Consumer and Auto ABS Rating Methodology

Structured Finance

3 March 2022

Contacts

David Bergman
Managing Director
+49-30-27-891-135
d.bergman@scoperatings.com

Martin Hartmann
Associate Director
+49-30-27-891-304
m.hartmann@scoperatings.com

Paula Lichtensztein
Senior Consultant
+49-30-27-891-224
p.lichtensztein@scoperatings.com

Sebastian Dietzsch
Director
+49-30-27-891-252
s.dietzsch@scoperatings.com

Table of Contents

1. Introduction

This document is an update of our Consumer and Auto ABS Rating Methodology, last updated in March 2020. The updated methodology does not propose any material changes to our existing rating approach and does not impact any outstanding ratings.

2. Ratings and applicability

This document describes our approach to analysing European asset-backed securities (ABS) whose collateral consists of granular portfolios of unsecured consumer loans, secured loans or leases that finance new and used vehicles or machinery, and partially secured Italian payroll-deductible loans[1]. Appendix I outlines further analytical considerations to rating Italian payroll-deductible loans, and Appendices III to V are dedicated to the analysis of residual value and voluntary termination risks specific to auto ABS.

This methodology complements our General Structured Finance Rating Methodology and should be read together with our Rating Methodology for Counterparty Risk in Structured Finance Transactions. This methodology may also be applied selectively to consumer and auto ABS outside Europe.

3. Methodology highlights

Greater differentiation. Our analysis relies on transaction-specific input assumptions. We use a fundamental bottom-up approach to capture the different credit and market risks related to the assets and the transaction structure, all of which are considered in the context of the originator and the relevant jurisdiction. We also take into account the transaction's legal and counterparty risks. This approach allows greater rating and transaction differentiation, even for transactions by the same originator and in the same country.

Comprehensive framework. This methodology defines a comprehensive analytical framework for rating consumer and auto ABS securitisations. It considers the specificities of auto ABS exposed to credit risk, credit and residual value risk, or credit, voluntary termination and residual value risk (e.g. characteristic of UK auto ABS). The methodology also highlights our detailed approach to analysing Italian payroll-deductible loans (CQS loans). Our approach reflects the multiple layers of protection available to this kind of loan and the potential effects of events not covered by historical data, such as defaults of insurance providers or the sovereign, which may impact cash flows generated by CQS loans.

No mechanistic link to sovereign credit quality. We do not mechanistically limit a transaction's maximum achievable rating as a function of the sovereign credit quality of the country in which the assets are located. Instead, we assess convertibility risk and the risk of institutional meltdown in the context of the tenor of each rated tranche, factoring macroeconomics into the ratings. Some transactions are more exposed to sovereign default risk depending on the portfolio's type of loans, type of obligors, and the transaction's counterparties such as the originator or a guarantor.

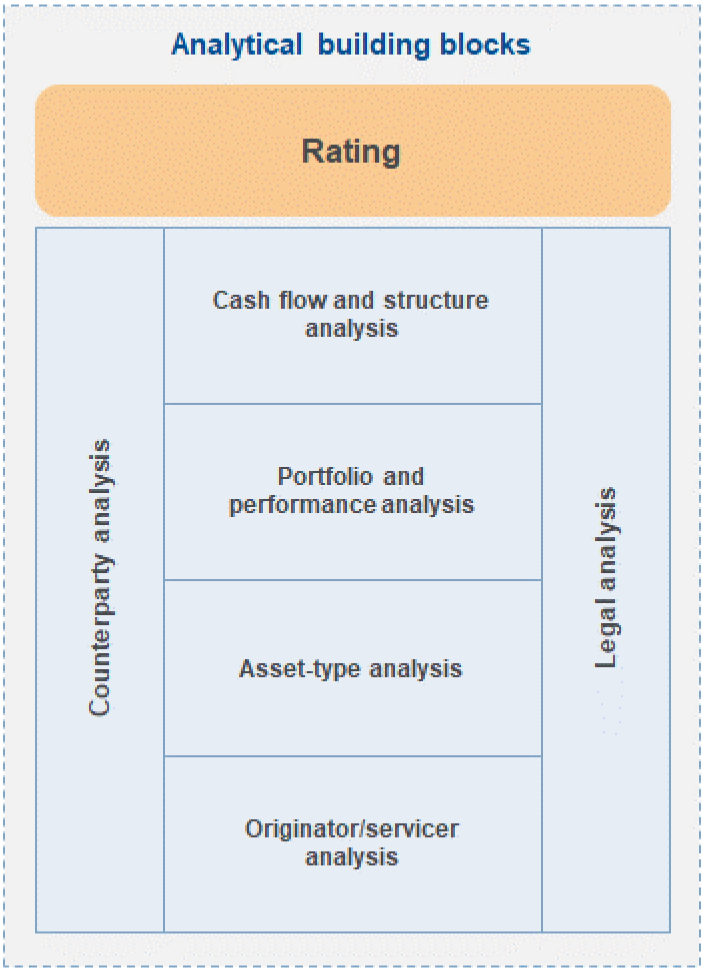
Originator analysis. We use the originator's knowledge of its customers. We form a credit view of the assets based on our analysis of the originator's market positioning, product portfolio, origination strategy, risk management and monitoring, and recovery functions.

Counterparty risk. We apply our understanding of the various bank recovery and resolution regimes created after the 2008 financial crisis. Traditional counterparty risk analysis and rating triggers in the context of these new regimes provide significant comfort that roles such as the transaction account bank or servicer can be performed by resolvable financial institutions without limiting the highest rating achievable by a securitisation, provided adequate structural protections are in place.

[1] Cessione del Quinto and Delegazione di Pagamento

4. Overview of analytical framework

Our analytical framework covers six areas: i) the originator and servicer; ii) asset types; iii) the portfolio and performance; iv) cash flow and structure; v) counterparties; and vi) the legal framework.



Our structured finance ratings reflect an investor's expected loss on a securitisation in the context of the investment's expected weighted average life. The expected loss accounts for the time value of money at the rate promised to the investor on an instrument. Our General Structured Finance Rating Methodology provides more detail on how we implement expected loss ratings.

We derive assumptions on the default rate, correlation and recovery for the portfolio using transaction-specific data, generally from the originator, and market data. We assume an inverse Gaussian distribution for the portfolio default distribution to analyse the transaction's cash flows. Our cash flow analysis incorporates key assumptions such as asset amortisation, prepayment rates, recovery rates, cure rates, default timing and interest rates. We analyse the expected loss of a tranche by applying recovery rate assumptions that have higher haircuts for higher-rated tranches (rating-conditional haircuts).

We use qualitative and quantitative inputs to analyse the transaction, accounting for the rating's sensitivity to key assumptions. The quantitative analysis or outputs alone do not dictate the final rating because our analysis also reflects qualitative and fundamental credit views on the key risks of a consumer or auto ABS transaction.

In this document, we present the six areas we analyse for new securitisations and when monitoring outstanding securitisations.

4.1 Originator and servicer analysis

We believe that the quality of the originator and the servicer[2], their business strategies, and experience and track record in the industry are essential to the assets' performance.

The information we receive from the originator on these areas is complemented with public information, allowing us to interpret the assets' credit performance. Our credit view on the securitised assets incorporates market positioning, product types, origination strategy, risk management, and recovery practices.

A limited track record of an originator can be offset in certain instances by a detailed analysis of potential risks linked to the originator, such as the alignment of interests between the originator and the noteholders, the quality of risk models, the management's experience or the originator's risk appetite. Our findings are factored into our base case portfolio performance assumptions.

[2] The originator and servicer are usually the same entity in consumer or auto ABS transactions. Therefore, in this methodology, we generally refer to both roles as the originator.

Figure 1 provides a list of the areas covered in our originator analysis.

Figure 1. Areas of originator and servicer analysis

Theme	
Market positioning and strategy	We analyse the stability of a strategy over time: whether products and obligor segments are time-tested, along with the originator's general risk appetite. We use past data on originated volumes and the originator's performance to form a view on the stability of the originator's business model and of the assets' performance.
Risk appetite	Low credit-score cut-off levels aimed at gaining market share at the expense of the loan's credit quality, or a high concentration of loans to borrowers under pressure to refinance or consolidate existing debts may result in volatile portfolio performance.
Staff, systems and processes	We review the originator's operational competence, capacity and expertise in managing the types of assets in the transaction.
Underwriting standards	We assess the originator's internal auditing standards, documentation and processes, as well as the independence of the risk function.
Origination stability and performance	We compare the assets' origination trends and credit performance with the volume and credit performance of the entire market and/or of peer originators.
Origination channel	Originators of consumer and auto loans encompass a range of entities including regulated banks, finance companies, and specialised brokers. Different origination practices can result in distinct risk profiles. For instance, loan underwriting that takes place in person at a physical branch generally provides more detail on the financial situation of the borrower, who is often an existing bank customer. Borrowers whose loans are originated online are likely to be more opportunistic and seek the lowest interest rates. Here, we determine whether the origination channel or extensive cross-selling is more likely to increase default risk.
Cross-selling	Extensive cross-selling of financial products could create a link (actual or perceived) with the loan. Borrowers may set off losses incurred in cross-sold products against amounts owed on their consumer loans. We assess whether borrowers can legally set off amounts due on their consumer loans and analyse structural features in place to mitigate this risk, such as set-off reserves.
Credit-scoring systems and risk models	An originator with sound, stable and predictive credit-scoring may be subject to lower default volatility. Our review of the originator's underwriting processes incorporates elements such as the use of external and/or internally developed credit-scoring and the quality of data sources. We also assess the frequency and the methods used to validate and review credit-scoring systems .
Monitoring and recovery strategy	We review the servicer's processes, from early-delinquency strategies to loss mitigation for defaulted loans, which should be reflected in roll rates and recovery vintage data. Proactive servicing generally limits the number of delinquent loans rolling into default and increases recoveries, resulting in low loss-given-default rates.
Fraud prevention	We review measures to prevent and monitor fraud (e.g. identity theft, loan stacking). The robustness and stability of processes related to borrower selection and loan application validation are important in reducing the volatility of loan portfolios. We take into account documentation and investigations surrounding loan applications and approvals.
Alignment of interests	We examine the alignment of interests between brokers and the originator if broker networks are used for origination. We also analyse how and to what extent the interests of the originator are aligned with those of investors in the securitisation.

4.2 Asset type analysis

4.2.1 Consumer loans

Unsecured consumer loans are receivables granted to individuals and originated by banks, online lenders or other types of finance companies. Examples include:

- Personal loans granted to individuals for an unspecified purpose, typically for general liquidity, holidays, and personal expenses.
- Purchase loans granted to finance the purchase of 'large ticket' items, such as appliances and furniture, but these purchases do not secure the loans.
- Consolidation loans that refinance and consolidate existing personal loans.
- Payroll-deductible loans (such as Italy's cessione del quinto and delegazione di pagamento), under which interest and principal payments are made directly to the servicer by the employer or pension provider. These loans benefit from insurance that covers unemployment and life risks. Appendix I explains our approach to capturing the peculiarities of this type of loan.
- Loans with multiple draw-down dates, such as amortising personal loans with an option after closing to draw down a portion of the loan's full nominal amount.

With the exception of specialised products like Italian payroll-deductible loans, the loans in consumer ABS transactions are normally unsecured. Therefore, the main risk is the debtor's credit quality. Unemployment rates and changes in GDP are typical leading indicators of the average obligor's ability to meet payment obligations.

