

Methodology

Master European Residential Mortgage-Backed Securities Rating Methodology and Jurisdictional Addenda

DBRS Morningstar

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Related Research

For a list of the Structured Finance related methodologies for our principal Structured Finance asset class methodologies that may be used during the rating process, please see the [DBRS Morningstar Global Structured Finance Related Methodologies](#) document on www.dbrsmorningstar.com. Please note that not every related methodology listed under a principal Structured Finance asset class methodology may be used to rate or monitor an individual structured finance or debt obligation.

Key Updates

For key updates in this methodology, please refer to the press release titled, "DBRS Morningstar Publishes Updated French Addendum to Master European RMBS Rating Methodology" dated 13 September 2023.

Scope and Limitations

A methodology sets forth the key analytical considerations and applicable analytics used when DBRS Morningstar assigns or monitors credit ratings or other opinions. DBRS Morningstar applies approved methodologies in the evaluation of a structured finance transaction or debt obligation. Quantitative and qualitative factors set forth in a methodology or in a combination of methodologies are evaluated by a DBRS Morningstar rating committee or discussion group that exercises analytical judgment and considers the regulatory environment, market standards, and customary practices in addition to other factors deemed relevant to the analysis.

As part of the evaluation process, DBRS Morningstar may opine as to whether a sponsor's proposed capital structure supports the assignment of a given rating(s), the loss level(s) the capital structure is able to withstand or the rating level(s) supported by a sponsor's proposed capital structure. Once completed, this process facilitates the assignment of a DBRS Morningstar rating, at a given rating level.

In cases when an applicable methodology does not address one or more elements of a structured finance transaction or obligation, or such element(s) differs from the expectations contemplated when an applicable methodology was approved, DBRS Morningstar may apply analytical judgment in the determination of any related analytical factor, assumption, rating, or other opinion. For a methodology that incorporates the use of a predictive model, DBRS Morningstar may also depart from the rating stress(es) implied by the predictive model. DBRS Morningstar typically expects there to be a substantial likelihood that a reasonable investor or other user of the credit rating(s) would

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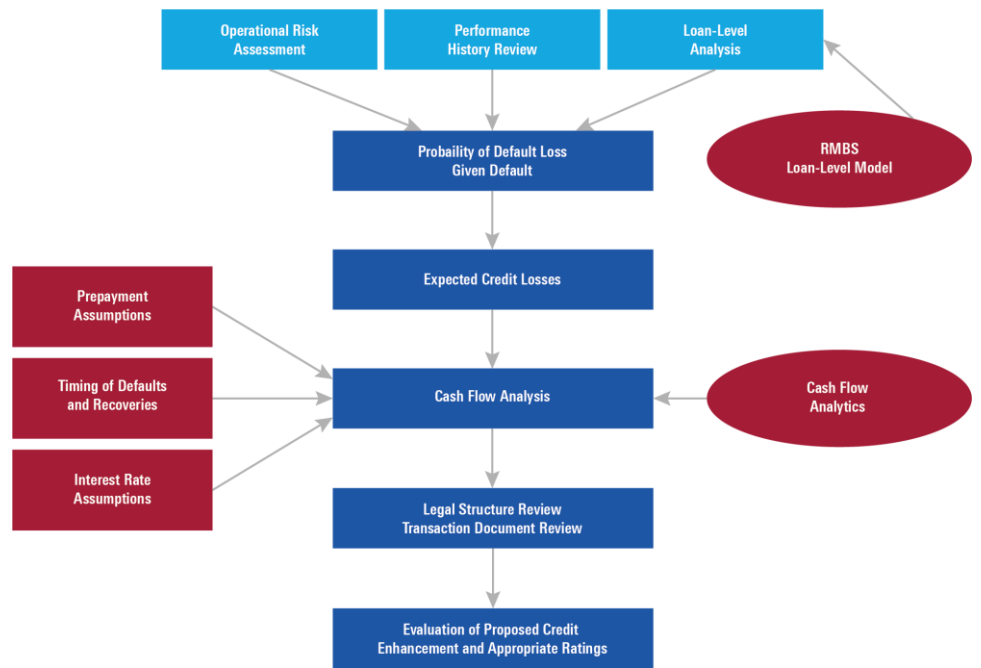
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consider a three-notch or more deviation from the rating stress(es) implied by the predictive model to be a significant factor in evaluating the rating(s). When a rating committee determines a material deviation, DBRS Morningstar discloses the material deviation and its analytical judgment for the material deviation.

Executive Summary

This report describes the DBRS Morningstar rating methodology for select European residential mortgage portfolios and forms part of the DBRS Morningstar criteria for rating European residential mortgage-backed securities (RMBS) and other transactions linked to residential mortgage assets including covered bonds. Please also refer to the appropriate jurisdictional RMBS methodologies at the end of this report for additional detail regarding DBRS Morningstar asset analysis.

DBRS Morningstar Rating Process for European RMBS Transactions



Source: DBRS Morningstar.

The diagram above summarises the process for analysing an RMBS transaction:

1. DBRS Morningstar assesses the operational risk by evaluating the quality of the mortgage originator and servicer.
2. DBRS Morningstar reviews actual performance data of the originator and servicer with respect to historical defaults and recoveries.
3. DBRS Morningstar conducts a loan-level analysis using its proprietary European RMBS Credit Model (RMBS Model), the parameters for which can vary by jurisdiction. The output from the model includes the probability of default (PD), loss given default (LGD), and expected credit losses for a residential mortgage pool. The results are then reviewed along with the results of the operational risk review and assessment of historical performance data and are subject to adjustments, as warranted.
4. DBRS Morningstar performs a cash flow analysis by incorporating stress assumptions applied to defaults, the timing of defaults and losses, prepayments, and interest rates to ensure timely payment of interest and ultimate payment of principal to the holders of the rated bonds for each assigned rating.
5. DBRS Morningstar reviews the legal structure of the transaction and the associated legal opinions.
6. DBRS Morningstar evaluates the form and sufficiency of proposed credit enhancement.

Operational Risk Assessment

Overview

DBRS Morningstar's operational risk review is designed to evaluate the quality of the parties that originate and service the loans being securitised. In instances where DBRS Morningstar believes that the originator's or the servicer's quality of operations is weak, issuers may incorporate certain structural enhancements such as additional credit support, dynamic triggers, or the presence of a strong backup servicer in order for DBRS Morningstar to rate the transaction. In the event that DBRS Morningstar determines that an originator or servicer is unable to effectively manage the assets within a specific transaction and/or there are limited mitigating factors surrounding the identified operational risks, DBRS Morningstar may decline to rate the transaction.

Originator Review

The originator review process evaluates the quality of the parties that originate the loans (leases or receivables) that are about to be securitised in a transaction rated by DBRS Morningstar. While DBRS Morningstar does not assign formal ratings to these processes, it typically conducts operational risk reviews to assess if an originator is acceptable and incorporates the results of the review into the rating process.

DBRS Morningstar typically begins the initial originator review process by sending a questionnaire to the company that outlines the topics to be covered during the discussion with management. In the event that DBRS Morningstar determines that an originator's lending policy and procedures are particularly weak and that the operational risks associated with poor origination practices are not sufficiently mitigated, DBRS Morningstar may refuse to rate the deal.

The originator review process typically involves a review and analysis of the following:

1. Company and management.
2. Financial condition.
3. Controls and compliance.
4. Origination and sourcing.
5. Underwriting guidelines.
6. Technology.

For details on the originator review process, please refer to DBRS Morningstar's *Operational Risk Assessment for European Structured Finance Originators* methodology.

Servicer Review

The servicer review process evaluates the quality of the parties that service or may conduct backup servicing on the loans (leases or receivables) that are about to be securitised in a transaction rated by DBRS Morningstar. While DBRS Morningstar does not assign formal ratings to these processes, it typically conducts operational risk reviews to assess if a servicer is acceptable and incorporates the results of the review into the rating process.

DBRS Morningstar typically begins the initial servicer review process by sending a questionnaire to the company that outlines the topics to be covered during the review. In instances where DBRS Morningstar determines that the servicer is below average and potentially unable to meet its servicing obligations, issuers may incorporate certain structural enhancements into a proposed transaction such as additional credit support, dynamic triggers, or the presence of a warm or hot backup servicer so that DBRS Morningstar can rate the transaction.

The servicer review process typically involves an analysis of the following:

1. Company and management.
2. Financial condition.
3. Controls and compliance.
4. Loan/lease administration.
5. Customer service.
6. Account maintenance.
7. Default management.
 - Collections.
 - Loss mitigation.
 - Bankruptcy.
 - Fraud.
8. Investor reporting.
9. Technology.

For details on the servicing review process, please refer to DBRS Morningstar's *Operational Risk Assessment for European Structured Finance Servicers* methodology.

Jurisdictional Differences

Each European jurisdiction exhibits different legal frameworks, market practices, and product characteristics. The present criteria apply across all European jurisdictions, with adjustments made to reflect the specificities of each market. The generic aspects of DBRS Morningstar rating approach are discussed in the first section of the report and aspects that are jurisdictionally specific are discussed in the addenda. The DBRS Morningstar European RMBS methodology focuses on historical performance data relevant to the jurisdiction and asset class under consideration and a loan-by-loan analysis of the assets in the proposed pool. With regard to DBRS Morningstar analysis of the legal structure of securitisation transactions, the reader is referred to the DBRS Morningstar methodology, *Legal Criteria for European Structured Finance Transactions*, which contains addenda addressing specific issues relevant to the principal European jurisdictions encountered by DBRS Morningstar.

