease rates over a period covering several economic cycles. On the other hand, CRA validates the transaction- and aircraft-specific assumptions using due diligence findings and considering external appraisals. CRA follows the Lease Rate Factor (LRF) approach: i.e., lease rates for future points in time are derived from the assumed aircraft values at those points in time.

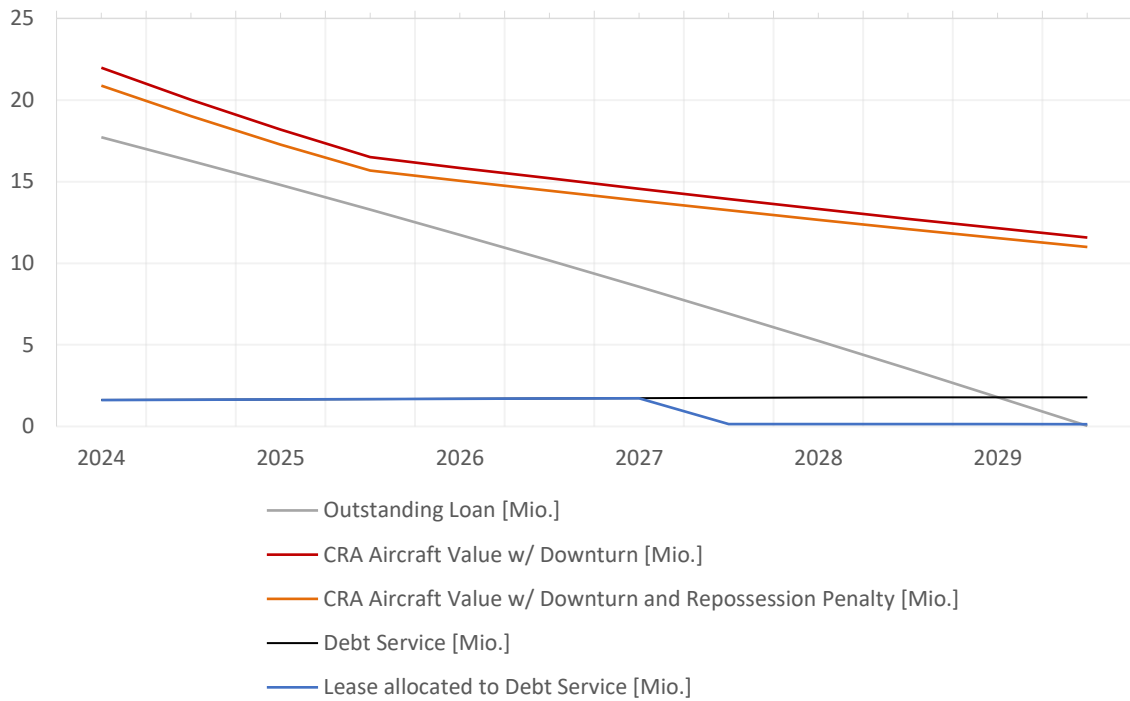
While the point-in-time aircraft value assumptions are generated as part of the aircraft assessment (4.4.3), the LRF assumptions are derived and validated using the aforementioned information sources. The forecasted lease rates are therefore also subject to the stress factors applied to the aircraft value. Upon expiry of a lease agreement, as well as in the event of a lessee default, a subsequent lease agreement may be concluded following remarketing phases and depending on the forecasted lease rates. For modeling purposes, CRA makes assumptions about the term of potential subsequent lease agreements during the remaining useful life of the aircraft. These assumptions are based on exchanges with industry-specialized analytical and consulting institutions, as well as on comparisons with track record data from relevant market participants. In this context, CRA applies rating scenario-specific stress as well as additional stress factors applied in crisis periods to the term assumptions made.

The lease cash flows modeled on the basis of the aforementioned assumptions are accompanied in the modeling process by assumed remarketing phases, which represent significant drivers of default risk. Remarketing phases are triggered in the cash flow modeling either by the natural end of the relevant lease term or by the default of the cash flow-generating entity (or entities). CRA simulates the latter based on the approach described in 4.4.2.