In addition to origination standards, the following loan features may also impact the performance of an unsecured consumer loan portfolio:

- Purpose of the loan
- Flexible features (payment holidays, re-draw options)
- Tenor
- Interest-related characteristics (i.e. interest rate type, payment frequency)
- Relation to possible linked contracts (e.g. insurance)

4.2.2 Auto loans

Figure 2 provides a summary of common features of auto loan and leasing contracts, some of which are relevant only for certain jurisdictions. For example, the UK's Consumer Credit Act gives obligors the option to voluntarily terminate a consumer loan[3].

Figure 2. Common features among auto-finance contracts

Amortisation profile	French, balloon, down payments
Maturity and prepayment options	Payment-in-kind via vehicle turn-in
Interest-related characteristics	Fixed/floating interest rates, rate reset frequency, payment frequency
Type of security on the vehicle	Ownership, reservation of title, no security
Relation to specific obligor groups	Promotional contracts
Relation to possible linked contracts	Insurance or maintenance
Origination channel	Captive originator, partner network, third parties

[3] Obligors are entitled to terminate the loan contract by returning the vehicle once 50% of the amounts due have been paid. Amounts due include principal, interest and any down payment. The turn-in of the vehicle extinguishes all claims against the obligor.

Figure 3. Summary of contract types

	Owner of vehicle title	Balloon payment at maturity	Residual-value risk	Voluntary termination risk	Obligor risk
Fully amortising loan	Obligor	No	No	No	Yes
Fully amortising lease	Lessor	No	No	No	Yes
Balloon payment at maturity	Obligor/lessor	Yes	No	No	Yes
Turn-in of vehicle in lieu of balloon payment	Obligor/lessor	Yes	Yes	No	Yes
Voluntary termination option (UK)	Lender	Yes/No	Yes	Yes	Yes

4.2.2.1 Exposure to obligor default risk

The collateral of most auto ABS transactions consists of plain vanilla loans or leases granted to finance a vehicle. The financed amount is either amortised in equal instalments or includes a final balloon payment. The lender has full recourse to the obligor, and in some cases, the vehicle may also secure the loan. The main risk is the obligor's credit quality. Ultimate losses will depend on the recoveries received from the debtor, and especially for secured loans, from the resale of the vehicle.

4.2.2.2 Exposure to vehicle residual-value risk

In standard auto leases and in some auto loans the lender finances a portion of the value of the vehicle. At maturity, the obligor has the option of either turning in the vehicle or paying a final pre-defined balloon instalment and keeping the vehicle.

Residual-value risk is the risk for the obligor that the vehicle's market value falls below the amount of the final pre-defined balloon instalment. This risk is linked to the change in the vehicle's value over time.

Residual-value risk in a transaction greatly depends on the prudential practices of the lender or lessor. Originators usually set the final instalment to avoid negative equity in the vehicle, mitigating the risk of a residual-value loss if the vehicle is liquidated.

See Appendix III and Appendix IV for our approach to analysing auto-finance contracts exposed to residual-value risk.

4.2.2.3 Exposure to vehicle voluntary termination risk

In the UK, contracts may entitle the lessee to return the vehicle and close the contract, typically after half of the total due amount has been amortised. This option is known as the voluntary termination option.

Voluntary termination risk is similar to residual-value risk, with the only difference being the uncertain timing of the vehicle's return.

4.3 Portfolio and performance analysis

We analyse the loan's characteristics and the historical performance of similar pools to establish key quantitative assumptions about the securitised assets, such as portfolio defaults, recoveries, delinquency cure rates, prepayment rates and expected yield. We apply a fundamental bottom-up approach to capture the credit risks resulting from the different characteristics of the assets, the portfolio or structure. This allows for greater rating and transaction differentiation, even for transactions with the same originator and in the same country.

If justified, we incorporate a long-term view on asset performance, complemented by market references for the specific country. This approach reduces distortions of protection levels resulting from default rate volatility over an economic cycle and is most relevant when historical performance data provided by the originator does not reflect an economic cycle.

4.3.1 Analysis of portfolio defaults

Our analytical approach applies the lessons of the 2008 financial crisis. The protection necessary to support ratings in the AAA_{SF} category are not distorted by performance data from benign periods, ensuring the ratings remain reasonably stable throughout recessions.

4.3.2 Point-in-time and long-term distributions

We assume that portfolio defaults follow an inverse Gaussian distribution because this probability function matches the probability distribution of defaults obtained from a Monte Carlo simulation for very granular portfolios, defined as a portfolio with an effective number of obligors exceeding 500[4]. The inverse Gaussian distribution is also simple, characterised only by the mean and coefficient of variation[5]. We normally derive the parameters for the portfolio default distribution from historical vintage data covering an economic cycle, generally provided by the originator. Historical data is complemented by factors specific to the origination or product, as well as macro and microeconomic conditions. We assess historical performance through a vintage data analysis and extrapolate the more recent data to the assets' risk horizon. This leads to a portfolio default-rate mean and coefficient of variation. Appendix II provides technical notes on how we apply vintage analysis.

In some cases, especially if originator data is limited, we may consider two different portfolio-default distributions: i) point in time; and ii) long term.

Point-in-time distribution. This typically reflects expected portfolio defaults based on limited historical data, generally vintage data provided by the originator, which tends not to cover an economic cycle.

Long-term distribution. This reflects the portfolio defaults we expect in a long-term average credit environment, in other words, a through-the-cycle view. We use a long-term data series to derive a portfolio's long-term mean default rate and coefficient of variation. Long-term data series are generally extrapolated with the support of macroeconomic factors that closely correlate with the obligors' credit performance. For example, GDP, wage growth and unemployment rates can be used to infer consumer default rates over an economic cycle.

The long-term distribution of defaults may differ from recent historical performance. For example, our long-term mean default rate assumption may be higher than any default rate in the originator's vintage data set if this data does not cover a period of significant stress. Depending on the length of the data history provided by the originator, point-in-time and long-term means may converge. We also expect the two curves to broadly converge for jurisdictions with relatively stable levels of long-term economic performance and defaults. If the long-term mean default rate is lower (or higher) than the point-in-time default rate, we may only give partial credit to long-term performance if credit fundamentals are changing or uncertain. For example, a past cycle may become irrelevant upon a significant change in consumer lending laws or other fundamental factors such as the structure of the labour market.

4.3.3 Estimating the mean default and the volatility of the default distribution

We analyse performance data (ideally vintage data) provided by the originator/servicer and a representation of assets to be securitised to estimate the portfolio's cumulative mean default rate and the volatility of the default distribution.

Seasoning effect. If relevant, we may adjust vintage data to capture the effect of seasoning on the assets. This adjustment (rebasing) produces the remaining cumulative default rate that applies to the securitised portfolio, rather than the lifetime default rate of the assets since origination.

Default trends. We consider recent vintage trends, which may reflect changes in underwriting criteria or in the macroeconomic environment. Recent delinquency data can also be useful for the analysis.

Segment-specific data. If segment-specific data is available and statistically significant, we may split the portfolio into segments, comprising loans with similar characteristics (e.g. purchase loans, personal loans, consolidation loans) and derive a mean default rate and coefficient of variation for each. This approach may be relevant if, for example: i) the portfolio segment weights differ significantly to those in the originator's entire book; ii) segment weights have changed materially; or iii) the portfolio's asset types significantly differ in their characteristics. In the absence of good-quality data by segments, we generally analyse the portfolio as a whole.

Benchmarking. We may also compare the analysed portfolio with market data and with portfolios of similar originators across Europe, considering the performance of transactions that survived the 2008 recession. For originators with a limited track record

[4] The granularity metric we employ is the diversity index with an order of diversity of two, which is the inverse of the Herfindahl index.

[5] The coefficient of variation is the standard deviation divided by the mean (i.e. it is a normalised standard deviation). The shape parameter of the inverse Gaussian distribution can be expressed as $\lambda = \mu / CoV^2$. Throughout this report, we will refer to both the standard deviation and the coefficient of variation as equivalent measures of volatility of the default distribution.

(either because the originator is new or available data is not relevant for the securitised portfolio), we may derive performance assumptions based on: i) market benchmarks; ii) qualitative considerations to capture the potential volatility, using market proxies; and iii) the number and quality of data sources underlying credit risk models or decision-making algorithms. Important risk drivers in this context are the originator's risk appetite, the alignment of interests between the originator and investors, and the qualifications of the management team.

4.3.4 Information balancing available long-term historical performance data

Impact of origination and servicing. We interpret and adjust loan performance data based on our originator and servicer analysis as described in section 4.1. Origination and servicing quality will affect loan performance under normal macroeconomic conditions and, more importantly, it will impact default volatility over macroeconomic cycles. For instance, similar performance during a benign economic period by two originators with different origination styles could hide very different expected default volatilities in an adverse economic scenario.

Macroeconomic context. We incorporate our macroeconomic expectations into our default rate assumptions, especially if performance data does not cover an economic cycle.

4.3.5 Standard performance reference using cure rates to adjust for different default definitions

We perform a default rate analysis based on the transaction's default definition, generally ranging from 90 to 360 days past due. We also analyse roll rates from early arrears to default, which provide an early warning of deteriorating performance.

If a transaction's default definition differs from that of vintage data, we may quantify cure rates. Cure rates indicate the recovery from obligors that are again performing and have not defaulted, according to transaction documents. A delinquency is cured when all due and payable interest and principal are repaid, and the position becomes current.

Our analysis can incorporate the impact of cure rates on a portfolio's cash flows. The cure rate assumptions are the same for all rating categories. Like defaults, delinquencies impact a transaction's liquidity as overdue instalments move through delinquency buckets to either default or cure.

4.3.6 Default timing

We derive a default timing assumption specific to the transaction, considering the characteristics of the securitised assets. We generally apply a front-loaded default timing, reflecting a constant default intensity that follows the portfolio's amortisation. If appropriate, we may also apply even more front-loaded or back-loaded default timings.

4.3.7 Recovery rate analysis

We derive the base case recovery rate from historical data, ideally in the form of vintages. This forms the starting point for our recovery analysis. We then analyse the expected loss of a rated tranche by applying recovery rate assumptions that are tiered to represent growing haircuts as the target rating becomes higher.

As recovery rates depend on the rating, this approach ensures higher ratings can withstand higher stresses. It also accounts for the sensitivity of higher-rated tranches to the volatility of recovery rates. Figure 4 shows the indicative recovery rate haircuts for consumer and auto ABS transactions. We may apply lower haircuts if data is sufficiently granular and shows stable recovery rates, with the AAA haircut generally being at least two standard deviations of the observed mean recovery level. The opposite is true for portfolios with more volatile recovery rates. For example, if the derived base case recovery rate is 50%, the recovery rate when analysing portfolio losses under a AAA stress is 30%, calculated as 50% x (1-40%).

Figure 4. Indicative recovery rate haircuts

Rating stress	B (base case)	BB	BBB	A	AA	AAA
Haircut	0%	8%	16%	24%	32%	40%

4.3.8 Timing of recoveries

We typically derive recovery-timing assumptions by quantitatively analysing the term structure of recoveries observed from historical data and then qualitatively benchmarking the data against those for comparable assets.

For auto ABS, the time to recovery mainly reflects: i) the strength and efficiency of the security on the vehicle; ii) the characteristics of the second-hand car market; iii) the characteristics of the vehicles underlying the contracts; and iv) the servicer's general recovery strategy. For consumer ABS, recovery timing mainly depends on the servicer's ability to efficiently manage debt collection and the efficiency of the legal system.

4.3.9 Portfolio concentration analysis

For auto ABS, high concentration in terms of manufacturers, brands or models may increase losses, whether from lower recovery rates on defaults or higher losses from vehicle-value risk (see Appendix III). We address high manufacturer or brand concentrations by complementing our statistical analysis with a fundamental view on event risk, in cooperation with our corporate ratings team.

