Originator-Specific Residential Mortgage Analysis Rating Criteria

Sector-Specific

Scope

This report outlines Fitch Ratings' methodology for analysing the cover pools of residential loans to individuals originated in Cyprus, the Czech Republic, Denmark, Norway, Poland, Singapore, Slovakia, South Korea, Sweden and Turkiye. Country-based assumptions, such as regional house price decline (HPD) assumptions, are applied to all residential mortgage cover pools in these countries, including loans to individuals backed by shares in housing associations in Norway and Sweden.

Originator-specific assumptions, such as frequency of foreclosure, are developed according to the analytical framework in these criteria and are disclosed in programme-specific publications.

Fitch applies these criteria when there is a limited number of covered bond programmes in a country and when we do not have RMBS rating criteria. The criteria apply to new and existing covered bonds programmes in the countries specified above.

The criteria set out in this report are used to calculate portfolio credit loss assumptions that are applied in the *Covered Bonds Rating Criteria* to determine break-even overcollateralisation (OC) levels for covered bond ratings. Credit loss assumptions and cash flow assumptions are listed in this report.

This report should be read in conjunction with the *Originator-Specific Residential Mortgage Analysis Rating Criteria – Supplementary Data File*, which sets out Fitch's quantitative assumptions.

Key Rating Drivers

The relative importance of these key rating drivers depends on portfolio characteristics.

Foreclosure Frequency (FF): Fitch derives originator-specific expectations for the performances of the cover pools of residential mortgage loans in different stress scenarios, taking into account historical mortgage loan performance of the issuer and macroeconomic expectations. The main assumptions derived are 'B' FF and rating scenario multiples. Pools that show regional concentration are assigned higher FF multiples. Fitch applies specific FF assumptions to loans in arrears.

Recovery Rate (RR): Fitch calculates RRs on defaulted residential mortgages from the assumed proceeds of the sale of the property securing the mortgage. The net recovery proceeds assumed to be available are primarily driven by assumptions of rating scenario-specific HPD and a foreclosed sale adjustment (FSA), which are established at a country level. Net proceeds are compared with assumed loan amounts at the time of default.

Portfolio Loss Floor: Fitch applies a portfolio loss floor at a 'AAA' level in each country to the weighted average (WA) losses for the portfolio. The portfolio loss floor is achieved by reducing the unadjusted WARR. Below 'AAA' the portfolio loss floor is calculated by applying the portfolio loss floor scaling factors.

Cash Flow Model Assumptions: Fitch also applies country-based assumptions regarding prepayments, servicing costs, foreclosure timing and foreclosure costs.

Models

Fitch uses its ResiGlobal analytical model to calculate the credit loss of the portfolio. We also use country-based assumptions specified in this criteria report and originator-specific assumptions that will be detailed in rating communications. The asset model is described in detail in the *European RMBS Rating Criteria*.

Asset model results and cash flow assumptions are used in further analysis that is detailed in the *Covered Bonds Rating Criteria*. Fitch also uses its proprietary Asset-Backed Security (ABS) Loss Forecaster to extrapolate historical default rates.

Loan-Level Data Template

Data may be delivered in a different template, but Fitch's asset model works on the basis of the ECB RMBS loan-level data template and its taxonomy. The template is described in *Appendix 3: Asset Model*.

Originator-Specific Foreclosure Frequency

Expected-Case Foreclosure Frequency

Fitch will determine an expected-case FF, subject to the data requirements specified in *Appendix 1*, based on historical performance data delivered by an originator. The expected-case FF is Fitch's best prediction of the lifetime default behaviour of the underlying mortgages.

Fitch will extrapolate the default vintages obtained for the mortgage book to derive the expected-case FF, or any subset that is representative of the mortgages in the cover pool. The extrapolation will be done on a period equal to the longest available vintage. In the event of expected performance deterioration from the long-term average default performance, Fitch will also calculate the extrapolated cumulative defaults based on a subset of the data representing the last period of stress if this is deemed more representative (see *Expected Performance Deterioration* below). Each extrapolated FF will then be weighted according to the amounts of assets originated for that vintage year (WA-extrapolated default). Fitch will use its ABS Loss Forecaster model to derive it. A simplified example is outlined in *Appendix 4*.

Percentage Change Extrapolation Method

Fitch uses the percentage change method to extrapolate a base-case cumulative default. The historical periodical change is derived for each data period for static pool vintages that have at least five data points.

- Cumulative defaults are expressed in volume. If data are provided as a percentage, the percentage is multiplied by the origination volume for that vintage to calculate the defaults in volume.

- The amount of defaults for all vintages in a given period (e.g. month nine) is added and then divided by that of the prior period (e.g. month eight) to arrive at the percentage change factor.

- The derived percentage change factor for each period is then multiplied by the corresponding cumulative defaults for each vintage that have not reached the end of the default curve until the vintage is projected fully to the expected default curve.

All projected and actual cumulative defaults for each vintage are then averaged (weighted by the origination volume) to derive a historical average expected-case cumulative default assumption. Fitch will use a straight average of vintage cumulative defaults if the originator's volumes are skewed towards recent originations. Alternatively, origination volumes for the country's banking sector may be used for each vintage year for issuers that have experienced little origination during some years.

Adjustments to Extrapolated Defaults

Extrapolated vintage data could result in low extrapolated defaults in some cases. However, Fitch will floor the expected-case lifetime FF at 1% for residential mortgage loans.

The expectation of default for outstanding loans for cover pools with significant seasoning may differ from the projected default assumption. This would be the case when the mortgages underlying the vintage data used for extrapolation show a significant amount of accumulated defaults, whereas the cover pool is made mostly of performing loans. Fitch will compensate for

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this by adjusting the calculated expected-case lifetime FF based on remaining defaults as a percentage of the outstanding pool. This adjustment will be applied where the country has experienced severe economic stress and 'low' rating scenario multiples are used (see *Performing Loans* below). Countries that experienced severe economic stresses will show weaker historical data for the mortgage book that will not correspond to the performance of the collateral backing the covered bonds as the cover pools mostly comprise performing loans. The resulting expected FF will be the higher of the calculated expected lifetime FF based on remaining defaults, or 50% of the extrapolated defaults.