The different jurisdictions in Europe also exhibit varying degrees of sovereign-related risk. Here, the reader is referred to the DBRS Morningstar's *Global Methodology for Rating Sovereign Governments*.

Data Request

As part of the rating process, DBRS Morningstar analyses historical loan performance data provided by a sponsoring entity and also looks to compare the issuer's experience with the performance of the overall jurisdiction. DBRS Morningstar expects issuers to provide performance information, as described below, that covers asset performance during various economic cycles to enable DBRS Morningstar to evaluate the impact that macroeconomic factors, such as unemployment levels, may have on collateral performance. Where the performance history for the originator's assets is insufficient, DBRS Morningstar may consider proxy data such as the performance of similarly originated assets within the same jurisdiction. In all cases where originator-specific static pool data is unavailable, however, DBRS Morningstar is likely to adopt a significantly more conservative opinion regarding the assets' expected performance than would otherwise be the case. In the absence of adequate performance history, DBRS Morningstar may decline to rate the transaction as a result of insufficiency of data.

To gain comfort on the accuracy of loan-level data relative to underlying documents and data specific to each loan, DBRS Morningstar may seek to access Agreed upon Procedures (AuP) reports that are performed by an issuer and/or seller for regulatory purposes. In situations where DBRS Morningstar requests AuP reports, DBRS Morningstar reviews the procedures performed for the following:

- The quantity of loans reviewed.
- The confidence level.
- The nature of the tests performed.
- The results of the tests and the nature and quantity of exceptions.

DBRS Morningstar may reflect these results directly in its analysis through additional or higher default probability penalties or, in certain situations, apply a rating cap or decline to rate a transaction.

Static Pool Data

DBRS Morningstar loss analysis typically focuses on static pool default data. Static pool analysis relies on historical default data from discrete groups of loans originated over a relatively short period of time; ideally, these time periods should be monthly or quarterly as annual vintage data may lack the precision to accurately assess performance volatility during periods of economic stress. In addition, to the extent possible, DBRS Morningstar reviews static pool arrears/default data on a gross basis, without taking into account any recoveries, for which separate static pool recovery/loss data should be provided. Presentation of data in this manner can help provide additional insight into the unique factors that affect loss and recovery performance for the collateral. By evaluating defaults and recoveries separately, DBRS Morningstar can better understand the volatility drivers behind each figure and can analyse the transactions with greater accuracy.

For cases where static pool arrears/default data is unavailable, DBRS Morningstar may consider using dynamic portfolio loss data as a proxy. However, this approach has several shortcomings. Firstly, portfolio figures are biased downward during periods of portfolio growth. While it is possible to make adjustments to the data to address this phenomenon, these adjustments do not provide insight into the timing of losses, an important component of DBRS Morningstar loss analysis during transaction cash flow analysis. In addition, using portfolio figures makes it difficult to adjust for changes in asset composition, and the amount and timing of recoveries can be obscured as well. As a result, in the absence of static pool data, DBRS Morningstar requests supplemental data to help refine its analysis.

Pool data should be presented such that mortgage loans are considered defaulted in a manner that is consistent with the definition of a defaulted receivable in the transaction documentation to ensure that cash flow stresses are constructed to properly address the collateral's loss profile.

In addition to default data, DBRS Morningstar also requests data to validate its LGD assumptions, including loan-level information for foreclosed properties, such as the original valuation, valuation date, and repossession sale price.

Pool Characteristics

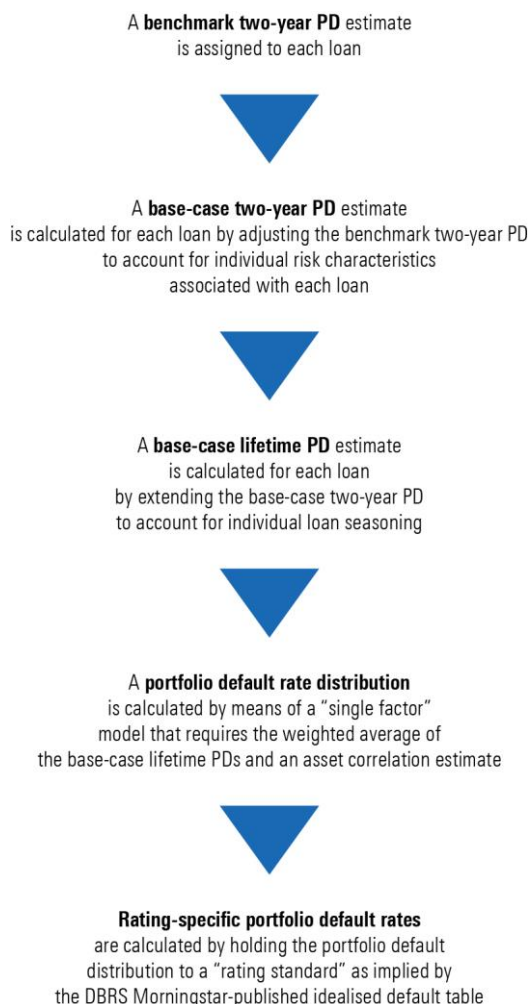
When approached to rate a transaction backed by residential mortgage loans, DBRS Morningstar requests that a loan-by-loan data template be completed. The data template captures data on the loan- and borrower-specific features that are described in this report.

Probability of Default

Summary

This section describes the DBRS Morningstar methodology used to calculate loan-level PD and portfolio-level default rates for European residential mortgage pools. One important component of this methodology is an approach to calculate base-case two-year and lifetime PD estimates for individual mortgage loans. The approach also includes the creation of a portfolio default distribution, which allows for the extension to rating-specific portfolio stressed default rates. For each transaction, DBRS Morningstar conducts additional analysis which serves as a reasonableness check when jurisdictional specific default penalties have yet to be validated. A summary of the

methodology used to calculate loan-level PDs and portfolio default rates is given on the following page and described in detail in the following pages. Jurisdiction-specific assumptions are described in each addendum.



Source: DBRS Morningstar.

The Benchmark Two-Year PD Estimate

Each loan in the mortgage portfolio is initially assigned a benchmark two-year PD. The benchmark two-year PD is determined using historical default information supplied by the originator and may be further calibrated by DBRS Morningstar based on marketwide loan-level data and the related default experience in the relevant jurisdiction. The historical data used to calculate the two-year PD should cover various points within a credit cycle. If DBRS Morningstar concludes data provided does not provide sufficient information as to possible asset performance in a period of stress, DBRS Morningstar may assign a lower rating or decline to rate a transaction.

The Base-Case Two-Year PD Estimate

The benchmark two-year PD is then adjusted on a loan-by-loan basis to create the base-case two-year PD estimate per loan. These adjustments are to account for borrower, property, and loan product factors that increase or decrease the credit risk associated with a particular loan. An overview of the risk-adjustment factors used is provided in the next section.

As mentioned previously, DBRS Morningstar conducts an operational risk review of the underwriting standards, credit policies, and servicing practices of the originator and servicer. The findings from this review may result in a qualitative overlay on the estimated loan-level PDs to adjust for potential originator or servicer specific influences on loan credit performance. Further adjustments may also be necessary in the case of significant pool concentration risks.

The following section focuses on the borrower, mortgage loan, and property characteristics that DBRS Morningstar considers to be influential on a borrower's propensity to default. The default behaviour of each mortgage loan in the pool is forecast by integrating past credit performance information with additional characteristics that may influence a borrower's likelihood of default. Each characteristic is associated with a multiplicative factor, which may be different by jurisdiction, that adjusts the benchmark two-year PD up or down.

Borrower Characteristics and Credit Risk

Credit Risk Band and Adverse Credit History

In order to differentiate between the credit quality of borrowers, each loan is assigned by DBRS Morningstar to a credit risk band, based on past credit performance information. The credit risk bands range from "A" to "E", with "A" borrowers considered to be the least risky and "E" borrowers having severe current or past credit problems and therefore considered to be the riskiest.

The available information currently used to determine the credit risk band is the following:

- Previous credit impairments.
- Any prior bankruptcy or the equivalent within each jurisdiction.
- Current arrears on mortgage.

Adverse credit history is a key differentiating factor for default risk because individuals who have suffered debt problems in the past have demonstrated a higher propensity for arrears and defaults on future debt repayment. Significant previous financial difficulties are indicated by arrears or defaults on loans, County Court Judgments in the UK, Judgments in Ireland, or BKR (Bureau Krediet Registratie) codes in the Netherlands or insolvency. Lending to borrowers with adverse credit history implies higher default risk compared with mainstream lending and is evidenced by significantly higher mortgage arrears and default performance compared with the prime mortgage market.

Employment and Other Income-Related Variables

Borrower propensity to default is clearly related to the ability to make timely mortgage repayments on an ongoing basis. DBRS Morningstar regards affordability, income, and employment characteristics as key attributes, particularly after noticing the high default rates of recent affordability products in some European countries. In addition, consumer indebtedness rose to record level in many jurisdictions in the run up to the financial crisis of 2007 and has raised serious concerns as to borrowers' ability to repay their debts.

The following sections outline employment and other income-related features that DBRS Morningstar considers may affect performance behaviour. These features are for owner-occupied properties only and do not apply to buy-to-let (BTL)/investment products, which are discussed separately in a later section.