4.3.10 Loss assumptions for vehicle turn-ins

For auto ABS, we estimate losses caused by vehicle turn-ins, derived as the difference between total outstanding payments and the stressed market value of the vehicles. We also apply stress factors relating to: i) depreciation and age; and ii) idiosyncratic vehicle-value decline as indicated by the obligor's intention to turn in the vehicle. These stress factors increase as the instrument's rating increases. We analyse a vehicle's depreciation by applying a monthly market-value-decline assumption to the vehicles' diminishing value, which ranges between 1.5% and 2.5% (see Appendix III to Appendix V). The monthly depreciation rate captures wear and tear, as well as the effects of changes in technology, emissions standards or safety regulations.

We derive the vehicle's age from the point at which we assume the obligor will turn in the vehicle, plus the time the servicer would need to sell the vehicle. For voluntary terminations, we assume the obligor will terminate the contract as soon as legally possible, e.g, for UK leases, when at least 50% of the financed amount is paid. If the obligor is contractually entitled to turn in the vehicle in lieu of a final instalment, we assume the turn-in to occur on the date of the last instalment under the contract.

Deleveraging of the contract often offsets the effect of depreciation. Deleveraging reduces the loan-to-value (LTV) ratio, whereas depreciation increases it. Therefore, the originator's prudential practices determine whether vehicle-value losses are material for a given transaction.

We believe vehicle condition will be below average if obligors turn in a vehicle upon the voluntary termination or maturity of a contract. This supports a haircut on the vehicle's theoretical average market value.

This analysis assumes that the vehicle's security cannot be legally challenged. We generally receive legal opinions regarding the security available on the assets, for example, on the enforceability of clauses on reserving the vehicle's title.

Appendices III to V explain how we calculate losses from vehicle turn-ins.

4.4 Cash flow and structure analysis

4.4.1 Cash flow analysis

We calculate losses on each note class by projecting the cash flow generated by the securitised portfolio, accounting for the transaction's structural features. For the asset side, our main quantitative inputs consist of our assumptions on default probability distribution, cure rates, default timing, recovery rates, recovery timing, prepayment rates, asset amortisation, and portfolio yield. For the liability side, the main inputs are the priorities of payments, size of the notes, expected coupons, transaction fees and expenses, any reserves covering liquidity or credit risk, any transaction triggers and, in some instances, a quantification of certain, identified counterparty risks.

Our quantitative analysis determines the cash flows available for the tranches in each default scenario as well as the associated probability of that scenario. We then calculate the expected loss and weighted average life for each class of note, which are mapped to our expected loss tables to determine the corresponding ratings as explained in our General Structured Finance Rating Methodology available at www.scoperatings.com. Qualitative counterparty and legal analysis is then applied to unquantifiable factors.

Our quantitative analysis alone does not dictate the final rating assigned to an instrument. The rating outcome also reflects qualitative and fundamental credit views that cannot be fully captured in a quantitative analysis.

4.4.2 Portfolio allowing replenishment of assets

Consumer and auto ABS structures often feature revolving or ramp-up portfolios. During the revolving period, the portfolio's cash flows are used to buy new assets instead of amortising the notes. This could lead to credit quality deterioration and an increased risk exposure compared to a static portfolio structure.

Asset and portfolio covenants typically limit a migration in portfolio quality. We analyse the risk of portfolio migration in the context of the originator's history and strategy, the assets' characteristics, and the asset and portfolio covenants in the structure.

Furthermore, revolving transactions usually feature early-amortisation triggers that limit credit quality deterioration during the revolving period. We assume the portfolio's performance will deteriorate within the limits set by early-amortisation triggers, further adjusted for our own expectations. We thus analyse the amortisation phase by assuming credit losses during the revolving phase will partially erode credit enhancement available to the tranches. The amount of credit loss during the revolving phase will largely depend on the performance-based early-amortisation triggers defined in the structure. We then analyse the amortisation phase of the transaction based on the portfolio's expected credit quality migration and the erosion of credit enhancement. We generally analyse an expected portfolio from the point of amortisation and benchmark the instrument's expected loss against its expected weighted average life over the amortisation phase. We determine the instrument's actual total expected weighted average life by adding the expected duration of the revolving period to the expected weighted average life over the amortisation phase.

4.4.3 Prepayment rate analysis

We test different prepayment scenarios, from low to high. High prepayment stresses are derived from historical highs as observed by the originator. The low prepayment scenario generally assumes no prepayments0%, whereas the high prepayment scenario is usually at 15%. We may change our approach if we deem that certain asset types, macroeconomic expectations (e.g. changes to interest rates), or changes to the loan products will affect the level of prepayments.

4.4.4 Portfolio yield and yield compression

The originator generally provides the portfolio yield for each period in the form of a yield vector, based on the contractual yield of each receivable in the securitised portfolio. For revolving portfolios, we consider potential changes in the yield vector caused by the addition of new assets. Transaction documents usually set a minimum guaranteed yield either on aggregate or for each new loan.

We apply interest rate assumptions using haircuts that reflect the risks of yield compression. Such risks may arise if a loan with a high interest rate is prepaid or defaults more quickly than other loans. Yield compression may also result if the originator and debtor renegotiate a loan, generally allowed by transaction documents up to a certain limit.

Structural features may also impact interest collections that protect investors against losses. Generally, excess spread (interest collections available after the notes' senior fees and interest are paid) is available on a 'use it or lose it' basis. Therefore, investors benefit from priorities of payments that are designed to use excess spread to cover cash flow shortfalls arising from portfolio defaults and delinquencies and to re-fill transaction cash reserves. Some structures also feature triggers that keep all excess spread in the structure if portfolio performance deteriorates, making it available to cover possible future payment shortfalls.

4.4.5 Fees

We estimate fees as part of our analysis. We assume fees will be paid to senior transaction parties such as the trustee, the account bank, the corporate servicer, the cash manager, and the servicer. If the servicer is also the originator, servicing fees are usually lower, given the servicer's interest in the transaction. In either case, our analysis assumes increased senior costs, particularly to address servicer replacement at market-level fees. We generally assume that servicing fees are calculated as a percentage of the outstanding portfolio amount, sometimes supplemented with caps and floors. We also assume a minimum senior fee expressed as an absolute amount (in local currency).

4.4.6 Liquidity risk

The risk that portfolio interest collections cannot cover the notes' senior fees and yield is generally mitigated by structural protection provided by cash reserves, liquidity lines, or the ability to use principal collections.

Cash reserves are generally funded at closing and either exclusively provide liquidity protection (i.e. only available to cover senior fees and interest on the notes) or may also accelerate the notes' amortisation in the event of losses. However, this may risk a depletion of the cash reserve, leaving the structure with insufficient liquidity.

Combined, or 'separate and interconnected' priorities of payments, which allow the use of principal collections to cover interest on senior tranches, can also mitigate liquidity risk.

We only assign high ratings (AAA_{SF} or AA_{SF} categories) if timely interest payment is highly likely, even upon servicing disruptions. We analyse whether liquidity support in the structure can reduce the risk of missed interest payments over certain (potentially long) periods, such as the time needed to replace a disrupted servicer.

4.4.7 Exposure to interest rate risk

Interest rate risk is the risk that the interest rate payable on the notes differs from the interest rate on the securitised assets. The most common are:

i) Basis risk: both the portfolio and the notes have a floating rate but they are linked to different reference rates.

ii) Fixed-floating risk: the portfolio pays a fixed rate, whereas the notes pay a floating rate (or vice versa).

iii) Reset date mismatch: both the portfolio and the notes have floating rates linked to the same reference rate, but the reset dates are different.

For consumer ABS, fixed-floating risk is more common than basis risk because such loans tend to pay a fixed interest rate while the notes pay a floating rate.

To mitigate interest rate risks, the issuer may enter into a hedging agreement. We assess the contractual terms of the hedging agreement to determine how effectively the risk is mitigated. For instance, a swap whose notional differs from the notes' balance may not provide a perfect hedge. We analyse unhedged exposures to determine whether they could represent a material source of loss for the rated instrument.

Natural hedges can sometimes be effective against basis risk. For instance, we acknowledge the high correlation between indices that refer to Euribor indices.

4.5 Counterparty risk analysis

We evaluate how risks are linked between the rated instruments and the various parties to the transaction. We assess the materiality of a counterparty exposure as excessive, material or immaterial. We distinguish financial risk from operational risk and assess the transaction's ability to mitigate or reduce counterparty risk. For more information refer to our Methodology for Counterparty Risk in Structured Finance, available at www.scoperatings.com.

We generally expect that, in the event of financial impairment, a resolvable financial institution can continue as a going concern and honour operational contractual obligations for at least the duration of the resolution process. This view provides reasonable comfort that the structure can implement mechanisms against counterparty risk before it crystallises. Likewise, this view limits our concerns regarding the disruption of any servicer that is a regulated and resolvable bank.

If the servicer is unrated and unregulated, a jump to default would result in losses for investors or a temporary interruption of payments. Further, a defaulted servicer must be replaced quickly to limit delinquencies and defaults; otherwise a transaction's losses could increase.

4.5.1 Servicer commingling risk

Servicer commingling risk is the risk that moneys of the issuer held by the servicer are commingled with the insolvency estate of a defaulted servicer. The materiality of this risk depends on: i) the servicer's credit quality; ii) the legal framework under which the servicer performs its functions; iii) the existence of pledged or dedicated accounts, such as escrow accounts; iv) the ease of preventing collections from obligors upon a servicer event (e.g. direct debit collections); v) provisions in place to instruct debtors to redirect payments into an account in the issuer's name; vi) the payment method used by the borrowers (e.g. wire, cheque, direct debit); vii) the frequency with which the servicer's funds are transferred into an account in the issuer's name; viii) the length of servicer holding periods as a function of the frequency of cash sweeps; and, generally, ix) receivables characteristics which determine the amount and potential clustering of collections around certain dates.

We consider whether structural protection features, such as a dedicated commingling reserve or guarantee, are effective at delinking risk from the servicer, assuming obligors' payments can be redirected rapidly. For example, we deem a reserve held in the issuer's name that fully covers collections over a stressed servicer-holding period to be effective at delinking a transaction from servicer commingling losses.

If risks cannot be delinked fully from the servicer, our analysis incorporates any uncovered exposure to the servicer by considering the servicer's likelihood of default and the amount of collections at risk. For more detail, refer to our Methodology for Counterparty Risk in Structured Finance, available at www.scoperatings.com.

4.5.2 Set-off risk

Set-off may be invoked by a debtor that holds a monetary cross-claim against the seller or originator. In this case, the debtor may be absolved from honouring the creditor's claim up to the amount of the cross-claim.

Regarding consumer and auto ABS transactions, set-off risk typically arises when the originator holds the obligors' deposits. These obligors may exercise set-off rights if they lose access to their deposits (for example, upon the originator's insolvency), which could substantially reduce or cancel out the enforceable claim, i.e. the proceeds payable to the issuer, creating a loss for the transaction.

As set-off risk can vary significantly by jurisdiction, we analyse jurisdiction-specific laws. We generally consider the following factors to determine the extent of set-off risk:

1. The probability of the originator becoming insolvent.
2. The structural protections in place, such as a dedicated reserve or an undertaking by the originator not to open accounts with the securitised debtors.
3. The existence of country deposit-scheme guarantees. For example, deposits in the EU are guaranteed up to EUR 100,000.
4. Whether the notice of assignment of the portfolio transfer to the issuer 'crystallises' the amount an obligor may set off against the issuer (equal to the amount that was credited to the debtor's bank account at the time of such notice).

For additional detail, refer to our Methodology for Counterparty Risk in Structured Finance, available at www.scoperatings.com.

4.5.3 Provisions to mitigate servicing disruptions

We analyse the liquidity available to pay senior fees and interest on non-deferrable classes, particularly in the context of servicing disruptions and servicer replacement.