For instance, if vintage data analysis shows accumulated defaults of 13% and extrapolated default of 20%, the cumulative default expected on a performing pool of seasoned mortgages would be the remaining expected default of 7% of the initial pool. This would equate to a lifetime FF of 8% for the remaining performing pool, i.e. 8% = 7% / (1% - 13%). The resulting FF is floored at 10% (50% of the extrapolated defaults).

Fitch will also take into account qualitative considerations to adjust any quantitatively derived result when forming an expected-case assumption. These considerations are outlined below:

- If historical data are volatile or show a certain trend, Fitch's analysis will focus on the drivers of these patterns and their impact on pool performance.

- The agency will also look into historical originator dynamic delinquency data as this can provide insight on near-term default performance, changes in underwriting standards and exposure to the economic cycle. Increasing delinquency levels indicate the likelihood of increased defaults.

Performing Loans

Each performing loan in the cover pool will be assigned the portfolio FF derived for each rating stress level. Fitch's rating analysis uses stress multiples to establish a degree of remoteness from the expected-case assumption that is appropriate for the assigned rating level. It addresses the risk that actual default performance may be worse than the expected case.

Fitch applies one of three sets of multipliers, depending on the severity of the stress embedded in the vintage data:

- Low: severe economic stress, with observed cumulative default typically above 10%.

- Median: a period of economic stress and increased unemployment, with observed cumulative defaults typically between 3% and 10%.

- High: mild economic environment, with observed cumulative defaults typically below 3%.

Fitch would change the rating scenario multiples for a programme if it observed a significant improvement or deterioration in the default data.

Fitch sets a 'B' FF assumption by applying a limited margin of safety over the expected FF, as detailed below. The margin of safety is higher where vintage data show limited stress.

Multiplier from the Expected Case to the 'B' Foreclosure Frequency

Low	Median	High
1.10	1.20	1.30

Source: Fitch Ratings

For higher rating scenarios, each performing loan is assigned the portfolio's 'B' FF times the low, median or high rating scenario multiples.

Rating Scenario Multiples[a] – No Regional Concentration

	Low	Median	High
AAA	3.5	5.0	6.5
AA	2.9	4.1	5.2
A	2.3	3.1	3.9
BBB	1.7	2.2	2.6
BB	1.4	1.6	1.8
B	1.0	1.0	1.0

[a] Stresses for intermediate rating scenarios will be interpolated (with the 'AA+' stress equal to one third of the difference between the 'AAA' and the 'AA', i.e. 84.33% of the stress above 'B')
Source: Fitch Ratings

Rating multiples are calibrated so the 'AAA' FF contains a significant buffer relative to the long-term average historical performance. The 'AAA' FF is expected to remain constant through normal economic cycles. For countries where a sovereign cap below 'AAA' applies multiples are applied as detailed in the *Country Risk Considerations* paragraph of this report.

Delinquent Loans

The FF assumption for loans in arrears is subject to a floor intended to address the elevated default risk of such loans, as reflected in the *Supplementary Data File*.

An arrears pool WAFF is calculated at each rating category by averaging the loan-level FF, after application of the floor, by the current balance of loans with a status of arrears in each rating category.

Portfolio WAFF

The portfolio WAFF is calculated in the expected case and for each rating category level ('B' to the maximum applicable rating) as the average of the performing pool WAFF and the arrears pool WAFF, weighted by the current balance. The asset model provides a notch-level portfolio WAFF for notches from 'B-' to 'AAA' by interpolating between category level outputs.

Regional Concentration

FF rating multiples for pools with regional concentration are defined at each rating category by multiplying the multiples (without regional concentration) by the figures in the *FF Assumptions Multiples – Regional Concentration* table below.

Regional concentration is deemed to exist if the proportion of properties within a given region (based on property count) exceeds the population distribution of the same region (e.g. Region 1 population = 5.0%), multiplied by a defined threshold (2.5x).

Fitch will apply higher rating multipliers to the percentage of the portfolio that exceeds the respective regional population threshold (e.g. the percentage above 12.5% in Region 1). In practice, the rating scenario multiples for the total portfolio will be the WA, based on a property count, of the multiples with and without concentration.

The population distribution will be taken from the national statistics provider for the purpose of the regional concentration calculation.

FF Assumptions Multiples – Regional Concentration

AAA	1.30
AA	1.23
A	1.16
BBB	1.09
BB	1.04
B	1.00

[a] Stresses for intermediate rating scenarios will be interpolated (with the 'AA+' stress equal to one third of the difference between the 'AAA' and the 'AA', i.e. 84.33% of the stress above 'B')
Source: Fitch Ratings

Expected Performance Deterioration

If Fitch expects an originator's residential mortgage default performance to deteriorate relative to its long-term average, it will increase its FF assumptions by applying one of the three vectors below. The vector will be chosen according to the severity and length of the expected stress relative to past performance: mild severity and short-term (length of stress shorter than two years: 'mild stress'); average and medium-term (two to five years: 'medium stress'); or severe and long-term (longer than five years: 'severe stress'); and so that the 'B' FF covers the worst five-year period of historical defaults.

The vector will be applied to the FFs determined after the application of multipliers from the expected case to the 'B' rating scenario and after application of the multiples from the 'B' to the 'AAA' rating scenario (see *Performing Loans* paragraph above). The vectors will be selected based on Fitch's expectations of GDP growth and unemployment compared to the last period of stress in the available historical default data.