Self-Certification

Self-certification is used by borrowers who want to obtain a mortgage without having to demonstrate their earnings to a standard required by conventional mortgage underwriting criteria. In such cases, applicants simply declare their own income, without having to provide the lender with any underlying documentation (e.g., pay slips, audited accounts, tax returns, etc.). Self-certification initially evolved as a product aimed at self-employed, commission-based, or contract workers. Self-employed borrowers may choose to self-certify for a number of reasons. Firstly, most lenders require self-employed workers to provide two to three years of audited financial accounts, which disqualifies more recent self-employed borrowers. Secondly, audited accounts and/or current tax returns are often time lagged and may not show the latest figures of a borrower's income. Thirdly, self-employed borrowers may also perceive that supplying the necessary documentation would be too onerous and time-consuming. Commission-based workers may also choose to self-certify, as they receive a salary with a high proportion of bonus payments and hence show a large degree of variability in income over time. Contract workers and those with incomes from a variety of sources usually choose to self-certify because their total earnings may not otherwise be considered under a traditional mortgage.

Whilst there may be valid reasons for self-certification, there are additional risks with self-certified mortgages. Historical data indicates that mortgage lenders generally have a higher level of material arrears for their self-certified portfolios compared to mainstream lending. Lenders endeavour to offset this risk in a variety of ways, the most common being:

- Most self-certified mortgage providers pass the applicant's stated income through a plausibility check to ensure their stated job type fits within a reasonable salary range;
- More conservative credit score cards are taken into account when assessing self-certified mortgage applications, as well as lower loan-to-value ratios (LTV) so as to deter borrowers from taking out a mortgage that they cannot afford;
- Fraud detection systems in various jurisdictions also discourage systematic fraud in the self-certified market.

Despite these additional safeguards, the higher level of arrears experienced with this product type and the potential for abuse by borrowers means that DBRS Morningstar considers self-certified loans to be riskier than benchmark loans. Note that DBRS Morningstar considers self-certification products to employed borrowers riskier than those to self-employed borrowers, given that the latter may have a more “legitimate” reason for self-certification (such as the burden of supplying audited financial accounts). DBRS Morningstar notes that since the onset of the global financial crisis self-certified loans are no longer generally available.

Self-Employed

Self-employed borrowers who do not self-certify their income need to provide the mortgage lender with documentary evidence of their earnings (e.g., latest tax certifications). However, compared with borrowers who are employees, self-employed borrowers tend to have less stable monthly income. In addition, self-employed borrowers often need to undertake large financial investments in order to set up their own business, which may make them more vulnerable in an increasingly stressful financial environment.

Loan-to-Income

Loan-to-income (LTI) is a measure of loan affordability and is commonly used by lenders to determine how much they are prepared to advance on a mortgage. LTI is calculated by dividing the loan balance by the total income for the household (e.g., the sum of incomes in the case of multiple borrowers). Many lenders also use more sophisticated affordability measures to take into account other financial commitments (e.g., council tax, unsecured loan repayments, childcare costs, utility bills, etc.). Although it is likely that more complex affordability tests are better indicators of risk than a simple LTI measure, the components of these measures are not consistent across lenders. As such, DBRS Morningstar considers LTI a simple but effective means of assessing affordability.

A higher LTI ratio is a sign of greater financial commitments and makes a borrower more susceptible to default in case of a life changing event such as divorce or loss of job, or an economic shock such as interest rates increases. DBRS Morningstar applies a risk adjustment to the benchmark two-year PD based on a borrower’s LTI ratio.

Income data may not be available for seasoned loans, in which case, for loans that have exhibited performance that is in line with loans where income has been provided, DBRS Morningstar calculates a conservative estimate of a borrower’s income by using the originator’s underwriting metrics (maximum LTI, maximum debt-to-income ratios, etc.). In addition, DBRS Morningstar expects that originators can represent within the transaction documentation that the loans have been underwritten in accordance with underwriting practices. Additional comfort may also be drawn from, depending on their scope and results, AuPs, and/or pool audits.

Single Income

When mortgage repayments are serviced by two separate incomes, if one income becomes unavailable (e.g., as a result of unemployment), being able to rely on a co-borrower’s income mitigates the likelihood of default. As such, the repayments on a mortgage serviced by a single income attract a multiple to the benchmark two-year PD rate.

Mortgage Loan Characteristics

Loan-to-Value

LTV is the ratio between the principal balance on the mortgage and the property value serving as security for the loan. The input used by DBRS Morningstar in the default model is the LTV at the time of securitisation (current LTV). This is calculated by summing all of the outstanding balances from every loan secured by the same property (e.g., first-lien and second-ranking mortgages) and dividing by the appraised value of the property serving as security for the loan itself.

In the case of flexible loans, for the purposes of default probability calculations the current balance is taken into account rather than the maximum drawable amount. For the purposes of loss severity calculations, the maximum drawable amount is taken into account instead of the outstanding loan balance.

Higher LTVs are associated with increased likelihood of default, attributable to the progressively smaller portion of equity that the borrower has in the property. Equity is the difference between the value of the property and the amount of all loans secured against it. The smaller the equity, the smaller the potential financial benefit the borrower can retain from the property, and the lower the incentive to maintain loan repayments.

The higher the LTV, the more likely the loans are going to default and risk adjustments tend to increase at a faster speed when an LTV is above 80%. The penalty for LTVs increases as the LTV of a loan increases. The increase in penalty is capped once the LTV reaches 105%. In the instance where there are loans in a portfolio with an LTV greater than 105%, DBRS Morningstar makes adjustments on a transaction-by-transaction basis.

Subsidised Mortgages

DBRS Morningstar considers loans granted on the basis of government subsidies or other forms of support riskier compared with standard mortgage loans due to the intrinsic weaker profile of the borrower that such subsidies imply.

Loan Purpose

Borrowers may apply for mortgages for a variety of purposes, including home purchase, remortgage, debt consolidation, equity release, and rehabilitation. Typically, when borrowers remortgage, they use the proceeds from the remortgage to pay down an already existing mortgage, with the same property being used as security. The main motivation for this type of remortgage, also referred to as refinancing, is usually to take advantage of a more favourable interest rate offered by an alternative mortgage provider.

Up to 2008, strong house price appreciation persuaded many borrowers to remortgage in order to release equity from their property. As such, a growing proportion of borrowers was raising capital from their properties, hence taking on more debt. Debt consolidation is a particular form of equity release remortgaging, where one loan (e.g., the remortgage) is taken to pay off other debts already existing (e.g., unsecured loans, credit lines, etc.).

DBRS Morningstar considers loans granted for purposes other than buying a property to be associated with a higher likelihood of default compared with traditional mortgages. As they allow a borrower to increase their credit exposure, such loans contribute to stretching borrowers' finances, potentially compromising their ability to repay their debts.

Repayment Type

There are two main mortgage repayment methods in Europe: repayment and interest only (IO), with many variations of each of these two types (e.g., a mixture of the two, where an IO reverts to repayment after a certain time period, investment-backed, etc.).

In a standard repayment mortgage, both interest and some of the capital borrowed is paid back over time to ensure the mortgage is completely paid off by the end of the term. In contrast, IO mortgages only require the repayment of the interest on the initial principal balance at maturity.

There are a number of borrower types that might be more likely to opt for an IO loan. Firstly, borrowers with a reduced financial capacity who seek a lower initial instalment and secondly, borrowers who require more flexibility in the way they repay their mortgages. For example, those who have fairly low regular earnings but have expectations for extra financial income (e.g., bonuses) can benefit from smaller regular payments of interest and a more flexible approach to repaying the principal.

With high levels of unsecured consumer indebtedness, combined with high house prices, borrowers have considered IO loans as a way to afford properties that they may not be able to afford with a regular repayment scheme. As such, DBRS Morningstar has some concern that IO borrowers are more likely to have stretched their financial circumstances. In addition, there are further concerns around borrowers' ability to pay back the entire balance due on the mortgage at the maturity date. Although borrowers can refinance at maturity, the market environment at that future date is unknown and, as such, exposes borrowers to refinance risk.

Loan Term

The maximum term offered by European mortgage originators varies by jurisdictions and lender. DBRS Morningstar regards repayment mortgages with a final maturity longer than typical as riskier compared with shorter amortising products. There is a general concern that a borrower may, as with IO products, choose a long amortisation term in order to reduce monthly payments and, that this could be indicative of potential financial vulnerability. Loans that are not IO and have a maturity greater than the typical loan maturity for a particular jurisdiction will be penalised. IO loans that have a maturity longer than is typical do not have the Loan Term Penalty applied as a separate IO penalty is applied.

Second Lien

A second-lien mortgage is a subordinated loan taken on a property already used as security for an existing mortgage. Lien positions differentiate levels of subordination in the rights of creditors to receive proceeds from the sale of the mortgaged property in the event of borrower default. In other words, although a first- and second-lien are both secured, the second-lien holder will not be paid off until the first-lien holder has been paid off in full. Second-lien mortgages, although a common feature of many mortgage finance products, generally have a different purpose across European jurisdictions. In some jurisdictions, second-lien mortgages are generally taken out as an equity release tool for raising capital or to finance the down payment of a purchase. Second-lien loans that are potentially granted to borrowers who are unable to remortgage easily to release equity may represent a riskier profile than the benchmark.

Loan Product

DBRS Morningstar applies risk adjustments to loan products where there is the potential risk of payment shock (i.e., a sharp increase in regular mortgage payments as a result of a change in the interest rate on the loan). Fixed-rate (short-term) loan products are seen to have the most potential for significant payment shock, as they do not adjust incrementally with increases in the base rate. If interest rates increase during the fixed period, the borrowers become exposed to a substantial and sudden increase in their regular mortgage payments at the time of the switch to standard floating rate.