Consumer and auto ABS transactions often arrange for a back-up servicer that can assist the issuer in finding a servicer replacement, for example, a warm/hot back-up servicer appointed at closing or a back-up servicer facilitator. These structural features aim to reduce the handover time to a new servicer, thus reducing the risk of payments on the notes being missed. Without a back-up servicer arrangement in place, a servicer disruption may pose liquidity risk for the issuer, as the portfolio may not be serviced for some time. The time between finding a new servicer and an effective take-over of servicing activities will depend on alternatives in the market, how easily the new servicer can access payment information on receivables and the obligor database, and the operational complexity of migrating certain servicing processes to a new platform.

4.6 Legal risk analysis

In our view, legal risks can arise from three main sources: i) the assets and the transfer of these assets to the special purpose vehicle; ii) the special purpose vehicle issuing the rated debt and its legal structure (e.g. bankruptcy remoteness); and iii) the transaction parties. We review legal opinions to gain comfort on assumptions regarding relevant legal issues.

For consumer and auto ABS transactions specifically, we focus on: i) consumer protection statutes under laws governing the contracts; ii) the validity of rights assigned to the issuer over the originator's liquidation proceeds; and iii) potential liabilities for the issuer created by linked contracts, which could result in losses from the setting-off of claims (from customer deposits or insurance policies paid upfront).

Further details can be found in our General Structured Finance Rating Methodology, available at www.scoperatings.com.

5. Rating sensitivity

Our analytical framework for structured finance transactions is designed to result in rating stability for high investment grade ratings. Two mechanisms enable this: i) rating-conditional stresses; and ii) an asset default distribution representing a through-the-cycle view.

Applying rating-conditional recovery rates adds more stability to high ratings. This is because the ratings' protective cushions, which become larger as the rating becomes higher, can absorb deviations from initial base case assumptions when the rating is monitored.

Our rating reports illustrate the stability of ratings when shocks are applied to relevant analytical assumptions. Sensitivity to shifts in the mean default rate and expected recovery rate illustrate to what extent and in which direction ratings depend on quantitative assumptions. Sensitivity test scenarios should not be interpreted as likely or expected scenarios for the transactions.

Figure 5 shows the typical scenarios in the rating sensitivity test. Upon excessive sensitivity to key analytical assumptions we may decide to lower a rating to increase its stability.

Figure 5. Typical sensitivity tests considered during the analysis

Analytical assumption tested	Shifts considered
Mean default rate	+ 50%
Recovery rate	– 50%

We may also provide the maximum default rate at which no loss is seen for a given tranche (break-even default rates) – under the rating-conditional recovery assumption or under zero recoveries. This information provides investors with another perspective on the resilience of the rated tranches.

6. Data adequacy

We are able to use a wide range of data formats produced by the originator's systems without the need for a particular template or data after processing. Risk information systems and the disclosures of large and medium-sized banks have improved both in volume and quality since the 2008 financial crisis, particularly for monitoring and recovery functions.

We use market and macroeconomic data to extrapolate performance references. This is complemented with a thorough, fundamental study of the originator's strategy, underwriting criteria and processes and how these have changed over time, and the servicer's processes and systems.

Our bottom-up approach allows us to establish a credit view of the originator, the assets and the portfolio. We assess the adequacy of the information received to meet this objective. We may explain the limits of available data and request more detail if information is insufficient to analyse a transaction.

6.1 Historical information

We rely on historical information, ideally in the form of vintage data that represents the assets to be securitised. Segment-specific information may be relevant if: i) the segments' weights differ significantly to those in the originator's entire book; ii) these weights have materially changed over time; or iii) contract types in the portfolio have significantly different characteristics.

We also ensure that performance references are granular enough to derive statistically significant base cases.

6.2 No portfolio data template

We do not use a proprietary portfolio template for consumer and auto ABS portfolios and welcome data that adheres to portfolio reporting standards set by the ECB taxonomy and adopted by the European DataWarehouse – as long as the information is relevant for analysing the assets' risk characteristics. We can also work with templates that allow a comparison between the credit characteristics of portfolio assets and those in the originator's entire book.

6.3 Data checks

We judge the plausibility of the information we receive from the originators and other sources, even if we consider these to be reliable and accurate. We may request additional information or clarification from an issuer or its agents if the information conflicts with our assessments. These 'sanity checks' do not, however, verify the reliability and accuracy of information used in the rating analysis.

Agreed-upon procedures performed by reputable, independent auditors can highlight any differences between the data provided by the originator/seller that we use for our rating analysis and the original documents or computer files containing such data.

We believe that the reliability of information increases with the degree of the originator's alignment of interests with noteholders, and/or the independence, experience and financial strength of the parties providing information. For example, independent legal opinions generally support our legal analysis, whereas representations by an affected party would not be deemed robust.

Conference calls and operational review visits also provide us with more details on the information received. We may review files to gain insight into the processes presented during the operational review visit or the assets being securitised.

7. Monitoring

We monitor consumer and auto ABS transactions using performance reports such as those produced by the management company, the trustee or the servicer. The ratings are monitored on an ongoing basis and are reviewed once a year, or earlier if warranted by events.

8. Adherence to the principles for responsible investment

We adhere to the principles for responsible investment, which integrate environmental, social and governance (ESG) factors into credit analysis. We incorporate the risks arising from a transaction's exposure to ESG factors as part of the analytical approach reflected in this rating methodology. Consequently, our ratings on structured finance instruments reflect ESG factors and comply with the principles for responsible investment. Generally, transactions driven by sound economic incentives comply with most of these principles.

Appendix I – Securitisation of payroll-deductible loans

Executive summary

This appendix explains how we analyse transactions exposed to cessione del quinto (CQS) and delegazione di pagamento (DP) loans – hereafter collectively referred to as CQS[6]. These loans differ from standard consumer loans in terms of their features and risks.

In addition to our standard unsecured consumer ABS transaction analysis, we focus on the following factors:

- **Multiple layers of protection**. Obligors are individuals who are responsible for repaying the loan. Two main features distinguish CQS loans from standard unsecured consumer loans: i) monthly instalments are paid directly by the employer or pension provider to the lender after being deducted from the obligor's monthly salary; and ii) every loan is insured for unemployment and life-event risks.
- **The inability of historical performance to fully reflect extreme events in relation to insurer or sovereign default**. CQS portfolios are directly exposed to employers, pension providers and insurance companies. This may have a significant impact on the portfolio's cash flows. Historical data does not cover scenarios involving a sovereign or insurer default, which, while rare, are generally severe. These events would therefore primarily impact the analysis of highly rated tranches.
- **Effects of a sovereign default.** In the case of Italy especially, we believe a long suspension of salary or pension payments affecting a large proportion of civil servants and pensioners would constitute a materially smaller risk than the risk of Italy defaulting on its public debt.
- **Exposures to local insurance companies.** A concentrated exposure to local insurance companies is a material risk for these transactions. Local insurance companies typically hold large investments in sovereign bonds, making them vulnerable in the event of a sovereign's default.

Figure 6. Key asset characteristics

Cessione del quinto (CQS)	
Loan repayment	The borrower's employer or pension provider repays the loans to the lender by deducting the instalments directly from the salary or pension. Once the lender notifies the employer/pension provider that a CQS loan has been granted, the assignment is automatically enforceable by the employer.
Collateral	The loans are collateralised by the debtor's salary or pension plus any accrued severance pay, known as Trattamento di Fine Rapporto (TFR)[7]. The instalments cannot exceed 20% (one-fifth) of the borrower's total net salary or pension, net of withholding taxes.
Compulsory insurance	The loans must be insured against life risk (i.e. the obligor's death), and job loss (i.e. unemployment, early retirement or resignation). The insurance policy pays out to the loan originator, and when the portfolio is sold in the context of the securitisation, the issuer becomes the beneficiary.
Interest rate	The loans are fixed rate.
Loan tenor	The loans are fully amortising with a tenor which cannot exceed 10 years. The average loan tenor is generally longer than for standard consumer loans.
Loan amount	The loan amount generally ranges between EUR 10,000 and EUR 30,000, above the average size of standard consumer loans.
Refinancing	Loans can be refinanced only after two-fifths of the loan has been repaid.
Regulated by law[8]	Initially, this law only covered central and local government employees before being extended to include retirees and private sector employees. Government employees and retirees who receive a public pension still collectively represent the largest share of obligors by a large margin.

[6] In Italian, CQS is sometimes used as an abbreviation for cession del quinto dello stipendio, but here we use it as an abbreviation for all types of Italian salary- or pension-deductible loans.
[7] State public administration, i.e. ministerial employees, cannot assign their TFR.
[8] Presidential Decree 180 of 5 January 1950 (Law 180/50); subsequently modified by Law 80/2005 regulates CQS loans. DP loans are not expressly regulated by law, but through the various Circular Letters from the Ministry of Economy and Finance.

Delegazione di pagamento (DP) – main differences to CQS loans	
Payment delegation	The employer/pension provider must expressly accept the payment delegation. If the employee changes jobs, the new employer must expressly accept the payment obligation.
TFR as collateral	The TFR only collateralises the loans if expressly agreed by the borrower and the employer/pension provider. In addition, if the debtor also has a CQS loan outstanding and the TFR is not enough to cover both loans, it will first serve as a security for the CQS loan.
Instalment amount	The instalments can represent up to 50% of the borrower's total net salary or pension. Lenders generally grant DP loans to borrowers who already have an outstanding CQS, whereby the instalments for the CQS can never represent more than 20% of the borrower's salary. The 50% limit is therefore the sum of the instalments for both loans.
Originator insolvency	If the originator becomes insolvent, the bankruptcy receiver may terminate the payment delegation. Therefore, the issuer would have to request a new payment delegation.

Risk analysis

In line with our general approach to consumer ABS, our assessment of securitisations backed by CQS loans starts with an analysis of historical performance, ideally in the form of vintage data, benchmarks, and macroeconomic indicators. However, as mentioned above, vintage data often does not reflect extreme event risks related to sovereigns and the insurers of the loans. This is particularly relevant for senior tranches. We adjust our assumptions to incorporate i) sources of default; and ii) sources of recovery.

Sources of default

In CQS transactions a loan is typically declared as defaulted upon: i) a life event; ii) an unemployment event; or iii) a certain number of due and unpaid instalments, usually upon the financial difficulty of an employer[9] or the employee taking unpaid leave. Pensioners may also be subject to temporary pension reductions.

If a salary/pension payment reduces by more than one-third, we recalculate the loan instalment to fall below 20% of the salary/pension payment. Unpaid instalments, or whole instalments in the case of total payment suspensions, are delayed until scheduled amortisation ends. Therefore, suspensions do not necessarily result in losses if the obligor can honour repayment obligations in full.