FF Assumptions Multipliers[a] – Expected Performance Deterioration

	Mild Stress	Medium Stress	Severe Stress
AAA	1.00	1.10	1.25
AA	1.01	1.11	1.27
A	1.02	1.14	1.29
BBB	1.05	1.18	1.34
BB	1.09	1.24	1.41
B	1.20	1.40	1.60

[a] Multipliers for intermediate rating scenarios will be interpolated (with the 'AA+' multiplier equal to the 'AA' multiplier minus one-third of the difference between the 'AA' and the 'AAA')
Source: Fitch Ratings

These vectors have been calibrated to ensure the same distribution of stress among rating categories compared with the FF multiples defined in *Performing Loans* above, and so that the 'AAA' to 'B' multiples obtained after applying these vectors do not decrease below the 'AAA' multiple. See table *Rating Scenario Multiples – No Regional Concentration* for the immediately less stressful multiple category (the median multiple for a severe stress, the low multiple for a medium stress).

This adjustment may not apply to originators where Fitch applies 'low' FF multiples due to the expected and 'B' FF already reflecting severe stress that is unlikely to be repeated.

Country Risk Considerations

As set out in its *Structured Finance and Covered Bonds Country Risk Rating Criteria*, Fitch will apply higher stresses if assets are located in countries with increased risk of macroeconomic volatility or event risk. This is usually the case in countries subject to a rating cap due to sovereign risk and will usually result in stresses exceeding the ranges shown in the *Rating Scenario Multiples – No Regional Concentration* table above, as follows:

- In case the highest covered bonds rating for a given country is 'A' or above, the pool WAFF at the level of the highest covered bonds rating is calibrated to be consistent with the pool WAFF that would have been applicable at the 'AAA' level in the absence of such a country rating constraint.

- In case the highest covered bonds rating for a given country is 'A-' or below, the pool WAFF at the level of the highest covered bonds rating is calibrated to be consistent with the pool WAFF that would have been applicable two categories above the highest covered bonds rating level in the absence of such a country rating constraint. For the avoidance of doubt, this assumes that when the highest covered bonds rating is 'A-', the assumptions at this level will be equal to the 'AA+' assumption plus one third of the difference between the 'AAA' assumption and the 'AA' assumption.

Scenario multiples (without regional concentration) below the rating cap are rescaled using a different allocation of the FF compared to that implicit in the tables *Rating Scenario Multiples –*

No Regional Concentration. This is to achieve a progressive increase in the stress level as opposed to a straight line.

Scenario multiples with regional concentration below the rating cap are derived by applying the multiples in the table *FF Assumptions Multiples – Regional Concentration* above to the rescaled rating scenarios multiples (without regional concentration).

A change in the sovereign IDR of a country or the Country Ceiling may result in a change to the highest achievable covered bond rating for a given country. A change to the highest achievable covered bond rating will result in a recalibration of scenario multiples (without regional concentration), as described above. Such recalibration will affect all rating levels above 'B'. However, the change will be greater at the level of the highest achievable covered bond rating. Separately, a change in the sovereign IDR may affect Fitch's 'B' FF assumption if the sovereign IDR change is indicative of broader macroeconomic changes.

Asset Model – Recovery Rate

Net Proceeds

Fitch's asset model calculates assumed property-level net proceeds for all loans. The net proceeds assumption represents the amount that would be recovered from the property in the event of a loan default and property foreclosure, net of foreclosure costs. The property-level net proceeds amount is used in the asset-model to calculate the borrower-level recovery rate.

The indexed property value and the HPD and FSA assumptions are the key drivers of the property-level net-proceeds assumption. The property-level net proceeds amount is calculated within the asset model for each rating category by applying the sequence below.

Asset Model – Net Proceeds Diagram
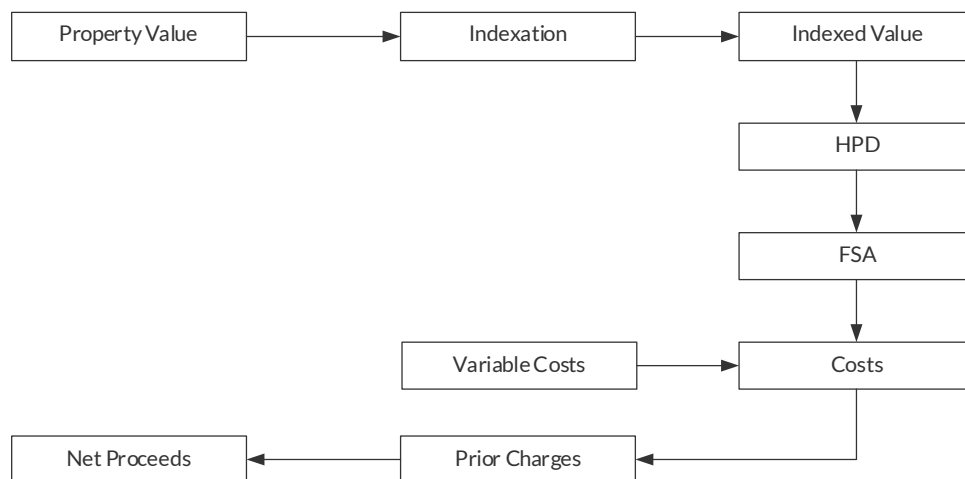
Source: Fitch Ratings

Indexation

Property values are indexed to capture the net effect of market-price movements (upwards and downwards) between the valuation date and the dates in the table on the following page. These are the dates of the property-price dataset considered for the current/trough (CTT) HPD assumptions for each country.

Indexation is used at a national level or for the regions listed in the *Supplementary Data File.* Fitch used data obtained from the sources listed in Appendix 2. The data series starts in the period listed in the *Supplementary Data File* and Fitch does not consider price movements before this date.

Fitch may consider an updated valuation provided for regulatory loan/value calculation purposes as the latest available full valuation from which the index will apply (fields AR 143 and AR 144 in the data tape).

