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European RMBS HEATmaps

Regional Diversification Is a Safeguard, but Mind the Hotspots

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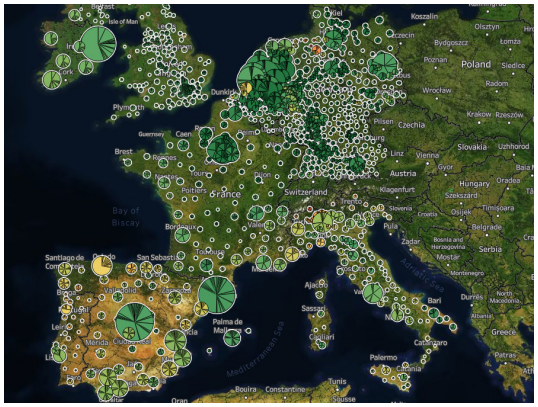
In our previous commentary, *Climate Risk Navigator – Physical Climate Risk Signals in Credit: Longitude, Latitude, and Exposure*, we introduced our Hazard Exposure Analytics and Trends (HEAT) dataset and demonstrated how physical climate risk varies across locations, regions, and time horizons.

This commentary focuses on linking that regional climate risk data to property location data in European residential mortgage-backed securities (RMBS), where exposure is reported in a standardised, region-based format.

We find that regional diversification is a strong mitigant for climate risk. Therefore, our data enable screening European RMBS transactions for outsized exposures in more affected regions and can serve as a signal to analyse risk from potential adverse weather or natural catastrophes in more detail. If more property location information is available, this can include where the securitised assets are in the respective Nomenclature of Territorial Units for Statistics (NUTS3[1]) regions, in addition to assessing other mitigants.

EXHIBIT 1 Public European RMBS Regional Distribution and Climate Score



Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

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KEY HIGHLIGHTS

- The European RMBS market benefits from a mostly standardised property location reporting process and a common data repository, enabling a consistent mapping of exposure and regional climate risk data.
- Transaction-level climate risk metrics from our HEAT database can be used to identify exposure and serve as a signal to analyse it further, particularly whether commonly assumed mitigants for granular property or lending portfolios are in place.
- We are working towards disclosing our transaction-level climate risk signals introduced in this commentary in European RMBS credit rating reports.

1. The European Union's NUTS classification is a harmonised system for regional statistics. With approximately 1,750 regions, NUTS3 is the most granular level in Europe.

Property Location Reporting in European RMBS

In European RMBS loan-level data, property location is typically reported at the NUTS3 regional level, the most granular standardised regional level across the 27 EU member states and some other European countries that use NUTS-type statistical regions (see Appendix 1). Substantially more granular property location reporting is often not allowed because of concerns around consumer data protection. This makes regional data for climate risk analysis in European RMBS a practical necessity, and the consistency in transaction reporting makes it a meaningful starting point for climate risk analysis.

In addition, though the UK is increasingly an exception, issuers report initial and updated loan- and property-level data into the European DataWarehouse (EDW). This creates a clear and transparent mapping pathway for this asset class. Individual loans are allocated to NUTS3 regions based on reported property location, regional collateral concentrations are established, and we can then overlay these exposures with HEAT's NUTS3-level physical climate risk metrics.

Mapping the Climate Risk of the European RMBS Market

EXHIBIT 1 shows the properties in current (as of end-2025) outstanding European RMBS transactions that report NUTS3, per EDW data, covering 213 transactions with a current balance of EUR 394 billion and GBP 16.2 billion. With only 27 transactions, the UK is underrepresented, because many issuers stopped reporting into EDW for various reasons. While the size of the bubbles represents the exposure in the region, the colour indicates the stacked climate (risk) score.

The larger the region, the more the average climate risk trends towards zero. It is no surprise, therefore, that many NUTS3 regions have a low (green in Exhibit 1) climate score. **EXHIBIT 2** maps European RMBS transactions relative to their exposure to NUTS3 regions and those regions' climate scores. According to EDW data, the Madrid region in Spain (NUTS3: ES300) represents the largest region in European RMBS (3.3%) but has a low average climate score.