Sources of recoveries

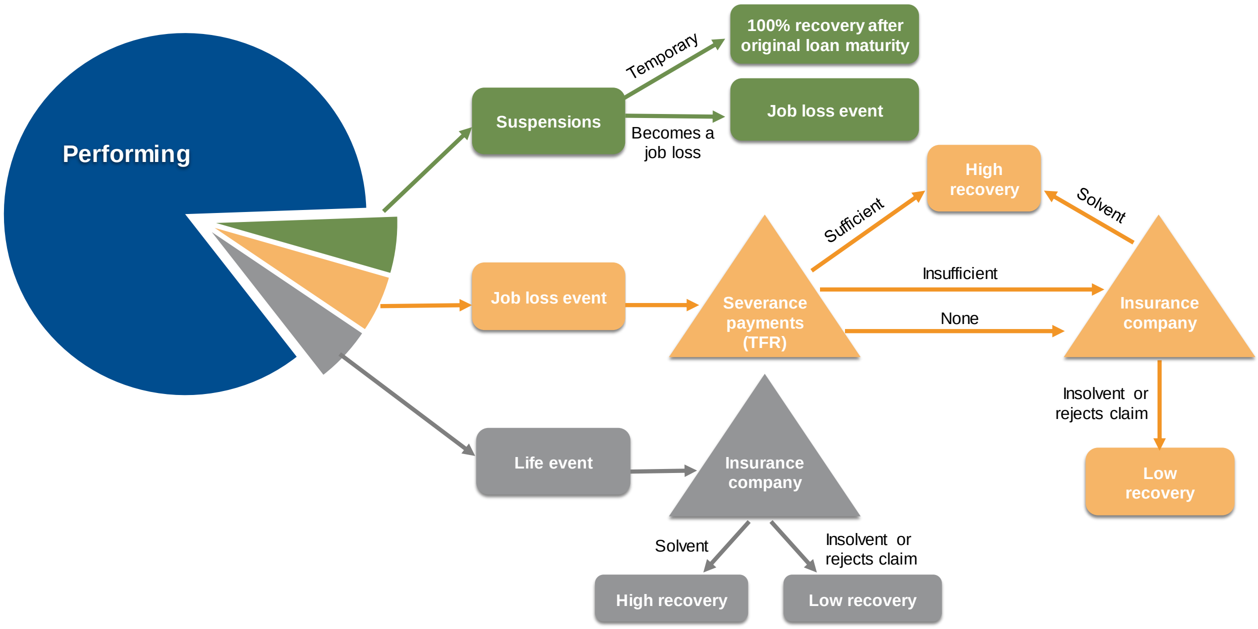
Life event. If the obligor dies, the main source of recovery is the insurance indemnity, which equates to the loan's outstanding amount as of the date of the event.

Job loss event. If the obligor becomes unemployed, the first source of recovery will be any potential TFR amount. The insurance company will then cover the loan's remaining outstanding amount. If the obligor finds new employment before the indemnity from the insurance company is paid, the lender will instruct the new employer to re-establish the payment delegation[10], without requesting an insurance indemnity.

Suspensions. If salary/pension suspensions are temporary, the obligor will repay missed instalments when the loan ends, resulting in no ultimate losses. If the suspension becomes a job loss event, the insurance company will cover the outstanding loan balance as of the event date. However, coverage of due and unpaid instalments as of the event date depends on the policy's conditions.

[9] Employers can apply for state aid (cassa integrazione), which legally allows them to reduce/suspend salary payments for a period of time.
[10] This is automatic in the case of CQS loans. In the case of DP loans, the new employer must expressly accept the payment delegation request.

Figure 7. Italian payroll-deductible default and recovery mechanisms



Sovereign risk

The ability of obligors to meet loan instalments would be severely curtailed if their salary or pensions are not paid. Hence, a major source of credit risk is an employer's credit quality. In the case of large exposures to public servants and pensioners, the rating of the sovereign (as the employer) will directly impact the rated notes' credit quality. However, the rating will not reflect a perfect dependency on the sovereign rating. We believe that a sovereign defaulting on public debt would not necessarily trigger the suspension of payments to public servants or pensioners or a general dismissal of public servants. In addition, if payments are suspended, the proportion of public servants or pensioners affected would vary. Therefore, our ratings on senior CQS notes are not mechanistically capped at the sovereign's rating. Instead, we assess the potential rating impact of a distressed scenario affecting the government of Italy and the associated loss severity for the securitised assets, as explained further below.

Insurance risk

By law, CQS loans must be insured against unemployment and life event risks. As a result, the ultimate losses on these loans are lower than on standard unsecured consumer loans. Upon the insolvency of one or more insurers providing coverage, we expect portfolio recovery rates to decrease significantly. The vintage data available usually only covers years in which no insurance companies have defaulted. We therefore adjust our recovery assumptions to account for this risk, as explained in the 'Analysis of recovery rates reflecting insurance risk' section below.

Analysis of portfolio defaults and arrears upon 'crystallisation' of sovereign risk

We assume that defaults on standard unsecured consumer loans follow an inverse Gaussian probability distribution. We derive mean-default and standard deviation assumptions from historical data, ideally in the form of vintages. If segment-specific data is available, we typically split the portfolio by product type and/or the type of debtor.

CQS transactions are usually exposed to sovereign risk. This is because a portion of debtors comprise civil servants and pensioners whose salaries or pensions may be affected in the event of a sovereign's default. The default could also trigger a significant restructuring of the public administration. We refer to this as 'sovereign CQS risk', which generates both liquidity and credit risks for the transaction. We assume that sovereign CQS risk is less likely to materialise than a sovereign's default on public debt. Empirical evidence shows that while the public sector headcount and salaries/pensions generally reduce after a sovereign default, full non-payment on salaries/pensions is significantly less likely because the social, political and economic consequences would be severe.

Liquidity risk. A suspension or reduction of salary and pensions may create a spike in arrears and thus a liquidity shortfall in the transaction. However, additional losses are generally not incurred because in this instance the loan's maturity is extended – unpaid instalments become due and payable as of the original loan's maturity date until the debt is fully extinguished[11]. We qualitatively assess whether liquidity available in the transaction, e.g. cash or a liquidity reserve, can cover this risk. We also quantify the effect of liquidity shortfalls triggered by increased arrears. Based on empirical evidence, we believe that if salaries or pensions in Italy are suspended or reduced below a minimum level, it would be only temporary and applied to only some public servants and pensioners. We therefore consider an impact of salary/pension reductions by 20% or 50% of recipients for a period of 1-3 years.

Credit risk. A restructuring of the public administration generates job losses and, therefore, asset defaults for the securitisation. Even if the public administration were to be restructured, vital public functions such as tax collection or law enforcement would continue to some degree. In addition, some Italian public employees may work at government-owned enterprises that have both private and public revenue streams for liquidity. Therefore, we assume that not all public employees would lose their jobs and instead consider the impact of higher loan defaults, triggered by job losses, of between 15% and 35% in scenarios where sovereign CQS risk materialises.

Insurance protection. All loans are insured against a job loss event. However, a sovereign default may affect local insurers because they tend to invest heavily in public debt. We therefore consider the impact of lower recoveries for the part of the portfolio insured by local insurers.

Analysis of recovery rates reflecting insurance risk

In CQS transactions, a loan is typically declared as defaulted upon a life event, unemployment event, or a certain number of missed payments.

The first source of recoveries is the recourse to the TFR[12]. We therefore analyse the level of coverage for each loan as of closing. This coverage increases as the loan amortises, also because TFR increases with job seniority.

The second source is the insurance coverage of defaults due to a life event or unemployment event. These recoveries are usually close to 80% and are reflected in historical data, typically in the form of the originator's vintages. As insolvency is rare for insurance companies, historical recovery data is unlikely to capture such events.

The third source is recourse to the debtor, who is ultimately responsible for the loan's full repayment. Therefore, if the insurer does not cover a default because: i) the claim has been rejected; ii) the event is not covered by the insurance policy; or iii) the insurer is insolvent, the lender will start procedures to recover amounts from the debtor.

We consider two levels of recovery rates. The first level, RR1, is derived from historical data and applies to scenarios in which insurance companies indemnify the defaults. The second, RR2, is significantly lower and applies if the corresponding insurance company is insolvent and the lender only has recourse to the TFR (if applicable) and the debtor.

The combination of RR1 and RR2 results in a recovery rate for each rating category.

We develop our recovery rate assumptions in three steps:

1. We ascertain RR1 based, inter alia, on historical vintage data, benchmarking with market-wide data or data from other originators; and RR2, based on pool characteristics like TFR coverage and sources such as market-wide data, for each rating category.
2. We derive a distribution of insurer defaults using a Monte Carlo simulation. We infer the default risk of the insurers using either: i) our own counterparty assessments; ii) available public ratings from European ECAIs, which we may adjust; or iii) conservative default risk assumptions equivalent to a BB or B risk depending on the insurer's size and characteristics. Our assumption on the correlation between insurers takes into account their level of business diversification and geographical risk exposure.

[11] If the maturity of the loans is extended beyond the final maturity of the notes, then suspensions or reductions of salary and pensions will effectively generate a loss for the transaction. Normally the final legal maturity date is set 7-14 years after the loan with the longest maturity date in order to mitigate this risk.

[12] Only relevant to employees, as pensioners do not have any TFR, nor are they subject to unemployment risk.

3. We calculate rating-conditional recovery rates. This is the weighted average of the RR1 and rating-conditional RR2, whereby the weights reflect the portion of defaulted insurers. We derive this weight by considering the insurers' default rate scenario, which is exceeded only by a probability linked to the corresponding rating scenario.

We determine a rating-conditional recovery rate by blending the two recovery rates (RR1 and RR2) and applying a weight to each. The weights applied to each recovery rate are based on the insolvency risk of the insurer(s). This approach captures the implicit dependency between the portfolio and the insurer, because for high rating scenarios it incorporates the default distribution tail of both the insurers and the portfolio.

Figure 8 below provides an example, with indicative assumptions used to derive the recovery rate.

Figure 8. Example of indicative assumptions

RR1	75%
RR2	10%
Asset correlation between insurers	20%
Number of insurers	7
Insurers' weighted average rating	BBB
Portfolio weighted average life	5.0 years
Recovery rate AAA stress for RR2	40%

Based on the above assumptions, we estimate the probability distribution of insurance survival (i.e. the probability that the insurance companies do not default) through a Monte Carlo simulation.

Figure 9. Probability distribution of insurance survival

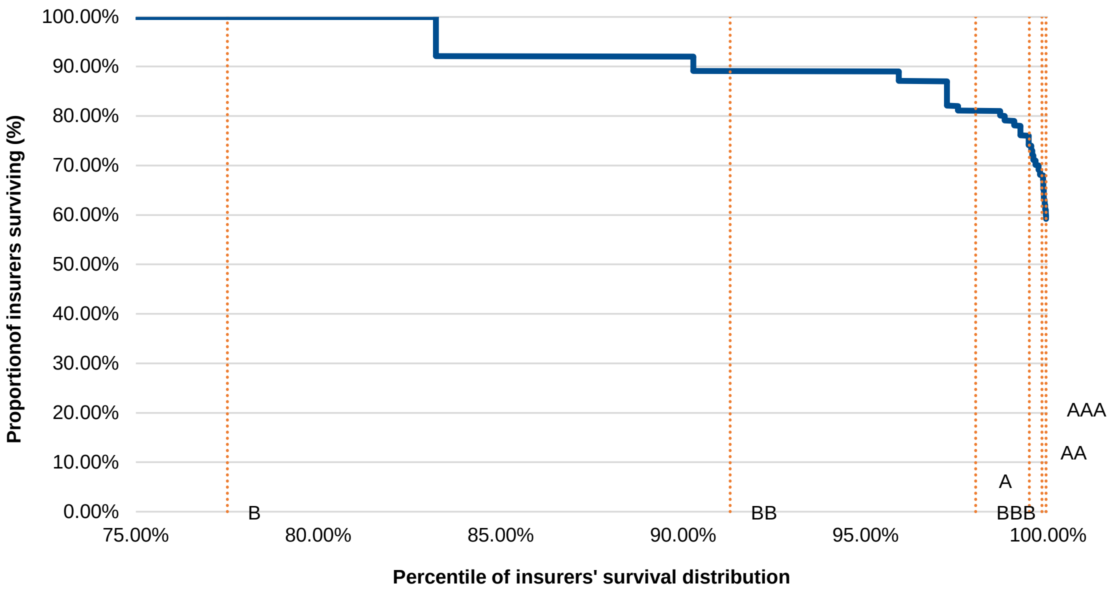


Figure 9 illustrates the proportion of insurance protection that survive (y-axis) as a function of a given percentile of the distribution (x-axis). The figure only depicts the fourth quartile of the distribution, because in benign scenarios all insurance companies are expected to survive. The weighted average rating for the insurers in this example is BBB, which would translate into a default probability of around 2% at five years, but this is only a point estimate. After considering the weight and default probability for each insurance company in Figure 9, we can see that below the 80th percentile (aligned with a B rating percentile with a five-year weighted average life) all the insurance companies are expected to survive. Towards the right-hand tail of the distribution, increasingly fewer insurance companies are expected to survive. For example, around the 92nd percentile (similar to a BB rating percentile with a five-year weighted average life) around 89% of the insurance protection will survive. Around the 98th percentile (equivalent to a BBB rating percentile with a five-year weighted average life), around 81% of insurers will survive.