House Price Decline
HPD assumptions vary by rating scenario and reflect the potential impact of differing degrees of economic stress on house prices. HPD assumptions are key inputs to Fitch's criteria. The 'B' and 'AAA' peak/trough (PTT) assumptions for each country are the following:

Fitch 'B' and 'AAA' PTT Assumptions

Country	'B' PTT assumption (%)	'AAA'/Country Ceiling[a] PTT assumption (%)	Reference peak
Cyprus	35	See below	3Q08
Czech Republic	25	50	4Q21
Denmark	15	45	4Q21
Norway	20	50	2Q21
Poland	10	35	4Q21
Singapore	15	45	4Q21
Slovakia	25	50	4Q21
South Korea	10	35	4Q21
Sweden	30	55	4Q21
Turkiye	25	See below	4Q21

a Or the rating cap defined in the *Structured Finance and Covered Bonds Country Risk Rating Criteria* if higher than the Country Ceiling
Source: Fitch Ratings

The PTT assumptions at the country rating cap changes when the cap is below 'A' (as explained in the section *Country Risk Rating Caps* below). These assumptions are laid out in the table below for Turkiye and Cyprus. For example, if the country rating cap for Turkiye is 'BB', the PTT assumption at 'BB' will be 40.9%.

Fitch PTT Assumptions for Different Country Caps[a]

Country Cap	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-	B+
PTT assumption - Turkiye	55.0	52.7	50.3	48.0	45.6	43.3	40.9	38.6	36.2
PTT assumption - Cyprus	55.0	53.4	51.9	50.3	48.7	47.2	45.6	44.0	42.5

[a] The figures in the table assume a 'B' PTT of 25% for Turkiye and 35% for Cyprus.
Source: Fitch Ratings

Each notch-specific assumption depicted in the table above is meant to be used only if it represents the maximum achievable rating for a given country; therefore, the assumptions for rating scenarios other than the maximum achievable rating will not be used in the rating analysis. For example, if the maximum achievable rating for Turkiye is 'BBB+', 50.3% PTT will be applied at the maximum achievable rating and 25% PTT at a 'B' scenario, while assumptions for scenarios between 'BBB+' and 'B' will be interpolated.

Fitch's HPD assumptions are applied on a CTT basis. HPD assumptions are specified for each country and vary by geographic region and rating-scenario category, as detailed in the *Supplementary Data File*.

Country PTT HPD
Country PTT HPD assumptions are calibrated taking into account an analysis of historical house price and income data, as well as forward-looking expectations. The first step includes Fitch defining country-specific PTT stresses. The 'B' PTT HPD assumption captures Fitch's forward-looking expectations and a limited safety margin. The 'AAA' PTT HPD assumptions are

calibrated so they contain a significant buffer relative to historical performance and future expectations.

Country CTT HPD

National CTT HPD assumptions are calculated using the assumed national PTT HPD and the observed peak/current (PTC) index movement (see the *European RMBS Rating Criteria* for an example calculation of Fitch's HPD).

The PTT assumptions are converted to CTT assumptions using the following equation:

CTT = 1 – (1 – PTT) / (1 –PTC)

Regional CTT HPD

Country CTT HPD assumptions are converted into regional CTT HPD assumptions by applying a regional scaling factor. The regional scaling factor ranges between plus 15% and minus 15% and is applied to the applicable country CTT HPD assumption. The regional scaling factor is intended to reflect the expectation that different regions may perform differently in a downturn.

HPD Update Process

Fitch will update the house price indexation values and CTT HPD assumptions on an annual basis at least.

The CTT HPD assumptions may be updated more frequently to reflect the latest PTC observation. The peak observed when setting the PTT HPD assumptions (the *Reference Peak*) will continue to be referenced when calculating CTT HPD assumptions for the purpose of these updates. Fitch will also review criteria assumptions annually. We will redefine the Reference Peak and PTT HPD assumptions where property values exceed historical peaks.

Country Risk Rating Caps

The PTT HPD assumptions incorporate the considerations set out in *Structured Finance and Covered Bonds Country Risk Rating Criteria* for countries where the highest covered bond rating is constrained by country-risk factors.

- If the highest covered bond rating for a given country is 'A' or above, the PTT HPD assumption at such level is calibrated to be consistent with the one that would have been applicable at the 'AAA' level, in the absence of such country rating constraints.

- If the highest covered bonds rating for a given country is 'A-' or below, the PTT HPD assumption at such level is calibrated to be consistent with the one that would have been applicable two categories above the level of the highest covered bond rating level, in the absence of such country rating constraints. For the avoidance of doubt, this assumes that when the highest covered bonds rating is 'A-', the assumptions at this level will be equal to the 'AA+' assumption plus a third of the difference between the 'AAA' assumption and the 'AA' assumption.

A change in the sovereign IDR of a country or the Country Ceiling may result in a change to the highest covered bond rating for a given country. A change to the highest covered bond rating will result in a recalibration of PTT HPD assumptions, as described above. This recalibration will lead to updated CTT assumptions that will be published in the relevant Assumption Sheet of the *Supplementary Data File*. Such recalibration will affect all rating levels above 'B'. However, the change will be greater at the level of the highest covered bond rating. Separately, a change in the sovereign IDR may affect Fitch's 'B' PTT HPD assumption if the sovereign IDR change is indicative of broader macroeconomic changes.

Foreclosed Sale Adjustment

The indexed value of a property (after application of the HPD in each rating scenario) is subject to an FSA. The FSA is intended to capture the expectation that foreclosed properties will report lower sale proceeds relative to the amount calculated based on indexation to the point of the rating analysis, followed by the HPD assumption from the date of the analysis to the date of foreclosure.

The calibration of the FSA is informed by an analysis of country-specific historical data. However, Fitch notes that historical data are often based on a small and adversely selected sample. The assumption setting is, therefore, supplemented with qualitative considerations.

Costs

The property-level recovery proceeds are further reduced to consider assumed foreclosure costs. The costs are applied on a variable basis. Fitch deducts the variable costs from the indexed property value after the reduction of HPD and FSA. The FSA and foreclosure costs assumptions for each country are specified in the *Supplementary Data File*.