Buy-to-Let/Investment Properties

A BTL mortgage is for the purchase or remortgage of a residential property used for investment purposes. Here, the property is let to tenants as opposed to direct occupation by the borrower. The expansion of the BTL market in some jurisdictions was attributable to strong house price appreciation and good rental demand in the past decade. DBRS Morningstar considers BTL performance to be likely influenced by a number of factors:

- A decrease in the minimum required rental coverage ratio, which is computed as the expected monthly rental income divided by the monthly mortgage repayment;
- Higher LTVs, mainly as a result of increases in the maximum amount lent to landlords;
- Changes in the type and experience level of borrowers accessing the residential property market; a growing proportion of new entrants are “amateur” landlords.

BTL mortgages are also exposed to the risk that the property may not be tenanted for part of the year, meaning the landlord may need to rely on alternative income to cover the loan repayment. Lenders try to mitigate the above exposure by requiring the rental coverage ratio to exceed 100%, but the surplus rent may not be sufficient to cover long void periods without tenancy, as well as other repairs and maintenance costs.

Although a BTL loan attracts a multiple that increases the PD in comparison with the benchmark PD, note that these types of mortgage loans are not exposed to the employment or income multiples that are associated with owner-occupied properties but rather depend on the expected income generated by the property.

Credit Risk Layering

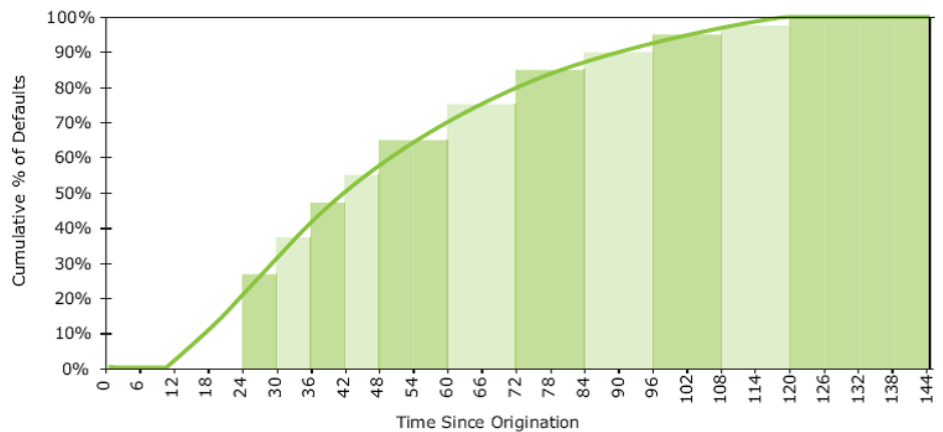
DBRS Morningstar makes a benchmark two-year PD adjustment to account for risk layering within a single mortgage loan; that is, the simultaneous presence of multiple risk factors is assumed to have an adverse effect on PD over and above that predicted by the single multiple associated with each component. Credit risk layering has been an important contributor to the rise of arrears and defaults in the U.S. mortgage market in recent times, and although the presence of credit risk layering in the European countries has not been as prevalent as in the U.S., DBRS Morningstar considers this to be an important element in ultimate default behaviour.

Simultaneous risk elements include combinations of high LTV (indicating minimal borrower down payments), past credit problems (e.g., past CCJ and/or bankruptcy), and high LTI ratios and/or self-certification. Additional risk layers may be assigned for specific countries and jurisdictions.

The Base-Case Lifetime PD Estimate

In order to expand the two-year loan PD estimates to “lifetime” expectations, the two-year estimate is extended by means of an assumed cumulative default distribution. The cumulative default curve for mortgages follows a fairly stable pattern over both time and different data sources, with the majority of defaults on a static portfolio occurring by the end of year five (60 months). The assumed cumulative default curve takes into account historically perceived cumulative default distributions. A sample cumulative default distribution is given in the graph below. Note for simplification that the fitted curve has been divided into six- to 12-month segments (this also allows for more stability in the lifetime default estimates over small changes in seasoning).

Exhibit 1 DBRS Morningstar Sample Cumulative Default Curve



Source: DBRS Morningstar.

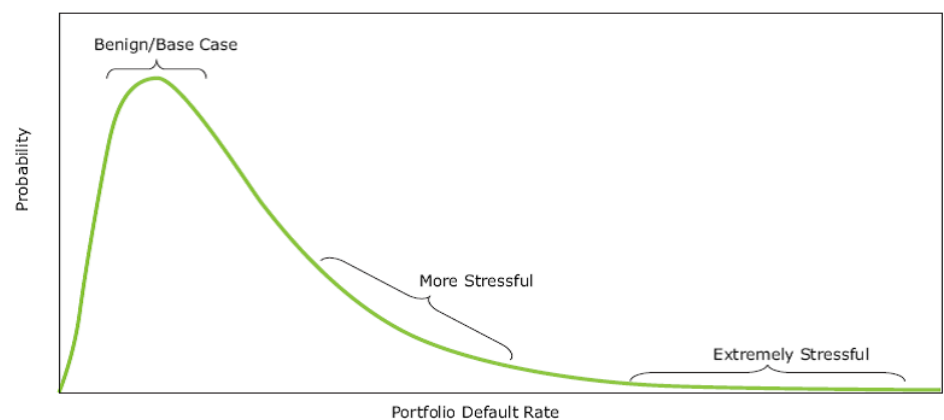
In order to calculate the lifetime PD estimate for a single loan, the percentage of cumulative defaults that should have occurred by the number of months the loan is seasoned (the number of months since origination) plus 24 months (the length of time the two-year PD estimate is predicting forward) is derived from the assumed cumulative default distribution shown in Exhibit 1. Consider the following example where a loan is seasoned for six months and has a current two-year PD estimate of 3%. The six-month seasoning plus the 24 months takes the loan to 30 months in the cumulative default curve. Reading from the bar chart plotted above, the percentage of cumulative default assumed to have occurred by 30 months is 37.5% (note that this percentage is the same for all loans seasoned between six months and 12 months). This means that the two-year PD estimate of 3% represents 37.5% of the lifetime PD estimate. The two-year PD estimate therefore needs to be multiplied by $100\%/37.5\%$ (or 2.67) to get the lifetime PD estimate ($3\% \times 2.67 = 8\%$).

Portfolio Default Rate Distribution

The analysis described in the previous section details the approach used to project “lifetime” base-case loan-level PDs. DBRS Morningstar considers that the results represent a “B” rating scenario or base case. Under more stressful economic conditions, however, a portfolio is expected to exhibit a higher default rate than the base case.

DBRS Morningstar assumes that for a single portfolio of mortgage loans, there is a distribution of potential future portfolio default rates. The default rate that is exhibited by a portfolio is a function of the base-case performance and the prevailing economic conditions, as represented in Exhibit 2. Given that mortgage portfolios are typically very large (e.g., greater than 1,000 loans), there is generally no need to simulate the default of each loan to create a distribution of defaults. A given loan may or may not default, but with such a large portfolio, the loss incurred by a single loan is negligible, and the primary concern is the overall portfolio default rate. As a consequence, simple analytical models can be used to estimate the portfolio default distribution, in particular the “tail” behaviour of the distribution that extends well beyond historically observed mortgage default rates.

Exhibit 2 Example Distribution of Mortgage Portfolio Default Rates



Source: DBRS Morningstar.

The framework used to approximate a distribution of mortgage portfolio default rates is a modified version of the single factor Gaussian credit loss model first proposed by Vasicek (1987).¹ This model allows for the creation of a hypothetical distribution of mortgage defaults using two parameters: the mean (or expected) portfolio default rate and the sensitivity of borrowers to changes in the economic environment.

The mean of the portfolio default distribution can be assumed to be the weighted average of the base-case lifetime PDs.² The variation in the distribution is determined by a measure of borrower sensitivity to macroeconomic effects. The influence of the economy, despite its complexity (e.g., GDP, interest rates, unemployment), can be approximated as a single factor that influences borrowers' propensity to default. Sensitivity to this factor is equivalent to assuming individual mortgage borrower performance is correlated, where the higher the sensitivity, the higher the correlation. For a more technical description of the single factor model framework, please see Vasicek (1987) or Gordy (2003).³

The single factor model approach is very similar to the Basel II methodology for large, well-diversified mortgage portfolios, with one key difference. DBRS Morningstar assumes that the single factor correlation changes over base-case default rates, whereas in the Basel II framework, the correlation remains constant at 15%. The correlation is capped at 25% for all portfolios with expected lifetime base-case PD below 2%. It then decreases as the mean default rate increases and floors at 10% once the mean portfolio default rate reaches 8%. The decrease in correlation at high default rates can be interpreted as a decrease in the sensitivity of high-PD borrowers to macroeconomic effects relative to low-PD borrowers (i.e., high-PD borrowers are more prone to idiosyncratic (borrower-specific) effects than low-PD borrowers).

Rating-Specific Portfolio Default Rates

The analysis described in the previous section results in an analytical distribution of potential default rates for the mortgage pool. Given that a DBRS Morningstar rating ultimately addresses the PD of a tranche backed by the mortgage pool, the distribution can be analysed to determine a portfolio default rate that is consistent with a given rating. This is done by determining the probability that a certain default rate will be exceeded and ensuring that this probability is less than or equal to the default probability of a benchmark bond. The benchmarks are derived from the DBRS Morningstar published idealised default table.

1 Vasicek, O. (1987). "Probability of Loss on Loan Portfolio." Working paper, Moody's KMV.

2 DBRS Morningstar floors the base-case portfolio PD estimate at 1%. In order to continue to rank-order portfolios with very low expected default rates, a scaling factor that decreases as PD increases is applied to all base-case portfolio expected default rates below 2%.