Consequently, the PD assumptions for the cash flow-generating entity (or entities) are incorporated into the CRA cash flow model and, together with the described aircraft value, lease and remarketing assumptions, constitute the primary asset-side components of the quantitative analysis.

Within the simulation framework, the asset-side model assumptions are combined with the corresponding transaction and financing specifics, particularly the exposure amounts and the specific interest and principal payment modalities. Risk buffers provided by collateral elements, as well as all other identified credit enhancements are also considered in the simulation at their planned levels. CRA simulates the cash flows based on different rating scenarios. The various rating scenarios, which conceptually follow the CRA rating scale (e.g., rating scenario 'A+'), are linked to different asset-side stress assumptions.

Figure 5. Simulation Run for the Rating Scenario 'A+' (Exemplary).



Rating Scenario	Lessee Credit Quality	Financing Term	Repossession Penalty
A+	B	Apr 2017 - Sep 2029	5%

Year	Event	CRA Aircraft Value (w/ Rep. Penalty)	Outst. Loan	LGD
2027	Lessee-Default	USD 15 Mio. (USD 14 Mio.)	USD 9 Mio.	--
2027	Loan-Default	USD 15 Mio. (USD 14 Mio.)	USD 9 Mio.	--

Figure 5 illustrates a sample simulation run for the "A+" rating scenario, using a CRA Aircraft Class 2 aircraft as defined in Figure 2. The key events generated during this simulation run are highlighted. The simulation run illustrated above produces a lessee default during the term of the financing, with a subsequent re-lease option. In this case, the lease rates forecasted upon conclusion of a re-lease are not sufficient to service the debt of the financing in accordance with the contractual terms. Consequently, a loan default is recorded. The expected recovery proceeds, based on the stressed CRA aircraft values, exceed the outstanding principal amount of the financing. CRA simulates a large number of runs for each rating scenario examined in order to be able to derive reliable statements on the probability of default of a financing given the stochastic nature of the model.

4.5.2 Sensitivity Analysis

The information gathered during the rating process is used to construct Best-, Base-, and Worst-Case assumptions regarding the parameters of the cash flow model. Additionally, sensitivity analyses are conducted to examine how the quantitative Base-Case result changes with variations in individual parameters. This allows for an assessment of the impact of uncertainty and risk concerning the input parameters and the resulting changes in the evaluation of the rated entity.

4.6 Qualitative Analysis

In the rating process, CRA combines both quantitative and qualitative elements to arrive at a final rating result. The incorporation of qualitatively captured evaluation criteria allows CRA to consider rating-relevant aspects that, due to complex interrelationships or measurement-specific limitations, cannot be fully or only partially operationalized in the CRA cash flow modeling. Qualitative parameters relevant to the rating are captured and processed through a scoring approach during the analysis. The qualitative assessments of the scoring model are summarized in such a way that, based on the results of the quantitative analysis, a systematic upgrading or downgrading by several notches can be applied to determine the final rating result for a financial instrument. Key evaluation criteria included in the CRA scoring approach are listed in Appendix II, though this list is not exhaustive.

Appendix I: CRA Documentation Requirements (Exemplary)

Initial Rating

1. Foundation Documents: Commercial registry excerpts, bylaws, meeting minutes, etc.
2. Term Sheet / Issuance Conditions
3. Latest Audited Annual Financial Statements of the debtor or relevant compartment
4. Subscription/Purchase Contracts, fund/sub-fund conditions, prospectuses, memoranda
5. Cash Flow Model / Fund Model: Fully integrated with assumption structure
6. Detailed Information on Issuance-Related Costs and Fee Structures
7. External appraisals with current and forecasted Half-Life Base and/or Market Values
8. Final Credit Decisions/Waivers
9. Interest and Amortization Schedules: Linked by formula for total financing and derived for acquisition tranches (incl. interest and amortization components, acquisition rates, FX rate, if applicable)
10. Bible Documentation at the level of senior loan financings
11. Last Three Annual or Consolidated Financial Statements of the cash flow-generating entities (Lessee/Sub-Lessee; borrower if ≠ SPV; full-recourse units or guarantors)
12. Track Record: Asset Manager/Service
13. Summary Documents regarding risk management and investment process
14. Transaction Documents (Pricing Letter, Transfer Certificate, Proceeds Agreement, etc.)
15. Summary Legal Due Diligence of individual transactions (Review Memos)
16. Deal Pipeline