Prior Charges and Pari Passu Loans

The property-level recovery proceeds are further adjusted to consider the balance of any prior charges or pari passu loans as per the *European RMBS Rating Criteria*. In particular, the balance of the prior charge is increased to take into account assumed interest accrued during the foreclosure period, using the WA interest rate of the corresponding borrower. For loans that are not at a fixed rate, the interest-rate calculation will use an assumed reference rate and an assumed loan margin as per the *European RMBS Rating Criteria*. These assumptions will be equal to the average reference rate and margin observed for the pool.

Recovery Rate

The asset model uses property-level net proceeds to calculate borrower-level recovery rates and portfolio-level recovery rate assumptions. The borrower-level recovery rate represents the net proceeds amount divided by the borrower's combined loan balance. Recovery rates are calculated for different points in time to consider expected loan amortisation. The resulting recovery rate vector is then aggregated into a single portfolio recovery rate. The sequencing below is applied for each rating category scenario.

Asset Model — Recovery Rates Diagram
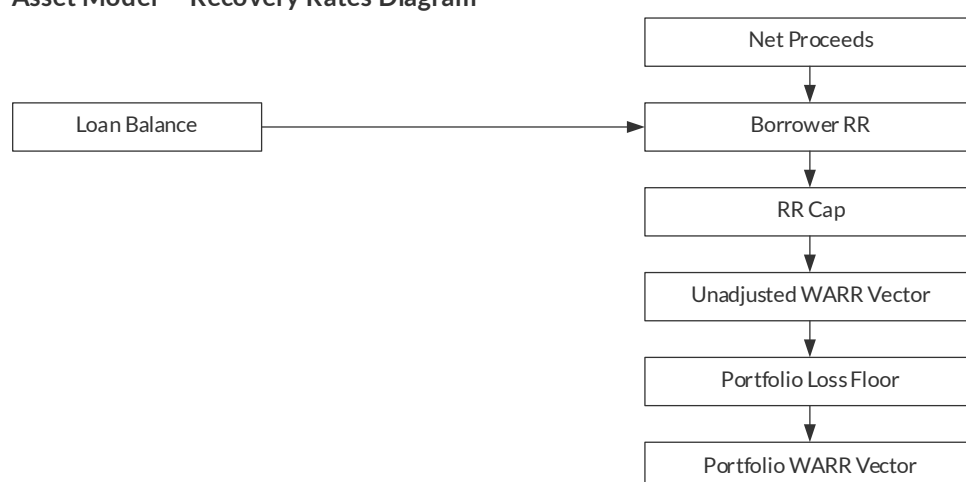
Source: Fitch Ratings

Borrower-Level Recovery Rate

The asset model calculates borrower-level recovery rates for each year of the loan's amortisation period (between year one and year 30 from the cut-off date). It does this in each rating category scenario as net proceeds divided by the assumed balance of loans and considering foreclosure timing. Please refer to the *European RMBS Rating Criteria* for details. The foreclosure timing assumed for each country at each rating category is specified in the *Supplementary Data File*.

Recovery Rate Cap

The borrower-level recovery rate may exceed 100% of the corresponding loan balance as at the date of default. This applies where loan balances are increased post default via the application of accrued interest and where there are sufficient proceeds to cover such amounts. However, Fitch applies a 100% recovery rate cap.

Unadjusted WARR Vector

The unadjusted WARR vector is produced by aggregation of borrower-level recovery rates for each year of the amortisation period and in each rating scenario category between 'B' and 'AAA'.

Portfolio Loss Floor

The asset model applies a portfolio loss floor at the 'AAA' level in each country, as specified in the table below. The portfolio loss rate is defined as WAFF x (1 – WARR). Proportional adjustments are applied for lower rating categories. Please refer to *the European RMBS Rating Criteria* for details. Below 'AAA' the portfolio loss floor is calculated by applying the portfolio loss floor scaling factors to the 'AAA' loss floor.

The floor will be used to assess the level of recoveries on defaulted covered bonds if the model output results in losses that are below the floor. Under the covered bonds rating criteria, a recovery uplift of two to three notches can be granted if the relied-upon OC offsets the cover pool's credit loss in the target rating scenario.

In countries where ratings are subject to a country risk cap lower than 'AAA' the portfolio loss floor will be applied based on theoretical 'AAA' assumptions.

Portfolio WARR Vector and Portfolio WARR

The portfolio WARR vector is calculated in the expected case and for each rating category level ('B' to 'AAA') under the steps described above. The asset model provides notch-level portfolio WARR vectors for notches from 'B-' to 'AAA' by interpolating between category level outputs. Fitch's analysis of residential mortgage cover pools uses a single set of portfolio WARR assumptions. It is calculated by applying the notch-level WARR vector to the middle-loaded default definition.

Cash Flow Model

Fitch may use its covered bond cash flow model as part of its covered bond rating methodology, as described in the *Covered Bonds Rating Criteria*. Relevant assumptions are listed in this section.

Prepayments

The cash flow model applies prepayment assumptions according to the annual prepayment rate assumptions shown below.

Annual Prepayment Rate (High)

Rating scenario	Cyprus, Poland, Turkiye, Czech Republic, Slovakia (%)	Denmark, Sweden (%)	Norway, Singapore (%)	South Korea (%)
AAA	18.0	25.0	30.0	40.0
AA+	16.7	25.0	30.0	40.0
AA	16.0	25.0	30.0	40.0
AA-	15.3	25.0	30.0	40.0
A+	14.7	25.0	30.0	40.0
A	14.0	25.0	30.0	40.0
A-	13.3	25.0	30.0	40.0
BBB+	12.7	25.0	30.0	40.0
BBB	12.0	25.0	30.0	40.0
BBB-	12.0	25.0	30.0	40.0
BB+	12.0	25.0	30.0	40.0
BB	12.0	25.0	30.0	40.0
BB-	12.0	25.0	30.0	40.0
B+	12.0	25.0	30.0	40.0
B	12.0	25.0	30.0	40.0
Expected case	12.0	25.0	30.0	40.0

Source: Fitch Ratings

Annual Prepayment Rate (Low)

Rating scenario	Cyprus, Turkiye (%)	Poland, Czech Republic, Slovakia (%)	Denmark, Singapore, Sweden (%)	Norway (%)	South Korea (%)
All scenario	1.0	2.0	5.0	7.5	10

Source: Fitch Ratings

Default Distribution

Three different default distributions are applied (front-loaded, middle-loaded and back-loaded). The time from the cut-off date refers to the point when a loan becomes delinquent. It will be considered as defaulted in subsequent months according to the default definition. The values in the *Supplementary Data File* refer to the total amount of defaults during that time range.