The insurance companies' survival is considered in the rating-conditional recovery rates through the following formula:

- Rating-conditional recovery rate = IS * RR1 + (1 - IS) * RR2 * (1 – RR2HC)

Where:

I_S = Probability of insurance protection survival (Figure 8)

RR1 = Indicative recovery rate when insurance protections survive (Figure 8)

RR2 = Indicative recovery rate without insurance (Figure 8)

$RR2_{HC}$ = Rating-conditional haircut for RR2 (Figure 4)

From Figure 9 we take the following indicative values for I_S:

- B rating scenario: I_S ~ 100%
- BB rating scenario: I_S ~ 89%
- BBB rating scenario: I_S ~ 81%
- A rating scenario: I_S ~ 74%
- AA rating scenario: I_S ~ 68%
- AAA rating scenario: I_S ~ 60%

As a result, the rating-conditional recovery rates in this example are:

- B rating-conditional recovery rate: 100% * 75% + (1 – 100%) * 10% * (1 – 0%) ~ 75%
- BB rating-conditional recovery rate: 89% * 75% + (1 – 89%) * 10% * (1 – 8%) ~ 67.8%
- BBB rating-conditional recovery rate: 81% * 75% + (1 – 81%) * 10% * (1 – 16%) ~ 62.3%
- A rating-conditional recovery rate: 74% * 75% + (1 – 74%) * 10% * (1 – 24%) ~ 57.5%
- AA rating-conditional recovery rate: 68% * 75% + (1 – 68%) * 10% * (1 – 32%) ~ 53.2%
- AAA rating-conditional recovery rate: 60% * 75% + (1 – 60%) * 10% * (1 – 40%) ~ 47.4%

Legal risks

Set-off risk upon loan prepayment

Upon the prepayment of a loan, a CQS debtor is entitled to a reimbursement of some loan expenses and the insurance premium[13] paid upfront to the lender at origination. This peculiarity of CQS loans creates a specific set-off risk for the asset class. Transaction documents typically require the originator to pay these amounts. However, upon the originator's insolvency, debtors might set off this claim against the outstanding loan amount, resulting in a loss for the issuer. We incorporate this additional risk by taking into account the likelihood of set-off and the associated severity.

Notification of the asset transfer

The notification of the portfolio's transfer from the originator to the issuer is valid only when published in the Official Gazette (Gazzetta Ufficiale). However, the transfer of the salary assignment by a public administrative body is valid only when executed by way of a public deed (atto pubblico) or notarised private deed (scrittura privata autenticata). In addition, the relevant public body must also be notified. Therefore, we take into account whether transaction documents include this requirement and facilitate its correct execution[14].

[13] Insurance premiums are always paid upfront by originators, but some lenders charge this cost to the borrowers gradually over the life of the loan. This arrangement reduces the potential amount the borrowers might set off.
[14] See Royal Decree No. 2440 of 18 November 1923 (R.D. 2440/1923) and Ministerial Decree No. 313 of 27 December 2006.

Appendix II – Vintage data analysis

Consolidation and extrapolation of vintage data

We consolidate vintage series into an annual series before calculating the coefficient of variation of the default rates for a given portfolio segment. This approach standardises the analysis across transactions and increases the granularity of the vintage series used for the analysis. We extrapolate incomplete annual vintage series, accounting for the term structure implicit in the credit quality of such a series.

Intra- and inter-segment correlation

If we decide to consider different portfolio segments, we assume perfect correlation for thesegments in granular consumer and auto ABS portfolios. This simplifies the calculation of a portfolio's coefficient of variation, which uses the coefficients of variation of each portfolio segment.

We thus derive the correlation between the assets from the intra-segment default volatility. The vintage data for each segment of the portfolio reflects the assets' correlation to the extent that vintage data contains sufficiently diverse scenarios.

We assess whether the originator's vintage data adequately reflects asset correlation. For example (and ideally), whether data includes periods of stress and shows significant deterioration in asset performance starting from a benign period, i.e. from pre-crisis to post-crisis.

Adjustments for seasoning (rebasing)

Vintage data demonstrates an asset's performance from origination to maturity and reveals the average effect of seasoning. We believe the shape of default vintage curves is explained not only by the improving credit quality of underlying obligors, but also by factors involved in its composition. Typical curves reflect: i) the compounding of survival rates; ii) the amortisation of the initial balance; iii) prepayment rates; iv) the expiration of contracts at maturity; and v) the possible higher propensity of obligors to pay as equity accumulates under a contract. Additionally, the term structure of each series in a vintage set also captures the point in an economic cycle, which may cause a pronounced front-loading of default rates.

If appropriate, we may adjust vintage data to capture the effect of seasoning on assets that have been or will be transferred to the portfolio. This adjustment (rebasing) produces the marginal cumulative default rate that applies to the portfolio of assets transferred to the special purpose vehicle (as opposed to the lifetime default rate of the assets since origination).

The marginal contribution to the assets' lifetime default rates is referred to as the surviving balance of the vintage at the seasoning point, i.e. the weighted average seasoning of the relevant portfolio segment. The balance at the seasoning point depends on the amortisations and defaults that have occurred between the contract's origination and the seasoning point.

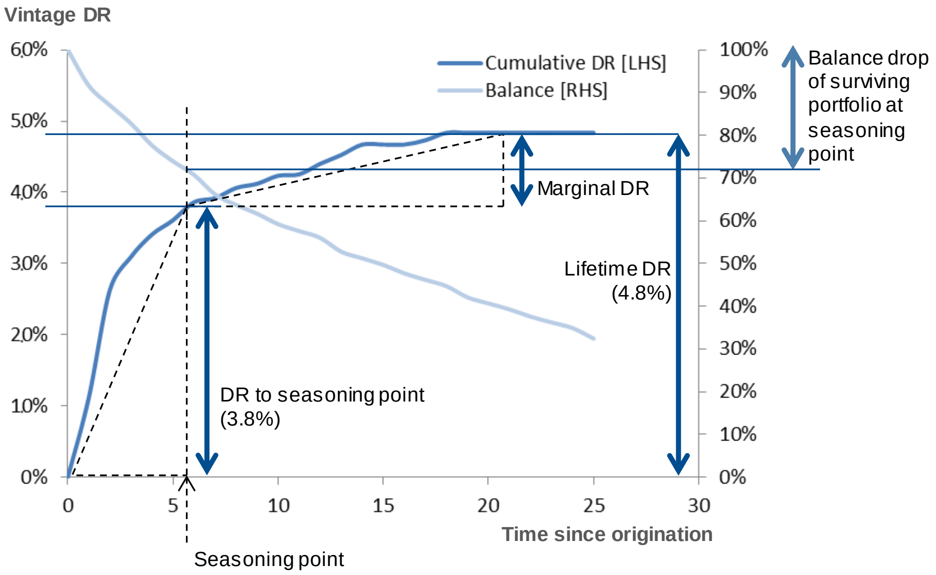
An example of rebasing is illustrated below. The marginal default rate of 1.0% on the original balance at origination is 1.5% when applied to the balance of surviving assets at the seasoning point. This marginal default rate is the lifetime default rate applicable to the securitised portfolio and differs to the lifetime default rate at origination (4.8%).

The rebasing is described by the following expression:

$$(1)\ Rebased\ marginal\ DR = \frac{Marginal\ DR\ from\ seasoning\ point}{1 - DR\ to\ seasoning\ point - Performing\ balance\ drop} = \frac{(4.8\% - 3.8\%)}{1 - 3.8\% - 28\%} = 1.5\%$$

The rebased marginal default rate can thus represent the percentage of the outstanding balance at the seasoning point that is larger than the lifetime default rate as applicable to the balance at origination.

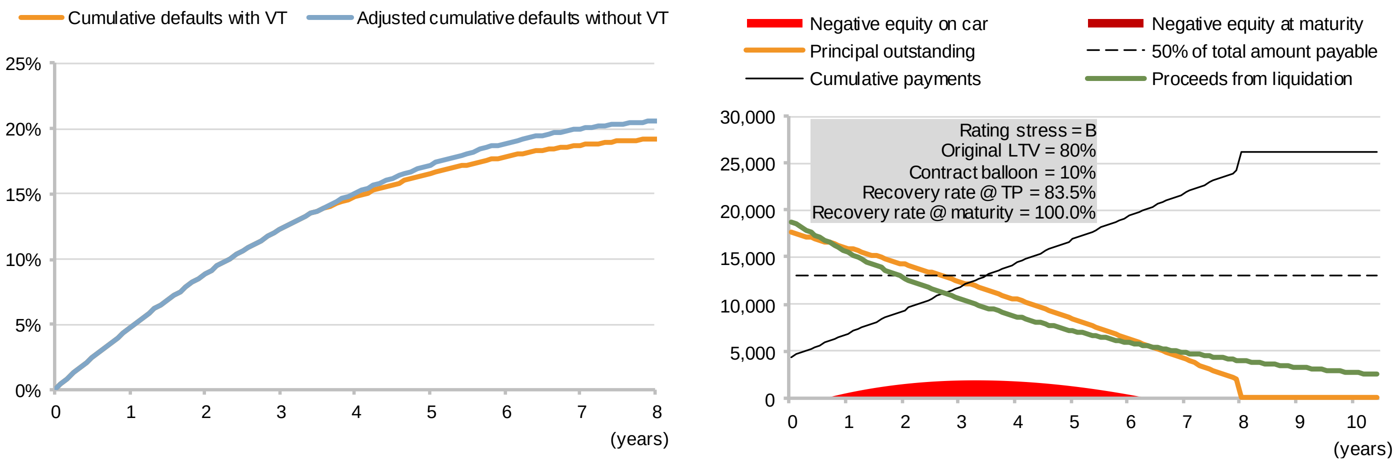
Figure 10. Rebasing marginal default rate from vintage analysis



Adjustment for voluntary terminations

In auto ABS, we may adjust vintage data for portfolios exposed to voluntary termination (VT). This is to address the fact that voluntarily terminated contracts cannot default, thus reducing the outstanding portfolio amount from the moment the vehicle is turned in. This effect is illustrated in Figure 11, which shows vehicle turn-in is possible after 3.5 years (the turn-in point, TP) and there is negative equity from the vehicle's depreciation over the life of the contract (but not at maturity, even though the contract features a final balloon payment after eight years). The adjustment would consider the cumulative default rate up to the point of voluntary termination and then derive the implicit constant marginal default rate. The marginal default rate enables us to rebuild the cumulative default curve, which assumes stressed turn-in rates for the structure's cash flow.

Figure 11. The effect of vehicle turn-ins on vintage data after 3.5 years



Appendix III – Assets exposed to vehicle-value risk

Residual value risk in loan or lease contracts

The right to voluntarily terminate the contract by turning in the vehicle before maturity constitutes vehicle-value risk. This right is embedded in: i) lease contracts that allow the obligor to turn in the vehicle at maturity instead of making the last balloon payment; and ii) UK auto finance contracts that allow the obligor to terminate the contract at any time after a certain date by turning in the vehicle. Such rights expose the issuer to losses if any sales proceeds for turned-in vehicles cannot cover the outstanding loan/lease balance plus liquidation expenses, or if the counterparty that guaranteed a minimum vehicle value defaults.