3 Gordy, Michael B. (2003). "A Risk-Factor Model Foundation for Ratings-Based Bank Capital Rules," *Journal of Financial Intermediation*, 12, pp. 199–232.

Loss Given Default

This section describes the DBRS Morningstar methodology used to calculate the LGD for European residential mortgage portfolios. This approach is primarily centered on the potential market value decline (MVD) a foreclosed property could experience compared with its valuation at the time of portfolio assessment. As such, the DBRS Morningstar analysis focuses both on foreclosed property values compared with the general market norm and on how they may behave under more stressful conditions.

Loss Given Default Overview

Upon default, the property is repossessed and sold to recoup the amount owed by the borrower. Upon sale, the amount owed by the borrower not only includes the loan principal balance; there will also be costs associated with the foreclosure process and the forced sale, and given that there is a lag between severe delinquency status and the actual property being sold, the borrower will also owe accrued interest. Note that, for simplicity, the LGD calculations described in this report exclude accrued interest.

LGD is calculated by taking the difference between the outstanding principal loan balance owed by the borrower (also known as exposure at default, or EAD) and the recoveries deriving from the sale of the property and any other form of credit mitigation in place (e.g., mortgage insurance payments), net of any costs and prior ranking loans. This difference is then expressed as a percentage of the EAD, which cannot be less than zero.

$$LGD = \frac{EAD - (\text{property foreclosure sale price} - \text{costs} - \text{prior ranking loans})}{EAD}$$

In Europe, with the notable exception of the Netherlands, most loans are originated with LTVs that are lower than 100%; that is, the loan principal balance advanced is less than the value of the property.

Despite this, if the market value is eroded for any reason (property neglect, economic downturn) and repossession and sale costs are netted from recoveries, then losses will be observed. The decrease in the property value is commonly referred to as a MVD and is clearly a key factor when determining expected losses for mortgage defaults.

Components of Loss Given Default

The DBRS Morningstar methodology for the estimation of each of the contributing components to LGD (e.g., the amount owed, the costs, the property valuation, and the assumed recoveries upon sale) is described in the following pages.

Principal Amount Owed (Exposure at Default, or EAD)

DBRS Morningstar expects that loans are more likely to default relatively early in their life, with the highest default vulnerability occurring between 12 and 60 months. Loans defaulting within this period are unlikely to show significant decreases in the principal amount owed at origination (amortisation). Loan products that do amortise tend to show minimal decreases in the first years of their life, and there are also many nonamortising products now being originated in Europe. In addition, although certain borrowers may manage to pay off more principal balance through partial prepayments, it is less likely that this borrower type will subsequently default. Therefore, DBRS Morningstar assumes that the principal amount owed at default is the same as the balance at the time of the portfolio assessment (e.g., the pool cut-off date).

Current Property Value

DBRS Morningstar makes adjustments to the given property valuation on the basis of the property valuation method and may make adjustments for the time of origination in order to account for any material increase or decrease in the property valuation since the given valuation date.

Property Valuation Methods

There are a number of methods that are currently used to value properties in Europe to assess their adequacy as security for a mortgage advance. In some jurisdictions, lenders have relied on a full physical valuation, where a property expert such as a chartered surveyor would visit the property in question. The surveyor valuation is based on the condition of the interior and exterior of the property, in addition to comparative sales in the vicinity and general market activity. However, a number of alternative valuation solutions, such as drive-by valuation, desktop, and automated valuation models (AVMs), have evolved. In general, these alternative solutions are restricted to either less risky loan characteristics (such as low LTV loans) or situations where there is a known past physical valuation.

- **Drive-by Valuation:** A valuer visits the property and assesses it from the property boundary. Comparative sales and market activity also contribute to the final valuation.
- **Desktop Valuation and AVMs:** In both desktop and AVM valuations, a property is valued without any physical inspection. With a traditional desktop valuation, a house price index or a comparable property evaluation is used to estimate the property value, usually from a past known full property value. A more formalised version of the desktop valuation is derived using an AVM, which assigns a property valuation using a statistical algorithm that can run on an automated basis once certain property characteristics are entered by the user. The AVM derives values based on an analysis of comparable sales in the area and property value indexation (e.g., from repeated sales). The accuracy of an AVM generally depends on the number of suitable comparative properties and the age of their valuations. Therefore, AVM performance is best when the property comes from a densely populated homogenous area with a high number of property sales. This statement is true for all methods of valuation. AVMs, however, are unique in that each valuation produced is accompanied by an independent measure of “confidence.”

AVM confidence measures are based on the number, similarity, and time of the comparable properties used to calculate the target valuation. The more similar and numerous the comparables are, and the more recent the sales data, the higher the level of certainty that can be associated with the target property valuation. Surveyor, desktop, and drive-by valuations have no such measure of accuracy. This, however, does not mean they are immune to the specifics of a particular market, which can make valuations inaccurate and volatile (e.g., sparsely population regions, unique property features, or low comparable sales).

Adjustments Based on Valuation Method

DBRS Morningstar typically considers a full surveyor valuation as the standard. As a consequence, typically no adjustments are made to such valuations. The other property valuation methods, in some circumstances, are adjusted downward.

Property Indexation

With the exception of Ireland, DBRS Morningstar does not typically give any formal credit to positive property indexation. However, in times of significant price rises or declines since origination DBRS Morningstar considers the appropriateness of the standard MVDs for each jurisdiction and may increase or decrease the standard MVDs accordingly. DBRS Morningstar discloses the MVDs used in its rating disclosures.

Sale Price of the Foreclosed Property

DBRS Morningstar believes a forced sale as a result of property repossession will result in a discounted sale price relative to a property sold that has not been repossessed. Therefore, although average historic house price indexes are useful in estimating potential MVDs for the housing market as a whole, they do not indicate how repossessed properties performed relative to the average.

The Benchmark Market Value Decline

It is important to note that housing market cycles differ by country; hence DBRS Morningstar considers a wide range of macroeconomic variables to determine the benchmark MVDs within each European jurisdiction.

Adjustments to assumed MVDs for repossessed properties are usually made to capture additional risks associated with repossession sales. Analyses of historical house price declines do not always take into account how the sale prices of repossessed properties would behave in severe economic environments, such as those experienced in several European markets over the last few years.

Market Value Decline Benchmark Adjustments per Property

The benchmark MVD is then altered on a property-by-property basis depending on various borrower and property factors that DBRS Morningstar assumes to influence a property's resale value. The factors that result in MVD adjustments are property location, property size, and property type.

- **Property Location Adjustments:** Historical house price trends in Europe have shown considerable and persistent regional differences. In certain geographical areas, especially those far from significant cities, historical prices tend to display higher volatilities as demand weakens. DBRS Morningstar may adjust the benchmark MVD where appropriate, in order to differentiate regional demands within each jurisdiction.

- **Property Size Adjustments:** Very expensive and inexpensive properties tend to have more volatile and less liquid resale markets because of the more limited number of potential buyers. In addition, the scarcity of good comparable valuation benchmarks increases the potential for the valuation of these properties to be overestimated. DBRS Morningstar increases the MVD for property valuations for such properties, computing the adjustment by comparing the subject property to an average property valuation within the region.

Sale Price of the Foreclosed Property: Overall Calculations

For every loan in the mortgage pool, DBRS Morningstar determines an updated valuation and then computes the expected sale price at repossession by subtracting from this value the associated MVD.

Costs

The lender bears a number of costs associated with loan delinquency, repossession, and subsequent property resale; hence, these payments need to be subtracted from the sale proceeds. Costs include legal fees (e.g., as the result of possession, eviction, and property sale procedures), expenditures associated with any property maintenance the sale requires and the estate agency charge. Estate agency fees are usually calculated as a percentage of the sale price of the property and are therefore based on the assumed property value after the MVD has been taken.

Prior Ranking Loans

For second-lien mortgages, any prior ranking balance is taken into account and deducted from the property foreclosure sale price. This derives from the fact that, as mentioned earlier, lien positions differentiate levels of subordination in the rights of creditors to receive proceeds in case of foreclosure.

LGD Per Rating Level

Loan-Level and Portfolio-Level LGD Calculations

On a loan-level basis, LGDs are computed for all rating scenarios using the following process. Firstly, the property value at foreclosure is estimated by valuation adjustments, if any. The sale price at foreclosure is then derived using the appropriate loan-level MVD at each rating scenario. Given that MVDs are rating dependent, the assumed costs will then vary accordingly, because they are a function of the foreclosure sale price. LGD is then calculated by subtracting the expected foreclosure sale price from the EAD and adding costs and any existing prior ranking balance, and then dividing the remainder by the EAD. Fixed and variable costs associated with foreclosure are specific to each jurisdiction.

The portfolio-level expected loss is the balance-weighted average loan-level expected loss. The portfolio-level LGD is the ratio of the portfolio-level expected loss to portfolio-level default rate.

Cash Flow Analysis

Summary

DBRS Morningstar undertakes a detailed cash flow analysis to ensure timely payment of interest and ultimate payment of principal at each rating category. The cash flow assumptions DBRS Morningstar uses for rating RMBS transactions focus on the prepayment speeds, timing of defaults and recoveries, and interest rate stresses. As indicated in the table below, multiple scenarios based on the combinations of these assumptions are typically applied to test the resilience of the rated bonds. The upward and downward interest rate stresses referenced below are generated for the applicable currency by the *Interest Rate Stresses for European Structured Finance Transactions* methodology. The table below details the stresses that DBRS Morningstar typically applies in its cash flow analysis. Typically, a mortgage security would need to pass all scenarios at the relevant rating level. However, in certain circumstances a rating committee may elect to discount a specific scenario. This would be determined on a case-by-case basis and the rationale for doing so would be highlighted in any relevant ratings commentary.