Servicing Costs

Annual servicing cost assumptions are shown below. They are applied to the balance of performing, delinquent and defaulted loans.

Servicing Costs

Rating scenario	Denmark, Norway, Sweden, South Korea, Singapore (%)	Cyprus, Poland, Czech Republic, Slovakia (%)	Turkiye (%)
AAA	0.30	0.45	1.00
AA+	0.28	0.42	0.95
AA	0.27	0.40	0.90
AA-	0.26	0.38	0.87
A+	0.24	0.37	0.83
A	0.23	0.35	0.80
A-	0.22	0.33	0.77
BBB+	0.21	0.32	0.73
BBB	0.20	0.30	0.70
BBB-	0.20	0.30	0.70
BB+	0.20	0.30	0.70
BB	0.20	0.30	0.70
BB-	0.20	0.30	0.70
B+	0.20	0.30	0.70
B	0.20	0.30	0.70

Source: Fitch Ratings

Asset Margins

The interest rates on some mortgages in Denmark, Norway and Sweden are set at the discretion of the originator and may be changed at short notice. In its cash-flows analysis, Fitch models the lowest margin observed on the residential mortgage loans in the pool for the past 12 months, with a 40bp haircut for the first 12 months and a 15bp haircut afterwards, with a floor and a cap at 100bp and 200bp, respectively.

Basis Risk

Where cover assets and covered bonds reference different floating interest rates, a haircut on the WA spread on the cover assets would be modelled unless the basis risk is deemed immaterial (see *Structured Finance and Covered Bonds Interest Rate Stresses Rating Criteria*).

For Singapore, we believe basis risk among floating market-rate linked mortgage products, specifically Sibor- and SOR-linked products, is immaterial to the rating of Singaporean covered bond programmes. This is due to the historically high correlation between Sibor and SOR market rates.

For covered bonds programmes in South Korea, Fitch estimates basis risk on historical movements of floating index rates linked to cover assets and the liabilities. The estimate is reached by taking the average historical movement of the index rates against the base index rate used in the cash flow modelling and adding a correlation adjustment. An adjustment of one standard deviation of the historical data is calculated for index rates that are highly correlated. An adjustment of two standard deviations of the historical data is calculated where the index-rate movements are less correlated. The total average difference between the index rates, base index rate and correlation adjustment is deducted from or added to the relevant cash flow modelled by Fitch. The floating-rate cover-pool assets are currently linked to certified deposit rates, bank debenture rates and cost of fund index rates.

The reference rate of some floating rate loans in Cyprus is linked to the average interest rate paid on euro-denominated household deposits (related to the outstanding amounts or new business) in Cyprus (i.e. originator rate loans): historically these reference rates have been higher than other market rates (i.e. Euribor) and therefore lower margins above the reference rate may be offered. Fitch deems that this reference rate is originator-specific and could be discontinued in case of originator default.

Furthermore, the originator may also increase the margin for this type of loans should the reference rate become unavailable or no longer applicable. In its cash flow analysis Fitch models these loans as referenced to the Euribor and applies in the analysis an add-on to the margin determined considering the average difference observed from 2008 between the interest rate paid on deposits and three-month Euribor minus a correlation adjustment of two standard deviations.

Rating Assumption Sensitivity

Rating assumption sensitivity analysis of the *Covered Bonds Rating Criteria* applies.

Criteria Variations

Fitch's criteria are designed to be used in conjunction with experienced analytical judgment exercised through a committee process. Fitch's rating process is strengthened by the combination of transparent criteria, analytical judgment applied on a programme-by-programme basis and full disclosure via rating commentary. It also assists market participants with understanding the analysis behind our ratings.

A rating committee may adjust the application of these criteria to reflect the risks of a specific covered bond programme. Such adjustments are called variations. All variations are disclosed in the respective rating action commentaries, including their impact on the rating where appropriate.

A variation can be approved by a ratings committee. This applies where the risk, feature or other factor relevant to the assignment of a rating and the methodology applied to it are both included within the scope of the criteria, but where the analysis described in the criteria requires modification to address factors specific to the covered bond programme.

Limitations

Ratings assigned by Fitch, including Rating Watches and Outlooks, are subject to limitations specified in Fitch's ratings definitions. Limitations of *Covered Bonds Rating Criteria* also apply.

Appendix 1: Data Requirements for Rating Process

Loan-Level Data

Fitch expects loan-level data. The required fields can be seen in *Appendix 3*.

Originator Performance Data

Fitch expects to be provided with originator-specific historical performance data relating to its residential loan portfolio or a subset representative of the loans in the cover pool. This includes:

- cumulative default data in vintage format, by volume of defaulted loans;
- dynamic delinquency data;
- information on foreclosure cases, including a comparison of latest available appraisal prices against the actual selling proceeds; and
- dynamic prepayment data.

Fitch also expects a description of the portfolio underlying the historical data in the form of stratification tables when the underlying data are not representative of the cover pool. Tables should cover internal rating distribution or such attributes as original loan/value, loan repayment type, borrower employment type, interest type (fixed/floating), loan term to maturity, property type, property use and property and borrower location.

Investor reports are expected on a quarterly basis, outlining performance metrics, portfolio stratifications and bond information.

Assumption or Data Adjustments

Fitch will apply adjustments to address missing or inconsistent data, depending on materiality. Such data adjustments will be applied on a loan-level basis by amending the loan-level data file or on a portfolio basis as a portfolio-level manual adjustment. Data adjustments are recorded and reviewed as part of the rating committee process.