Key areas of consideration include:

- Contract characteristics: i) irregular amortisation schedules (typically balloon payments and down payments on a vehicle); ii) residual value components; iii) voluntary termination options; and iv) the reservation of title or vehicle ownership.
- Origination/commercial practices in setting contract residual values. Typically, the materiality of residual-value risk depends on the amortisation terms of the contract and, particularly, the sizing of the final balloon payment in relation to the vehicle's expected market value.
- Vehicle market value: i) fluctuations in market prices; ii) technological and design innovations; iii) events related to manufacturer performance; iv) regulatory changes such as fiscal disincentives linked to environmental considerations; and v) maintenance costs that can affect consumer appetite for certain types of vehicles.
- The credit quality of the guarantor if applicable.

Quantitative framework for contracts with vehicle-value risk

Figure 12 presents a 'tree' of possible default and vehicle turn-in events, which enables us to derive the expressions in Figure 13 and details how credit and vehicle-value risks contribute to the portfolio's total expected loss.

This general framework is simplified if a contract's terms and conditions do not allow certain events. For example, only two blocks are relevant if contracts are only exposed to 'no loss' or 'default' credit risk. If there is no option to voluntarily terminate a contract (i.e. p{Turn-in} =0) or pay in kind at maturity (i.e. p {Turn-in at maturity} =0) then the expected loss from elements (4) and (2) in the diagram, respectively, become zero.

Figure 12. Schematic view of sources of loss in vehicle-finance contracts

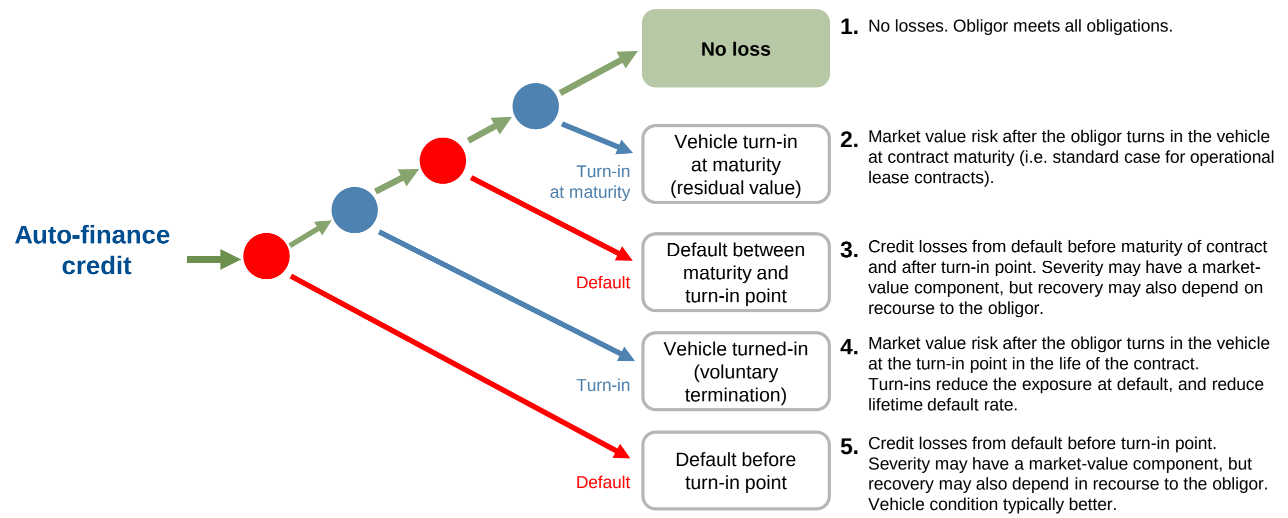


Figure 13. Contributions from portfolio to total expected loss

$$\Delta ExpectedLoss_1 = 0$$

$$\Delta ExpectedLoss_2 = (1 - DR_{TP}) \times (1 - p\{Turn\text{-}In\}) \times (1 - DR_{TP\text{-}Maturity}) \times p\{Turn\text{-}In_{Maturity}\} \times PF_{Maturity} \times (1 - RR_{fundamental@Maturity})$$

$$\Delta ExpectedLoss_3 = (1 - DR_{TP}) \times (1 - p\{Turn\text{-}In\}) \times DR_{TP\text{-}Maturity} \times (1 - RR)$$

$$\Delta ExpectedLoss_4 = (1 - DR_{TP}) \times p\{Turn\text{-}In\} \times PF_{TP} \times (1 - RR_{fundamental@TP})$$

$$\Delta ExpectedLoss_5 = DR_{TP} \times (1 - RR)$$

$$ExpectedLoss = \sum_{i=1}^{5} \Delta ExpectedLoss_i$$

where,

- $\Delta ExpectedLoss_i$ are the contributions to the total expected loss from the portfolio of assets (ExpectedLoss);
- DR_{TP} is the cumulative default rate from the contract's origination to the point of voluntary termination;
- p{Turn-in} is the probability of voluntary termination;
- $DR_{TP\text{-}Maturity}$ is the cumulative default rate from the point of voluntary termination to maturity;
- $p\{Turn\text{-}in_{Maturity}\}$ is the probability of vehicle turn-in at maturity;
- $PF_{Maturity}$ is the portfolio factor at the point of voluntary termination;
- $RR_{fundamental}$ is the recovery rate calculated on the proceeds of liquidating the vehicle in the market at the time of voluntary termination;
- $RR_{fundamental@Maturity}$ is the recovery rate calculated on the proceeds of liquidating the vehicle in the market at maturity; and
- RR is the recovery rate from vintage analysis.

A numerical calculation of the contribution of losses from voluntary termination is illustrated in Appendix V.

Voluntary termination risk

Voluntary termination occurs when the obligor has the contractual or statutory right to terminate the contract by turning in the vehicle before maturity, thus exposing the transaction to vehicle-value risk, which may result in value losses.

Our analysis factors in the effect of voluntary termination or residual-value risk by incorporating losses from the vehicle's liquidation into our expected loss computation. We determine the market value loss by comparing the stressed proceeds expected from the liquidation with the outstanding debt balance at the time the vehicle is turned in. Zero loss results when liquidation proceeds exceed outstanding debt (i.e. in the case of full recovery when a vehicle is turned in).

Losses from vehicle turn-ins and portfolio defaults are inversely interdependent. This is because defaulting obligors cannot turn in a vehicle and terminate the contract, and voluntary termination triggers full amortisation at the point of default, eliminating credit risk.

All other things being equal, the lifetime default rate of transactions with voluntary termination options is lower than for those without this option. Our quantitative analysis accounts for the corresponding reduction in credit losses when analysing the structure's cash flow.

Figure 14. Risks, risk drivers, implications and metrics of possible events in vehicle finance

Event	Risk	Driver	Implications	Relevant metrics
Obligor defaults before turn-in point	Credit	Ability or willingness of the obligor to pay	In general, dual recovery analysis (i.e. obligor and vehicle) Lower market value losses from turn-ins	• Cumulative default rate from vintage data at turn-in point • Recovery rate from vintage data
Obligor turns in the vehicle after turn-in point but before scheduled maturity	Vehicle value	Option provided by contract or legal regime and obligor incentives	Pure vehicle-value risk and severity driven by stressed LTV Lower lifetime losses from credit	• Probability of voluntary termination • LTV at turn-in point
Obligor defaults after turn-in point	Credit	Ability or willingness of the obligor to pay	In general, dual recovery analysis (i.e. obligor and vehicle) Lower market value losses from turn-ins at maturity	• Cumulative default rate from vintage at turn-in point (possibly adjusted for vehicle turn-ins) • Recovery rate from vintage data
Obligor turns in the vehicle at maturity	Vehicle value	Option provided by contract or legal regime and obligor incentives	Pure vehicle-value risk and severity driven by stressed LTV	• Probability of vehicle turn-in at maturity • LTV at maturity

Analytical implications

Adjustment of default rates after vehicle turn-in

In vintage data, the option to turn in a vehicle is reflected in a reduced lifetime default rate, a result of early voluntary terminations. In our analysis, we decouple defaults from turn-ins, which allows us to apply independent stresses to both defaults and the probability of vehicle turn-ins.

Vehicle-value risk

Losses from vehicle-value risk add to losses from credit risk. Our analysis incorporates such losses in the cash flow analysis, given the dependency between portfolio defaults and the probability of a voluntary termination or a turn-in at maturity.

Level of turn-ins

The two key inputs of this part of the analysis are the mean probability of voluntary termination (i.e. the historical average frequency of vehicle turn-in) and the mean probability of turning in the vehicle at maturity (i.e. the historical average frequency of termination with a payment in kind). We also analyse the volatility of such historical frequencies, in addition to the historical means, to derive the probabilities to be considered under stress.

We stress the mean probability assumptions by applying rating-conditional stresses (see Figure 15) to derive rating-conditional assumptions. For example, we will consider a probability of voluntary termination under a AAA rating-conditional stress, which equates to the historical mean frequency plus double the standard deviation of the historical frequency of voluntary terminations.

Figure 15. Rating-conditional stresses on the probability of vehicle turn-in

(Number of standard deviations)	B	BB	BBB	A	AA	AAA
At voluntary termination point	0.0	0.4	0.8	1.2	1.6	2.0
At contract maturity	0.0	0.4	0.8	1.2	1.6	2.0

Appendix IV – Severity of vehicle turn-in on voluntary termination or at maturity

We analyse the severity upon voluntary termination or turn-in at maturity by comparing the outstanding loan/lease amount with the proceeds expected from a vehicle's liquidation. This involves two steps: i) estimating the proceeds from a vehicle's liquidation under stress; and ii) finding the implied fundamental recovery rate achievable from using such liquidation proceeds only.

If an obligor is required to cover any shortfall after turning in the vehicle, we reduce the severity and consider our standard recovery assumption on any marginal claim above the vehicle's liquidation value. We use this approach only when contractual terms explicitly state such a requirement and the issuer would be legally entitled to claim a shortfall from the obligor.

The following sections explain the calculation of vehicle values and the fundamental recovery rates after a vehicle turn-in. We provide examples for calculating the fundamental recovery upon a turn-in at maturity. The calculation of the fundamental recovery rate upon voluntary termination follows the same steps, but only considers the exposure and the proceeds from the vehicle value at the voluntary-termination turn-in point.

Fundamental recovery rates do not depend on the default scenario and are rating-conditional because they embed increasing levels of stress as the target rating rises (i.e. the higher the rating, the greater the vehicle-value decline and the higher the probability of a vehicle turn-in).

Proceeds from vehicle liquidation

We determine the potential loss from a vehicle's liquidation by estimating the proceeds that can be obtained from selling used cars under a rating-conditional stress. We estimate the vehicle's value by applying a cascaded series of rating-conditional vehicle-value stresses to the vehicle's original value. The stresses are: i) a depreciation value adjustment from normal ageing as a function of time; ii) an additional vehicle-value haircut for below-average condition revealed by the obligor's intention to turn in (i.e. the turn-in value haircut, *TurnInVH*); and iii) liquidation costs. The resulting credited car value is shown in expressions (2) to (4) and is equal to the proceeds we expect from the liquidation under stress.