Monitoring

1. Current Fund/Investor Reporting (at least quarterly)
2. Audited Annual Financial Statements of the debtor or relevant compartment
3. Updated Cash Flow Model / Fund Model
4. Updated External appraisals with current and forecasted Half-Life Base and/or Market Values
5. Ongoing Documentation of source of funds (emissions) / use of funds (acquisition of loan tranches)
6. Ongoing Drawdown and Distribution Notices
7. Updated Interest and Amortization Plans (linked by formula)
8. Updated Annual or Consolidated Financial Statements of the cash flow-generating entities
9. Current Quarterly or Semi-Annual Figures, especially of lessees
10. Updated Track Record: Asset Manager/Service
11. Updated Deal Pipeline

Appendix II: CRA Servicer Review (Exemplary)

1. Business Model	5.4 (Re-) Marketing
1.1 Strategy	5.4.1 Proactivity
1.2 Operations	5.4.2 Networking
1.3 Aircraft Focus	5.4.3 Track Record
1.4 Lessee Focus	5.4.4 Staffing
1.5 Geographical Focus	5.4.5 Costs
1.6 Concentration Risks	5.4.6 Aircraft Downtime
2. Capital Structure	5.5 Repossession
2.1 Funding Sources	5.5.1 Proactivity
2.2 Asset Management	5.5.2 Networking
2.3 Risks	5.5.3 Track Record
3. Order-Book	5.5.4 Staffing
3.1 Aircraft on Order (Actual)	5.5.5 Delivery
3.2 Aircraft on Order (Planned)	5.5.6 Costs/Aircraft Downtime
4. Management	5.6 Lessee Evaluation
4.1 Structure (CxO)	5.6.1 Credit Scoring Methodology
4.2 Experience n Times of Crisis	5.6.2 Historical Data/Samples
4.2.1 Lessee Defaults	5.6.3 Monitoring
4.2.2 Asset Value Declines	5.7 Lessee Negotiations
4.2.3 Lease Discounts	5.7.1 Terms and Conditions
4.2.4 Repossessions	5.7.2 Collateral (Maintenance Provisions)
5. Functional Competencies	5.8 Legal Department
5.1 Underwriting	5.8.1 Staffing
5.2 Receivables Management	5.8.2 Risk Management
5.2.1 Cash Flow Management	5.8.3 Scope of Analysis
5.2.2 Debt Collection	5.9 Insurance
5.2.3 Delinquency Management	5.9.1 Liability Insurance
5.3 Technical Management	5.9.2 Component Insurance
5.3.1 Lease (Maintenance Costs/Reserves)	5.9.3 Minimum Coverage
5.3.2 Asset Inspections	5.9.4 Validity (On-Lease/Off-Lease)
5.3.3 AD Compliance (Airworthiness Directive)	
5.3.4 Aircraft Tracking System	

Appendix III: Notching-Relevant Criteria (Excerpt)

A prerequisite for considering any of the criteria listed below in CRA's qualitative rating analysis (Notching) is always to verify the relevance of the specific criterion for the individual transaction, and to confirm that this criterion has not been or could not be adequately considered in the quantitative rating analysis.

Structural Risks (among others):

1. Collateral Structure Configuration
2. Availability of Relevant Additional Collaterals
3. Complexity and Transparency of the Overall Transaction
4. Possibility of Leveraged Financing at the Investment Vehicle Level
5. Mismatch of Deadlines within the Transaction Structure
6. Professionalism of Transaction Contracts
7. Presence of Conflicts of Interest within the Transaction Structure
8. Counterparty Risks (at all transaction levels)
9. Ongoing Legal or Tax Risks
10. Placement Risks
11. Etc.

Operational Risks, Portfolio, and Credit Risks (among others):

1. Relevant Market or Industry Developments
2. Track Record of the Asset Manager
3. Blind-Pool Risks Combined with the Degree of Restriction of Investment Criteria
4. Frequency and Robustness of Provided External Valuation Reports
5. Project Risks
6. Country Risks
7. Regulation Level of the Underlyings
8. Tail-Period Risks
9. Etc.