Manual adjustments made to address missing or inconsistent data will not be treated as variations from criteria. Manual adjustments applied for other reasons will be treated as variations from criteria.

Please refer to the sections *Data Adjustments, Manual Loan Adjustment, Manual Pool FF Adjustment and Manual Loan-Level Valuation Adjustment* in the *European RMBS Rating Criteria* for details.

Data Availability

Fitch expects to be provided with the above data by the originator on an annual basis to perform the analysis outlined in this criteria report.

The historical data are expected to cover:

- a minimum of 10 years, ideally covering all phases of at least one economic cycle; and
- the usual average life of the residential mortgages in the cover pool.

Fitch may consider available historical data to be sufficient even if it does not fully cover the lifetime of the majority of eligible assets or a full 10-year period. For instance, Fitch may choose to proceed with the analysis if sufficient, relevant and comparable market information is available from which proxy assumptions can be derived. The historical data may be insufficient for a number of reasons, such as limited time during which data are available, limited relevance of available data or high levels of volatility in the available data. Fitch may only rate the covered bonds on a limited uplift basis, as described in the *Covered Bonds Rating Criteria*, if available historical data are deemed to be insufficient.

Data Quality

The rating approach outlined in this criteria report uses historical cumulative default data by vintage to form an expectation of future performance. Fitch expects historical data to be representative of the performance of the cover pool. The data should show the performance of the obligors in relation to the original contractual payment terms.

Fitch will use cumulative default data based on the default definition used by the issuer if it is deemed to be representative of – or more conservative than – foreclosure rates. Typically, a residential mortgage loan will be considered in default if it is more than 90 days in arrears. The agency may also use cumulative foreclosure data, if available, to reflect the cure rate on the defaults that do not lead to a foreclosure.

Fitch has defined the following conditions under which historical performance data can be used for the purposes of these criteria:

1. The data cover at least a full economic cycle, typically 10 years, and the average life of a typical loan.

2. The default data reach a point of flattening.

3. There has been no material change in the issuer's origination practices, such as a change in scoring models, target business or general loan characteristics, including term, loan/value or analysis of loan types.

4. The originator's mortgage book has not expanded substantially over the period (typically no more than 10% a year and not substantially higher than market average). This assessment may consider the inflationary environment. For example, mortgage book growth rates above 10% but in line with inflation may not be considered excessive for the purpose of assessing the reliability of performance data.

5. The cover pool is not materially different from the loan book underlying the vintage data.

Fitch will consider if one or more conditions not being fulfilled could lead to material divergence between the data and expected pool performance. The agency may ask for further data to support its assumption or rate the covered bonds on a limited uplift basis, as detailed under the *Covered Bonds Rating Criteria*.

Performance data that cover all eligible cover assets will be deemed representative as long as the five conditions defined above are fulfilled.

Fitch usually receives data on the issuer's full mortgage book, of which the cover pool is a subset. In such cases, the agency will analyse the issuer's selection criteria for the cover pool and compare the characteristics of the cover pool with that of the mortgage book. This may be done by comparing the distribution of the pool and mortgage book according to the originator's internal rating system or by analysing the following attributes:

*   Loan attributes: loan/value, loan term, principal payment type (i.e. amortising vs interest only), interest-rate type (i.e. fixed vs floating), loan purpose (i.e. purchase, construction or other), occupancy type (owner-occupied, buy-to-let)

*   Borrower attributes: employment type, debt/income

*   Property attributes: property type (i.e. flats, houses and other), regional concentration

Performance data will be deemed representative as long as the cover pool shows similar or better characteristics than the loans underlying the performance data received. Fitch will ask for additional data covering any identified risk characteristics not covered by the performance data if the pool shows negative selection.

Cover pools are usually a positive selection from the total mortgage book because eligibility criteria typically exclude loan parts above a certain loan/value threshold (80% or below) and loans in arrears or in default are usually given limited or no credit in the calculation of regulatory OC. These criteria have to be met on an ongoing basis. Regulators check that covered bonds issued under a dedicated legislative framework comply with the regulatory eligibility criteria.

Appendix 2: Data Sources for Criteria Development

The following data have been used in the development of the criteria assumptions:

- Foreclosure timing, costs and FSA: repossession data provided by mortgage loan originators in each country; some assumptions are based on estimates provided by originators in the context of the operational reviews held for rating purposes.

- Prepayment data: obtained from originators in each country.

- Household disposable income from the OECD and monthly average household income (waged households) from the Economic Statistic System (South Korea).

- Average house price index from the Bank of International Settlements, the ECB, national central banks, national statistical offices and Kookmin Bank (for South Korea).

- Regional house price data from the index sources listed below for each country.

- Observations from Fitch-rated cover pools and RMBS transactions and servicers, when available.

Country	Source of House Price Index
Cyprus	Central Bank of Cyprus
Czech Republic	Czech Statistical Office
Denmark	Statistics Denmark
Norway	Statistics Norway
Poland	European Central Bank
Singapore	Department of Statistics Singapore
Slovakia	National Bank of Slovakia
South Korea	Kookmin Bank
Sweden	Statistics Sweden
Turkiye	TMBC (Central Bank of the Republic of Turkiye)

Source: Fitch Ratings

Appendix 3: Asset Model

ECB Data Template

The following table lists all fields used by the asset model. Only a subset is relevant for the purpose of these criteria. The 'Applicability' column indicates the relevance of fields for our analysis and required inputs.