DBRS Morningstar Standard Cash Flow Stress Scenarios*

Scenario	Prepayments	Default Timing	Interest Rate
1	Slow	Front-Loaded	Upward
2	Mid	Front-Loaded	Upward
3	Fast	Front-Loaded	Upward
4	Slow	Back-Loaded	Upward
5	Mid	Back-Loaded	Upward
6	Fast	Back-Loaded	Upward
7	Slow	Front-Loaded	Downward
8	Mid	Front-Loaded	Downward
9	Fast	Front-Loaded	Downward
10	Slow	Back-Loaded	Downward
11	Mid	Back-Loaded	Downward
12	Fast	Back-Loaded	Downward

* Additional scenarios may be necessary depending on the pool attributes and transaction capital structure.

Loss Expectation

As described in previous sections, the first step in analysing a pool of mortgage loans is to determine the loss expectations for each rating category. DBRS Morningstar uses the loan-level RMBS model to derive default probabilities and LGDs based on a pool's collateral composition. External factors are also taken into consideration, including the origination process, the servicer's capability, and the originator's historical performance.

Prepayment Speeds

Prepayment speed measures the rate at which borrowers make their principal payments prior to the scheduled maturity date. Prepayments reduce the outstanding principal balance of a mortgage pool, thus reducing excess spread. The faster the prepayment speeds, the quicker excess spread is depleted.

Historical data shows a correlation between a borrower’s prepayment behaviour and interest rate movements. Generally, in a declining interest rate environment, borrowers are motivated to refinance and may do so if their credit profile allows. Conversely, prepayment speed typically slows as interest rates rise. However, in the current market, despite extremely low interest rates, voluntary prepayments remain extremely low. Faced with either blemished credit histories or insufficient home equity and tougher underwriting standards, many existing borrowers find it difficult to refinance.

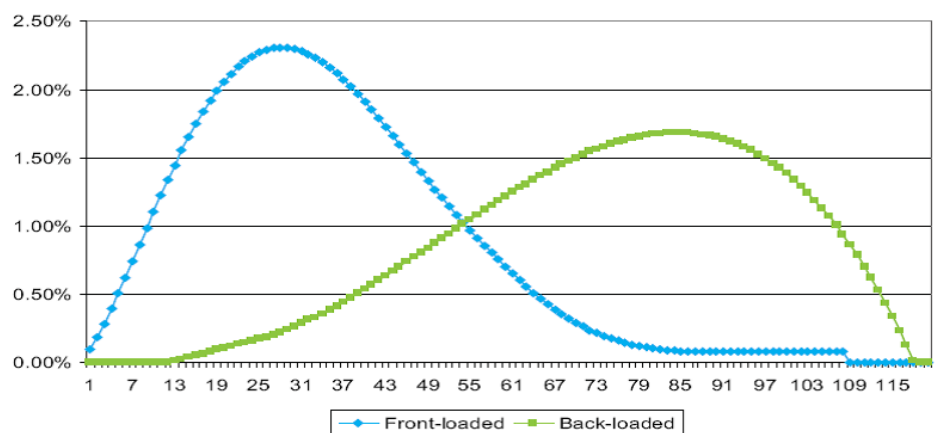
The current low prepayment environment presents a challenge in stressing RMBS transactions as slow prepayment speeds lead to slow build-up of credit enhancement. Conversely, high prepayment speeds stress excess spread properly, but may also deplete collateral too quickly to allow 100% of the expected losses to pass through the capital structure. As a result, DBRS Morningstar finds it prudent in the current environment to apply three prepayment stresses (slow, middle, and fast) that range from 5% to 20% conditional prepayment rates (CPR). The stresses are also compared to the originator’s actual prepayment experience. Different stresses may, however, be applied depending on the jurisdiction and the nature of the collateral.

Timing of Defaults and Recoveries

The timing of defaults is a key factor in evaluating the cash flow structure of a transaction. DBRS Morningstar estimates two default timing patterns: front- and back-loaded, as shown in the graph below. These curves illustrate how defaults will be distributed throughout the life of a transaction.

Because servicers do not advance cash for mortgages in arrears, any principal and interest payments will be shut off as soon as a loan becomes delinquent. Under the assumptions DBRS Morningstar uses to analyse cash flows once the cash flow is shut off, any recoveries or liquidation proceeds will not be available for an extended period of time. The length of this period is dependent on the foreclosure and liquidation timeline within each jurisdiction and varies by transaction.

Exhibit 3 DBRS Morningstar Standard Default Timing Pattern



Source: DBRS Morningstar.

Interest Rate and Basis Risk

Interest rate risk occurs when the interest rate on the underlying mortgage loans adjusts differently from the interest coupon on the bonds. For example, assume that the underlying mortgage loans are either fixed rate or fixed rate (short-term),⁴ and the bonds are based on the Euribor, if Euribor rises, all other things equal, cash flow to the transaction decreases. Interest rate mismatches also exist for securitisations in which the mortgage loans and bonds adjust based upon different indices (Basis Risk). If the two indices were to converge, cash flow to the transaction would be affected. It is important to quantify the effect of this mismatch by stressing interest rates.

When stressing interest rates in some European RMBS transactions, DBRS Morningstar often notices that under a few extremely conservative stress scenarios, namely high interest rate stresses coupled with a front-loaded default timing pattern, the rated bonds tend to come under a significant amount of pressure. In such scenarios, front-loaded defaults shut off a considerable amount of interest payments from the mortgage assets, causing an interest shortfall to the bonds.

When this happens, the principal portion of the mortgage payment, which otherwise would have been used to amortise the bond balances, will likely be “borrowed” to cover these interest shortfalls, thus prolonging the paydown of the rated bonds. The more principal cash used to cover interest shortfalls, the longer it takes to retire the rated notes. Under such scenarios, credit enhancement levels, which are greater than the expected losses, may be insufficient for such ratings on account of “borrowed principal” to cover interest shortfalls.

Jurisdiction-Specific Addenda

The DBRS Morningstar *Master European Residential Mortgage-Backed Securities Rating Methodology and Jurisdictional Addenda* sets forth the analytical framework for the DBRS Morningstar credit analysis of European RMBS. DBRS Morningstar has published a number of country-specific addenda to this master methodology (appended hereto) that detail the factors and multipliers of each of the PD and LGD drivers for given jurisdictions.

French Residential Mortgage Addendum

This addendum details the specific risks of French residential mortgages and DBRS Morningstar analytical treatment of these risks when projecting default probability, LGD, and expected losses for such loans. The addendum can also be applied to the analysis of cover pools in covered bond transactions backed by residential loans in France.

As noted in the master methodology, DBRS Morningstar RMBS loss analysis is divided into two distinct segments. The first segment determines the PD of each underlying borrower, which is then aggregated to derive a pool level default probability. The second segment of the analysis derives the estimated LGD of each mortgage followed by an aggregation to an overall pool level loss projection. The product of the default probability and LGD gives the total expected losses for the

⁴ Fixed rate (short-term) pays a fixed-rate coupon for a short term (commonly between two and five years), then switches to a variable rate for the remaining years until the maturity date.

pool. For details on DBRS Morningstar methodology on European RMBS cash flow analysis, please refer to the master methodology.

Set-Off Risk

There is the potential for set-off risk in French transactions in the case of insolvency of the originator. A borrower may invoke the right to set-off in respect of amounts due and payable to the borrower from the originator at the date of assignment of the loan to the issuer. DBRS Morningstar requests an analysis of the amount of potential set-off for each transaction and makes adjustments to the loss analysis by transaction based on the estimated amount of potential set-off exposure. Please refer to the French addendum to DBRS Morningstar's *Legal Criteria for Structured Finance Transactions* methodology for further information on set-off in France.

Data Request

When estimating mortgage losses for a pool of residential mortgage assets originated in France, DBRS Morningstar requests static pool performance data from each issuer requesting a rating. This data is expected to be representative of the asset pool that is to collateralise the proposed RMBS transaction or covered bond programme. DBRS Morningstar prefers data that is stratified by product type and/or LTV. If various vintages show markedly different performance relative to each other, DBRS Morningstar assesses the reasons for such performance. For more details, please refer to the main report.

PD Analysis

Benchmark Two-Year PD Estimate

DBRS Morningstar calculates the benchmark two-year PD for each pool based on historical issuer-specific data. The calculation of the two-year PD is typically weighted by the corresponding origination volume for that particular year of origination. The two-year PD concentration for a particular transaction is calculated by DBRS Morningstar using the loan-by-loan data tape, or by reference to portfolio level stratifications provided for a particular transaction. For example, if the origination vintages of a pool being analysed were evenly distributed across four years (e.g., 2004, 2005, 2006, and 2007), DBRS Morningstar calculates the two-year PD for each vintage of historical data and applies the respective calculations to the vintage weighting.

Mortgage Loan and Product Specific Default Penalties

Having established a two-year PD for a particular transaction, DBRS Morningstar then applies borrower, mortgage loan, and property characteristic-specific default penalties to each loan to arrive at a base-case two-year PD. The list of typical assumptions used when assessing default risk in French residential mortgages appears at the end of this addendum. The numbers presented are not prescriptive and the actual figures used may differ by transaction. The default penalties used for the analysis of French mortgages were validated by performance data outside of the jurisdiction. As a result, DBRS Morningstar conducts additional analysis of issuer vintage performance data as a reasonableness check against the base-case portfolio default rate. When necessary, DBRS Morningstar adjusts the base-case portfolio default rate accordingly. Disclosure of the assumptions used for each transaction is available on www.dbrsmorningstar.com.