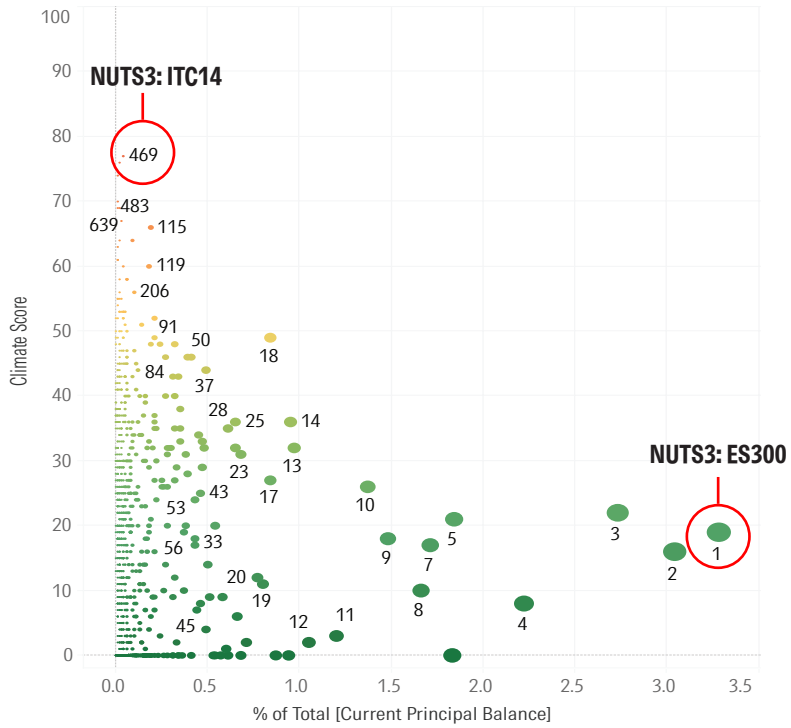
PHYSICAL CLIMATE RISK DATA USED IN THIS COMMENTARY

- **Archetype**: Residential
- **Vulnerability**: Average
- **Climate Scenario**: IPCC SSP2-4.5
- **Climate Risk**: Stacked
- **Year**: 2040

CLIMATE SCORE CONCEPT

Climate scores range from zero to 100 and are calculated as a logarithmic function of the EAD for the selected time horizon. For example, an EAD of less than 0.05% has a climate score of 40 or lower; an EAD of 1.7% has a climate score of 90; and an EAD of 3.3% or more has a climate score of 100.

EXHIBIT 2 European RMBS: Exposure to NUTS3 Regions and Climate Score



Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

WEATHER AND CLIMATE EVENTS

The HEAT framework includes seven acute and slow-onset hazards that can result in property damage:

- Riverine Flood
- Pluvial Flood
- Sea Level Rise
- Extreme Winds
- Wildfires
- Landslides
- Cyclones

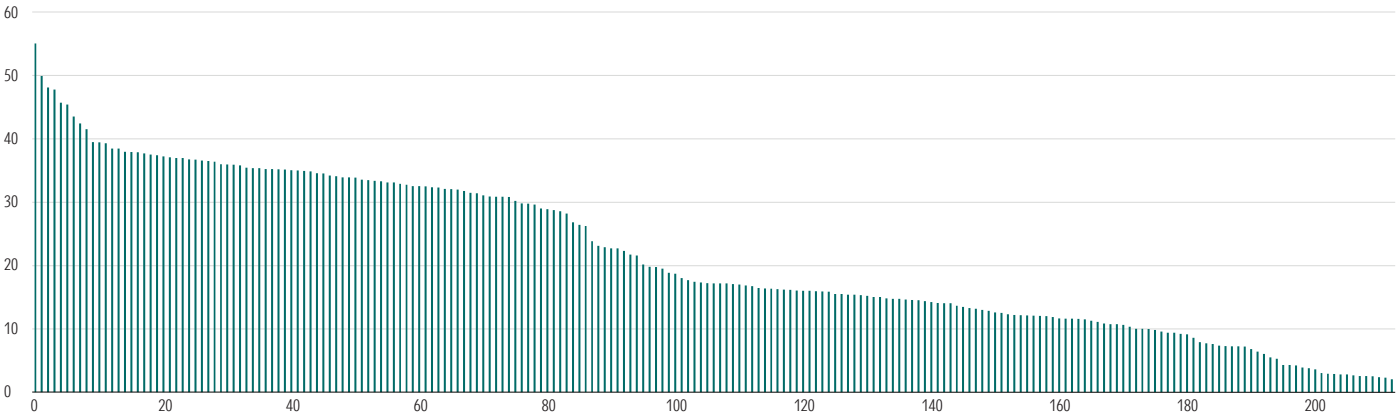
Stacked is the cumulative risk of the considered hazards. Our data also include heat waves as a hazard, but there is no direct relationship between heat waves and property damage.