ECB Template Fields Used in Fitch Analysis

Field number	Field name	Applicability[a]
AR1	Pool cut-off date	Results
AR3	Loan identifier	Results
AR7	Borrower identifier	Results
AR8	Property identifier	Results
AR16	Foreign national[b]	Stratifications
AR21	Borrower's employment status	Stratifications
AR26	Primary income	Stratifications
AR27	Income verification for primary income	Stratifications
AR28	Secondary income[b]	Stratifications
AR55	Loan origination date	Results
AR56	Date of loan maturity	Results
AR58	Origination channel/arranging bank or division[b]	Stratifications
AR59	Purpose	Stratifications
AR66	Original balance	Results
AR67	Current balance	Results
AR70	Payment frequency	Stratifications
AR71	Payment due	Results
AR72	Payment type[c]	Stratifications
AR80	Prior balances[b]	Results
AR82	Pari passu loans[b]	Results
AR87	Maximum balance[b]	Results
AR107	Interest rate type	Stratifications
AR109	Current interest rate	Results
AR110	Current interest rate margin	Results
AR113	Revision margin 1	Stratifications
AR114	Interest revision date 1	Stratifications
AR115	Revision margin 2	Stratifications
AR117	Revision margin 3	Stratifications
AR120	Final margin[b]	Stratifications
AR128	Geographic region list[b]	Results
AR130	Occupancy type[b]	Stratifications

ECB Template Fields Used in Fitch Analysis (Cont.)

Field number	Field name	Applicability[a]
AR131	Property type	Stratifications
AR136	Valuation amount	Results
AR137	Original valuation type	Stratifications
AR138	Valuation date	Results
AR143	Current valuation amount	Results
AR144	Current valuation type	Results
AR145	Current valuation date	Results
AR166	Account status	Needs flag '1' or '2'
AR169	Arrears balance	Results

[a] Results: values in this field affect the model-calculated portfolio loss
Stratifications: Values in this field are used by the model to produce portfolio stratifications
[b] ECB priority: Optional
[c] Amortisation is assumed for loans with a payment type of 'annuity' (1), 'increasing instalments' (3), 'fixed Instalments' (4 or 5), 'bullet and savings deposit' (7) on the basis of a constant amortisation profile. Amortisation is assumed for loans with a payment type of 'linear' (2) on a linear profile
Source: Fitch Ratings

Loan Aggregation

The ECB data template requires each loan (or loan part) to be shown as a separate line item with a unique loan identifier (AR3) with a corresponding property identifier (AR8) and borrower identifier (AR7). Please see *Asset Model – Loan Aggregation* in the *European RMBS Rating Criteria* for details.

For loans corresponding to the same property, the relevant property valuation amounts must be input on a pro rata basis and are added to arrive at the property value. The applicable valuation date for the property is based on the most recent applicable valuation date across the loan parts. The applicable valuation type, property type and region for the property will subsequently correspond to the loan part with the most recent applicable valuation date. If the applicable valuation dates are the same across all loan parts of a property, the information will be taken from the first loan listed in the data file that is linked to the property.

Unused Assumptions

The asset model includes a broad range of functionalities. Some of these are not relevant for the purpose of these criteria. The corresponding assumptions are populated with values so that asset-model results are not affected.

The model also allows for certain transaction-specific assumptions to be made. Fitch will use the following result-neutral values for the purpose of these criteria:

- Sector: prime

- Originator adjustment: 1.0

- Average constant default rate (CDR): 0%

- Portfolio-level adjustments (WAFF): adjustment factors 1 to 5 and performance balance for adjustment factors 1 to 5 = 0% (all).

- Performance adjustment factor (PAF): cap = 1; floor = 1

- Cash flow assumptions for PAF calculations: prepayment rate = 0%, interest-only = 0%, interest rate = 0%

Appendix 4: Static Data and Extrapolation Example

The following is a simplified example of the extrapolation of vintage default data.

Rows in the three following tables represent the period when the receivables were originated; Year 1 to Year 7. The columns represent the period since origination; one-to-five years. The tables have been simplified to annual periods for presentation purposes.

For example, the rate of 3.4% in the table below represents the percentage of receivables originated in Year 1 that had been recorded as defaulted one year after origination. A cumulative amount of 4.6% of receivables had defaulted after Year 2:

Unextrapolated Defaults

(%)	Year 1	Year 2	Year 3	Year 4	Year 5
Year 1	3.4	4.6	5.1	5.2	5.3
Year 2	3.1	3.6	4.0	4.0	4.0
Year 3	3.1	4.2	4.6	4.6	4.6
Year 4	3.3	4.4	4.8	4.8	
Year 5	2.4	3.3	3.6		
Year 6	2.8	3.9			
Year 7	3.6				

Source: Fitch Ratings

Gradient factors are shown in the following table. The figure of 1.37 shows that, for the Year 1 vintage, the amount of cumulative defaults increased by a factor of 1.37 between years one and two; that is, 4.6% divided by 3.4%.

Gradient Factors

(%)	Year 1	Year 2	Year 3	Year 4	Year 5
Year 1	-	1.37	1.10	1.03	1.01
Year 2	-	1.16	1.10	1.02	1.00
Year 3	-	1.37	1.09	1.01	1.00
Year 4	-	1.35	1.09	1.01	
Year 5	-	1.37	1.08		
Year 6		1.37			
Average		1.33	1.09	1.01	1.00

Source: Fitch Ratings

The actual cumulative default observations as well as extrapolated through-the-average gradient factors and the data points are shown in the next table. For example, the projection for the Year 7 vintage after two years is a default level of 4.8% – i.e. 3.6% x 1.33 – whereas the projection after three years for the same vintage is 5.2% – i.e. 4.8% x 1.09.

In practice, the gradients will be weighted by the originator's volume of origination. However, Fitch may use straight averages or weight cumulative defaults by the country's mortgage market origination volumes in each vintage year in the cases described in the core of this report.

Extrapolated Defaults

(%)	Year 1	Year 2	Year 3	Year 4	Year 5
Year 1	3.4	4.6	5.1	5.2	5.3
Year 2	3.1	3.6	4.0	4.0	4.0
Year 3	3.1	4.2	4.6	4.6	4.6
Year 4	3.3	4.4	4.8	4.8	4.9
Year 5	2.4	3.3	3.6	3.6	3.6
Year 6	2.8	3.9	4.2	4.3	4.3
Year 7	3.6	4.8	5.2	5.3	5.3

Source: Fitch Ratings