Mortgage Loan Characteristics

Loan-to-Value

LTV is the ratio between the principal balance on the mortgage and the appraised value of the property serving as security for the loan itself. The input used by DBRS Morningstar in the default model is the LTV at the time of securitisation (current balance over original valuation).

Loan Purpose

Increased default penalties are applied to loans where the loan is for debt consolidation of lending, which is not secured. DBRS Morningstar reviews underwriting procedures and product specifications to assess whether, in its opinion, a particular loan product has been used to fund lifestyle expenditures rather than to fund acquisition of residential property to inhabit.

Repayment Type

IO loans in France tend to be of the short-term nature, typically three years or less, and a small percentage of total originations. The loans have the risk of a balloon payment at maturity, and additionally are viewed as having more risk than a fully amortising loan as a result of the payment shock at the end of the IO period.

Loan Term

DBRS Morningstar applies a penalty for loan terms that are longer than typically seen in the market if it concludes that the reason for such a long loan term is to arbitrage affordability assessments made at the time of underwriting unless the issuer provides a credit rationale for longer than average loan terms.

Second Lien

DBRS Morningstar applies penalties to all second-lien loans where it views the additional loan as a second charge rather than a further advance and the loan has a junior security position. Characteristics that may indicate that a loan is in character a second charge are the interest rate on the latest advance is higher than that of other previous advances, the loan term is shorter, or the product is underwritten to materially different criteria to that of the earlier senior charge.

Loan Product

DBRS Morningstar applies risk adjustments to loan products where there is the potential risk of payment shock (i.e., a sharp increase in regular mortgage payments as a result of a change in the interest rate on the loan). Fixed-rate (short-term) loan products have the most potential for significant payment shock, as they do not adjust with increases in the base rate. If interest rates increase during the fixed period, the borrowers become exposed to a substantial increase in their regular mortgage payments at the time of the switch to standard floating rate.

Investment Properties

DBRS Morningstar applies additional penalties to any loans that are not for residential owner occupation on the basis that it expects performance of investment properties to be inferior in terms of performance to residential properties in a stressed macroeconomic environment. DBRS Morningstar believes that owning and managing a residential investment property/portfolio requires a borrower to have a higher degree of financial expertise and discipline than is required to own a single property for owner occupation. For example, a landlord has to deal with issues such as legislation, void periods, and nonpaying tenants. DBRS Morningstar also expect that, in times of significant stress, landlords would stop paying commitments on investment property mortgages prior to commitments on the house in which they reside.

Credit Risk Layering

DBRS Morningstar makes a base-case PD adjustment to account for risk layering within a single mortgage loan; that is, the simultaneous presence of multiple risk factors is assumed to have an adverse effect on PD over and above that predicted by the single multiple associated with each component.

Simultaneous risk elements include combinations of high LTV (indicating minimal borrower down payments), past credit problems (e.g., prior arrears), and high LTI ratios and/or self-certification.

Flexible Loans

Flexible loans are not common in France. However, where encountered, they can vary markedly in their features. Certain flexible loans allow payment holidays, others allow for the repayment of overpaid principal, while other types of flexible loans allow for the full redraw back to a predefined limit. DBRS Morningstar reviews the specific underwriting policies of the loans being analysed when assessing its opinion of the increased default risk associated with flexible loans.

Loans to Foreign Nationals

Loans to foreign nationals are allowed under French law although they tend not to be a material component of French RMBS transactions. DBRS Morningstar believes that these types of loans pose greater risk, all other things being equal, than loans to established French nationals. This is because, firstly, the credit profile of the borrower may be lacking in detail or history relative to a borrower who has been established in the country for a longer period. Consequently, there is a possibility that, even if a less complete picture is compensated for in the origination process by factors such as lower LTV lending, that the risk, as measured by PD, is higher. In addition, DBRS Morningstar believes that there is potential for foreign nationals to repatriate themselves in a situation where a property enters negative equity, thus leading to default. As the strength of the

underwriting process is critical in mitigating risks associated with lending to foreign nationals, the scale of the penalty may vary by transaction.

Borrower Characteristics and Credit Risk

Credit Risk Band and Adverse Credit History

DBRS Morningstar allocates each loan to a credit risk band. The allocation process is based upon a number of factors including:

- Any prior bankruptcy or the equivalent.
- Historical and current arrears on the mortgages.

Depending on the data provided for each of the above factors, DBRS Morningstar assigns each loan to a credit risk band which ranges from A to E. Credit risk band A is considered the best credit quality with E considered the worst credit quality. A successively higher default penalty is assigned to each successively higher credit risk band.

Self-Certification

DBRS Morningstar applies additional penalties to loans where the borrower has not proved stated income levels. The penalty is applied on the basis that (in the absence of any checks) borrowers may be incentivised to overstate their income. DBRS Morningstar also applies penalties to loans where the lender has elected not to check income levels.

Self-Employed Borrowers

DBRS Morningstar applies an additional default penalty to borrowers who are self-employed. DBRS Morningstar analyses each issuer's underwriting policies with regards to income documentation for self-employed borrowers to determine if further penalties may be warranted as self-employed borrowers' monthly income streams tend to be more volatile than for those in employment.

Loan-to-Income

DBRS Morningstar applies penalties to certain loans where the borrower's affordability is considered in DBRS Morningstar's opinion to be worse than the average. When assessing the application penalties for higher LTIs, DBRS Morningstar assesses the income that the lender takes into account during the underwriting process. If details of income are not provided, DBRS Morningstar assesses a borrower's income based on debt-to-income and other affordability metrics as described in the issuer's underwriting policies.

Single Income

Loans advanced to only one borrower are subject to an increase in default probability as obligors with two income streams tend to show more financial flexibility in periods of economic stress.

Loss Given Default

In DBRS Morningstar's opinion, the most robust mortgage valuation is by means of a full internal and external inspection by a qualified valuer. The valuation needs to be sufficient to allow the underwriter a comparison of the property in question to that of other comparable recently sold properties. For other valuation methods, such as drive-by valuations, AVMs, or desktop valuations, DBRS Morningstar reduces the stated market value. The quantum of the valuation adjustment is calculated for each transaction and is based on DBRS Morningstar's assessment of the robustness of the validation procedures implemented by the particular lender.

Typical Market Value Declines

DBRS Morningstar assumes the following standard MVDs to the appraised value (or the valuation, post any adjustment) for each rating level for French RMBS:

AAA	55.30%
AA (high)	49.70%
AA	48.50%
AA (low)	47.50%
A (high)	46.10%
A	45.00%
A (low)	44.00%
BBB (high)	42.20%
BBB	40.20%
BBB (low)	37.70%
BB (high)	36.50%
BB	34.50%
BB (low)	32.80%
B (high)	31.00%
B	30.00%

Costs of Foreclosure

DBRS Morningstar requests lender-specific data for each transaction to assess whether different cost of foreclosure assumptions should be used.

Foreclosure Timing

DBRS Morningstar requests lender-specific data on both the time it takes to enact foreclosure proceedings and sell a property to assess if a transaction specific adjustment is warranted. Therefore, assumptions on the time to foreclosure may vary by transaction and are disclosed in DBRS Morningstar's rating commentary.

Indexation

DBRS Morningstar does not apply indexation of property values, as a matter of routine, in its assessment of loss severity. It applies its MVD to the appraised value (or the valuation, post any adjustment). For seasoned transactions where loans have experienced significant price appreciation or depreciation, DBRS Morningstar may adjust property values on a case-by-case basis. In addition, DBRS Morningstar may also adjust original property valuations on a case-by-case basis where data provided indicates that observed recovery rates on property foreclosure are lower than expected.

Appendix: French Loan-Level Risk Adjustments

Risk Characteristic	Characteristic Value	Base Multiple
Loan-to-Value	<=40	0.60
	50	0.80
	60	1.00
	70	1.30
	80	1.65
	90	2.10
	95	2.35
	100	2.65
	>=105	3.00
Loan Purpose	Debt/Equity Remortgage	1.25
Repayment Type	IO	1.35
Loan Term	>25 Years	1.20
Second Lien	2nd Ranking Loan	1.50
Credit Risk Layering	LTV>=95 & Self Cert/High LTI	1.35
	LTV>=90 & Prior DQ	1.75
	LTV>=90 & Prior DQ & Self Cert/High LTI	1.85
Credit Risk Band	A	1.00
	B	1.00
	C	2.00
	D	4.00
	E	8.00
Employment/Income	Self-Certification (Employed)	1.75
	Self-Certification (Self-Employed)	1.35
	Self-Employed	1.15
	Loan-to-Income > 3.5	1.25
	Single Income	1.25

Portuguese Residential Mortgage Addendum

This report details the specific risks of Portuguese residential mortgages and DBRS Morningstar analytical treatment of these risks when projecting default probability, LGD, and expected losses for such loans. The addendum can also be applied to the analysis of cover pools in covered bond transactions backed by residential mortgage loans in Portugal.

As noted in the master methodology, DBRS Morningstar's RMBS loss analysis is divided into two distinct segments. The first segment determines the PD of each underlying borrower, which is then aggregated to derive a pool level default probability. The second segment of the analysis derives the estimated LGD of each mortgage followed by an aggregation to an overall pool level loss projection. The product of the default probability and LGD gives the total expected losses for the pool.