(2) $$Credited\ car\ value\ or\ liquidation\ proceeds|^{Rating}(time) =$$
$$= Original\ value \times Adjustment|^{Rating}_{ageing}(time) \times Adjustment|^{Rating}_{condition} \times (1 - Liquidation\ cost)$$

where

(3) $$Adjustment|^{Rating}_{ageing}(time) = Rating\text{-}conditional\ value\ haircut\ multiplier\ from\ ageing\ as\ a\ function\ of\ time =$$
$$= \left(1 - Monthly\ MVD|^{Base\ case} * \left(1 + Monthly\ MVD\ stress|^{Rating}\right)\right)^{time\ in\ months}$$

(4) $$Adjustment|^{Rating}_{condition} = Rating\text{-}conditional\ value\ haircut\ multiplier\ from\ condition\ at\ turn\text{-}in =$$
$$= \left(1 - TurnInVH|^{Rating}_{condition}\right) =$$
$$= \left(1 - TurnInVH|^{Base\ case}_{condition} \times TurnInVH\ Multiple|^{Rating}\right)$$

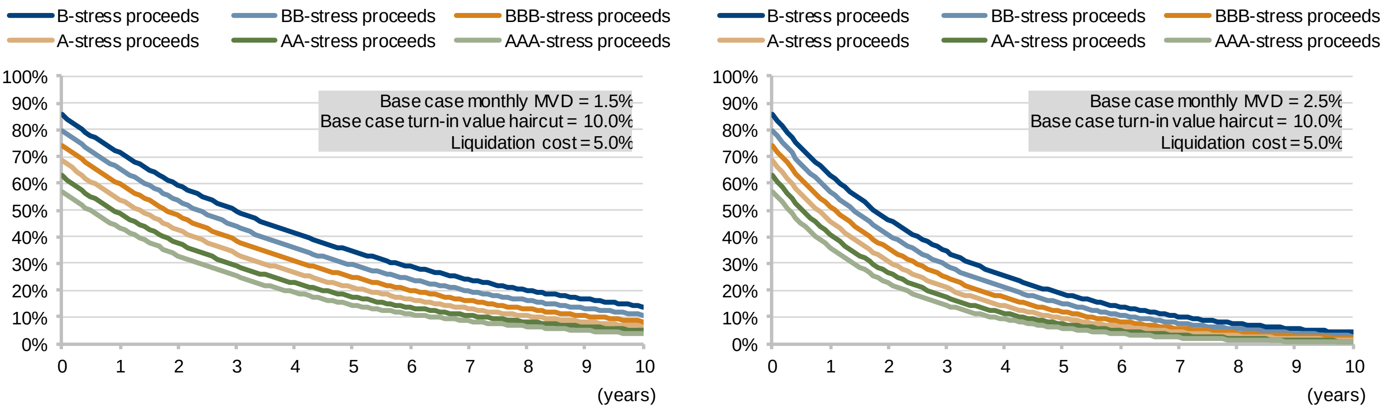
A numerical calculation is illustrated in Appendix V.

Figure 16. Stresses related to calculating losses from vehicle-value loss

	B	BB	BBB	A	AA	AAA
Monthly market-value-decline (MVD) stress	0%	10%	20%	30%	40%	50%
Turn-in value-haircut multiple	1.0	1.6	2.2	2.8	3.4	4.0

The vehicle-value haircut upon turn-in and the vehicle liquidation costs are transaction-specific assumptions because they depend on the originator's best practices and processes. We derive these assumptions from the information provided by the originator.

Figure 17. Credited proceeds from car values under different rating stresses (under 1.5% and 2.5% base case monthly vehicle-value declines, respectively)



Fundamental recovery rate from car liquidation proceeds

We compare the exposure at default, either at turn-in or at maturity, with the vehicle liquidation proceeds calculated in the previous step. The recovery rates are rating-conditional because the liquidation proceeds depend on the rating stresses applied when valuing the vehicle. The recovery rates are calculated as described in expression (5).

(5) $Fundamental\ recovery\ rate|^{Rating}(time) = min\left\{100\%, \frac{Credited\ car\ value|^{Rating}(time)}{Outstanding\ balance(time)}\right\}$

The fundamental recovery rate is 100% if the vehicle liquidation proceeds can cover the outstanding loan balance at either voluntary termination or maturity.

A numerical calculation is illustrated in Appendix V.

Appendix V – Numerical example of vehicle loss calculations

This appendix illustrates the calculation of losses from vehicle-value risk with simple numerical examples.

Calculation of proceeds from vehicle liquidation

In this example, we assume that the average vehicle in the portfolio has an original value of EUR 22,000 with an expected monthly market value decline of 1.6%. The expected average age of a vehicle to be liquidated after a turn-in at contract maturity is five years. Further, we expect an additional value decline (AVD) of 10% from the below-average condition of vehicles whose owners opted for a turn-in, and liquidation costs of 5%.

The liquidation proceeds we expect to be available to cancel outstanding debt at maturity are:

$$Proceeds|_{Rating} =$$
$$= Value\ new \times \left(1 - MVD \times \left(1 + MVDstress|_{Rating}\right)\right)^{Age\ in\ months} \times \left(1 - AVD \times AVDstress|_{Rating}\right) \times (1 - Costs)$$

Under a B stress:

$$\text{Proceeds}|_{B} =$$
$$= \text{EUR } 22{,}000 \times \left(1 - 1.6\% \times (1 + 0\%)\right)^{(5\times12)} \times (1 - 10\% \times 1.0) \times (1 - 5\%)$$

Under a AAA rating-conditional stress the monthly market-value decline increases to 50% and the value haircut related to vehicle condition is multiplied by four:

$$\text{Proceeds}|_{AAA} =$$
$$= \text{EUR } 22{,}000 \times \left(1 - 1.6\% \times (1 + 50\%)\right)^{(5\times12)} \times (1 - 10\% \times 4.0) \times (1 - 5\%)$$

Calculation of rating-conditional fundamental recovery rates

We now assume a financing contract under which vehicles are sold with a down payment of 20% (i.e. the original LTV is 80%) and there is a termination payment at maturity (i.e. balloon payment) of 20% of the original loan balance after five years. Such a contract has a weighted average life of 3.15 years, and voluntary termination would occur 2.42 years after origination, equivalent to a cash-weighted-average time of 1.28 years.

The fundamental recovery rates under B and AAA rating stresses are:

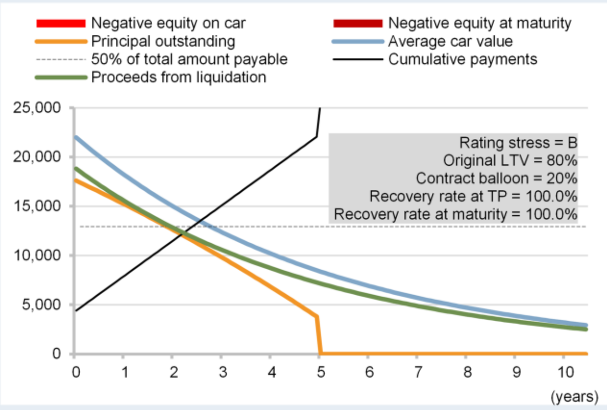
$$Fundamental\ recovery\ rate|^{B}(5\ years) = min\left\{100\%, \frac{\text{Proceeds}|_{B}(5\ yr)}{Outstanding\ balance(5\ yr)}\right\} = min\left\{100\%, \frac{EUR\ 7{,}146.5}{EUR\ 3{,}520}\right\} =$$

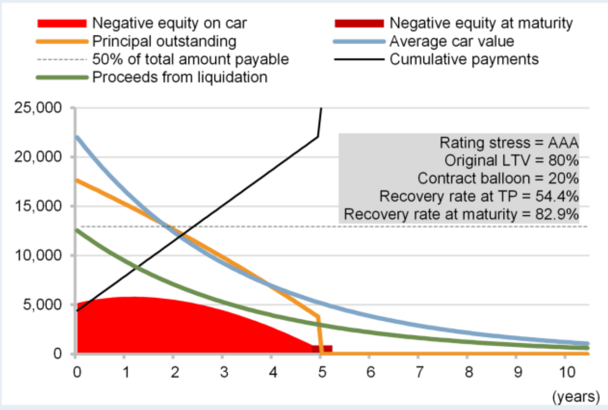
$$= 100\%$$

$$Fundamental\ recovery\ rate|^{AAA}(5\ years) = min\left\{100\%, \frac{\text{Proceeds}|_{AAA}(5\ yr)}{Outstanding\ balance(5\ yr)}\right\} = min\left\{100\%, \frac{EUR\ 2{,}919.4}{EUR\ 3{,}520}\right\} =$$

$$= 82.9\%$$

This is illustrated in the following figures. The liquidation proceeds can cover the outstanding balance at contract maturity under the B rating stress; thus, the recovery is 100%. However, the recovery under the AAA rating stress is just 82.9% because liquidation proceeds are less than the balloon payment.





Calculation of losses from vehicle-value risk at voluntary termination point

The fundamental recovery rate in a AAA stress scenario is 54.4% when calculated as in the previous example but at the voluntary termination point (i.e. 2.4 years after closing; bullet equivalent to 1.28 years). The amortisation factor at turn-in is 64.8%.

For this example, we assume historical frequencies of voluntary termination with a mean of 5% and a standard deviation of 5%. We also assume a rating-conditional stress of two standard deviations in AAA scenarios, which results in a AAA probability of voluntary termination of 15% = 5% + 2 x 5%.

In this example, we assume a portfolio with lifetime portfolio defaults of 15%. It is important to remember that our cash flow analysis considers all portfolio default rates (0% to 100%). This example illustrates the calculation for just one default rate case.

The constant marginal default rate is calculated as follows, considering the weighted average life:

$$\mathrm{DR}_{1year} = 1 - \left(1 - DR_{lifetime}\right)^{\left(\frac{1}{WAL}\right)} = 1 - (1 - 15\%)^{\left(\frac{1}{3.15}\right)} = 5.03\%$$

The cumulative default rate up to the voluntary termination turn-in point is calculated as follows (notice that we use the weighted average time to voluntary termination; as implicit in the formula, the exposure is constant):

$$\mathrm{DR}_{turn-in\ point} = 1 - \left(1 - DR_{1year}\right)^{(WA\ turn-in\ point\ time)} = 1 - (1 - 5.03\%)^{(1.28)} = 6.4\%$$

Finally, the losses from vehicle-value risk can be calculated as described in the methodology:

$$Loss\ from\ vehicle\ value\ risk|^{AAA}\left(DR_{lifetime} = 15\%\right) =$$
$$= (1 - DR_{TP}) \times p\{Turn\text{-}in\}|^{AAA} \times PF_{TP} \times \left(1 - RR_{fundamental@TP}|^{AAA}\right) =$$
$$= (1 - 6.4\%) \times 15\% \times 64.8\% \times (1 - 54.4\%) = 4.15\%$$

The result indicates that 4.15% of the initial portfolio balance is expected to be lost through vehicle-value losses from voluntary termination if the portfolio lifetime default rate is 15%.

Scope Ratings GmbH

Headquarters Berlin
Lennéstraße 5
D-10785 Berlin

Phone +49 30 27891 0

Frankfurt am Main
Neue Mainzer Straße 66-68
D-60311 Frankfurt am Main

Phone +49 69 66 77 389 0

Paris
23 Boulevard des Capucines
F-75002 Paris

Phone +33 6 62 89 35 12

Oslo
Karenslyst allé 53
N-0279 Oslo

Phone +47 21 62 31 42

Madrid
Paseo de la Castellana 141
E-28046 Madrid

Phone +34 91 572 67 11

Milan
Via Nino Bixio, 31
IT-20129 Milan

Phone +39 02 30315 814

Scope Ratings UK Limited

52 Grosvenor Gardens
London SW1W 0AU

Phone +44 2078245180

info@scoperatings.com

www.scoperatings.com