Data Request

When estimating mortgage losses for a pool of residential mortgage assets originated in Portugal, DBRS Morningstar requests static pool performance data from each issuer requesting a rating. This data is expected to be representative of the asset pool that is to collateralise the proposed RMBS or covered bond programme. DBRS Morningstar prefers data that is stratified by product type and/or by LTV. If various vintages show markedly different performance relative to each other, DBRS Morningstar assesses the reasons for such performance. For more details, please refer to page 7.

PD Analysis

Benchmark Two-Year PD Estimate

DBRS Morningstar calculates the benchmark two-year PD for each pool based on historical issuer-specific data. The calculation of the two-year PD is typically weighted by the corresponding two-year PD for that particular year of origination. For example, if the origination vintages of a pool being analysed were evenly distributed across four years (e.g., 2004, 2005, 2006, and 2007), DBRS Morningstar calculates the two-year PD for each vintage of historical data and applies the respective calculations to the vintage weighting.

Example:

	% of Pool	2-Yr PD
2004	25%	1.00%
2005	25%	1.50%
2006	25%	2.50%
2007	25%	3.00%
Estimated Pool Two-Year PD		2.00%

Mortgage Loan and Product Specific Default Penalties

Having established a two-year PD for a particular issuer, DBRS Morningstar then applies borrower, mortgage loan and property characteristic-specific default penalties to each loan to arrive at a base-case two-year PD. The list of typical assumptions used when assessing default risk in Portuguese residential mortgages appears at the end of this addendum. The numbers presented are not prescriptive and the actual figures used may differ by transaction. The default penalties used for the analysis of Portuguese mortgages were validated by performance data outside of the jurisdiction. As a result, DBRS Morningstar conducts additional analysis of issuer vintage performance data as a reasonableness check against the base-case portfolio default rate. In cases where deemed necessary, DBRS Morningstar adjusts the base-case portfolio default rate accordingly. Disclosure of the assumptions used for each transaction is available on www.dbrsmorningstar.com.

Mortgage Loan Characteristics

Loan-to-Value

LTV is the ratio between the principal balance on the mortgage and the appraised value of the property serving as security for the loan itself. The input used by DBRS Morningstar in the default model is the LTV at the time of securitisation (current balance over original valuation).

Subsidised Mortgages

Subsidised loans were granted by the Portuguese government up until 2002. Loans that had a subsidy prior to the end of the programme were grandfathered and are still covered by the subsidy programme. Notwithstanding this, DBRS Morningstar considers loans granted on the basis of government subsidies or other forms of support as riskier compared with standard mortgage loans because of the intrinsic weaker profile of the borrower that such subsidies imply.

Loan Purpose

Increased default penalties are applied to loans where the loan is for debt consolidation of unsecured borrowed debt. DBRS Morningstar reviews underwriting procedures and product specifications to assess whether, in its opinion, a particular loan product has been used to fund lifestyle expenditures rather than to fund acquisition of residential property to inhabit.

Repayment Type

IO loans in Portugal tend to be short term, typically three years or less, and a small percentage of total originations. The loans do not have the risk of a balloon payment at maturity, but are viewed as having more risk than a fully amortising loan due to the payment shock at the end of the IO period.

Loan Term

DBRS Morningstar applies a penalty for loan terms that are longer than typically seen in the market if it concludes that the reason for such a long loan term is to arbitrage affordability assessments made at the underwriting stage. DBRS Morningstar assumes that this is the case unless there is detailed credit rationale for longer than average loan terms.

Second Lien

DBRS Morningstar applies penalties to second lien loans where it is of the opinion that the second lien is being used as a financing tool by the borrower for personal consumption rather than the purchase of the property.

Loan Product

DBRS Morningstar applies risk adjustments to loan products where there is the potential risk of payment shock (i.e., a sharp increase in regular mortgage payments as a result of a change in the interest rate on the loan). Fixed-rate (short-term) loan products are seen to have the most potential for significant payment shock, as they do not adjust with increases in the base rate. If interest rates increase during the fixed period, the borrowers become exposed to a substantial increase in their regular mortgage payments at the time of the switch to standard floating rate. Loans that track the ongoing changes in interest rates over time are not subject to this risk adjustment.

Investment Properties

DBRS Morningstar applies additional penalties to any loans that are not for residential owner occupation on the basis that the majority of default data for residential mortgages is based on owner occupation. The affordability of investment properties is based on rental income.

Credit Risk Layering

DBRS Morningstar makes a base-case PD adjustment to account for risk layering within a single mortgage loan; that is, the simultaneous presence of multiple risk factors is assumed to have an adverse effect on PD over and above that predicted by the single multiple associated with each component.

Simultaneous risk elements include combinations of high LTV (indicating minimal borrower down payments), past credit problems (e.g., prior arrears), and high LTI ratios and/or self-certification.

Flexible Loans

Flexible loans vary markedly in their features; however, they are not common in Portugal. Certain flexible loans allow payment holidays, others allow for the repayment of over-paid principal, while other types of flexible loans allow for the full re-draw back to a pre-defined limit. DBRS Morningstar reviews the specific underwriting policies of the loans being analysed when assessing its opinion of the increased default risk associated with flexible loans.

Loans to Foreign Nationals

Loans to foreign nationals are allowed under Portuguese law and tend to be a small percentage of securitisation pools. DBRS Morningstar considers the treatment of foreign nationals for each transaction.

Borrower Characteristics and Credit Risk

Credit Risk Band and Adverse Credit History

DBRS Morningstar allocates each loan to a credit risk band. The allocation process is based upon a number of factors including:

- Any prior bankruptcy or the equivalent.
- Historical and current arrears on the mortgages.

Depending on the data provided for each of the above factors, DBRS Morningstar assigns each loan to a credit risk band which ranges from A to E. Credit risk band A is considered the best credit quality with E considered the worst credit quality. A successively higher default penalty is assigned to each successively higher credit risk band.

Self-Certification

DBRS Morningstar applies additional penalties to loans where the borrower has not proven stated income levels. The penalty is applied on the basis that (in the absence of any checks) borrowers may be incentivised to overstate their income. DBRS Morningstar also applies penalties to loans where the lender has elected not to check income levels.

Self Employed Borrowers

DBRS Morningstar employs an additional default penalty to borrowers who are self-employed. DBRS Morningstar analyses each issuer's underwriting policies with regards to income documentation for self-employed borrowers to determine if further penalties may be warranted as self-employed borrowers' monthly income stream tend to be unsteady.

Loan-to-Income

DBRS Morningstar applies penalties to certain loans where the borrower's affordability is considered in DBRS Morningstar's opinion to be worse than the average. When assessing the application penalties for higher LTIs, DBRS Morningstar assesses the income that the lender takes into account during the underwriting process. If income is not provided, DBRS Morningstar assesses a borrower's income based on debt-to-income and other affordability metrics as described in the issuer's underwriting policies. For additional detail, please refer to pages 10 to 11.

Single Income

Loans advanced to only one borrower are subject to an increase in default probability as obligors with two income streams tend to show more financial flexibility in periods of economic stress.

LGD

In DBRS Morningstar's opinion, the most robust mortgage valuation is by means of a full internal and external inspection by a qualified valuer. The valuation needs to be sufficient to allow the underwriter a comparison of the property in question to that of other comparable recently sold properties. For other valuation methods, such as drive-by valuations, AVMs, or desktop valuations, DBRS Morningstar reduces the stated foreclosure value. The quantum of the valuation adjustment is calculated for each transaction and is based on DBRS Morningstar's assessment of the robustness of the validation procedures implemented by the particular lender.

Typical Market Value Declines

DBRS Morningstar assumes the following standard MVDs to the appraised value (or the valuation, post any adjustment) for each rating level for Portuguese RMBS:

AAA	55.30%
AA (high)	50.06%
AA	49.21%
AA (low)	48.57%
A (high)	47.53%
A	46.79%
A (low)	46.14%
BBB (high)	44.70%
BBB	43.06%
BBB (low)	40.91%
BB (high)	40.07%
BB	38.43%
BB (low)	37.09%
B (high)	35.64%
B	35.00%

Costs of Foreclosure

Standard costs of foreclosure in Portugal are assumed to be EUR 2,500 and 3.0% of the post MVD value of the property. DBRS Morningstar requests lender-specific data for each transaction to assess if a different cost of foreclosure assumptions is appropriate.

Foreclosure Timing

Owing to the regulatory impetus to attempt to resolve mortgage arrears in a proactive manner and in a manner that is fair to the consumer, the arrears management process effectively becomes a bespoke process, taking into account the borrowers' individual circumstances. Consequently, DBRS Morningstar expects that the timeline from first arrears to foreclosure will vary from lender to lender – typically, DBRS Morningstar will assume at least a 36-month recovery lag.

Appendix: Portuguese Loan-Level Risk Adjustments

Risk Characteristic	Characteristic Value	Base Multiple
Loan-to-Value	<=40	0.60
	50	0.80
	60	1.00
	70	1.30
	80	1.65
	90	2.10
	95	2.35
	100	2.65
	>=105	3.00
Loan Purpose	Debt/Equity Remortgage	1.25
Repayment Type	IO	1.35
Loan Term	>25 Years	1.20
Second Lien	Second-Ranking Loan	1.50
Credit Risk Layering	LTV>=95 & Self Cert/High LTI	1.35
	LTV>=90 & Prior DQ	1.75
	LTV>=90 & Prior DQ & Self Cert/High LTI	1.85
Credit Risk Band	A	1.00
	B	1.00
	C	2.00
	D	4.00
	E	8.00
Employment/Income	Self-Certification (Employed)	1.75
	Self-Certification (Self-Employed)	1.35
	Self-Employed	1.15
	Loan-to-Income > 3.5	1.25
	Single Income	1.25

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