NUTS3 regions with climate scores in the 70s include regions in the alpine region of Italy, which has predominantly pluvial flood and landslide risks. Exposure to these regions, for example to Verbano-Cusio-Ossola (NUTS3: ITC14), in European RMBS is low. A climate score of 70 in 2040 presents an expected annual property damage (EAD) of approximately 0.4% in 2040, meaning that over 10 years, cumulative damage could be 4.0%, assuming it is repaired after each event. The numbers for a climate score of 80 the EAD estimated cumulative damage are 0.8% and 8.0% respectively.

At the European RMBS market level, mapping the NUTS3 regional distribution of the market allows for screening of potential physical climate risk. Exposures to scrutinise in greater detail would appear in the upper right corner of Exhibit 2, regions with high climate score and to which the market has high exposure. Mapping the regional distribution also enables the exposure analysis after an adverse weather or climate event.

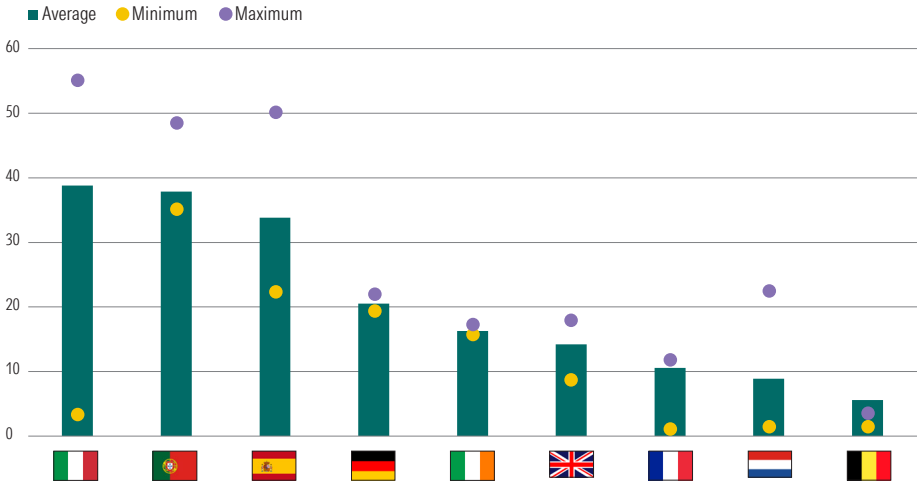
The combination of EDW and HEAT datasets allows for calculating transactions' aggregated climate scores. Across Europe, these range from two to 55 (**EXHIBIT 3**). The associated average EADs are generally low and imply negligible risk because of transaction regional diversification. Transactions in southern Europe have higher climate scores on average. Within countries, transaction climate scores show different variabilities, with Italy and the Netherlands standing out (**EXHIBIT 4**).

EXHIBIT 3 European RMBS Transactions Climate Scores



Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

EXHIBIT 4 European RMBS Transactions Average Climate Scores by Country



Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

TAIL RISK PROPERTY DAMAGE

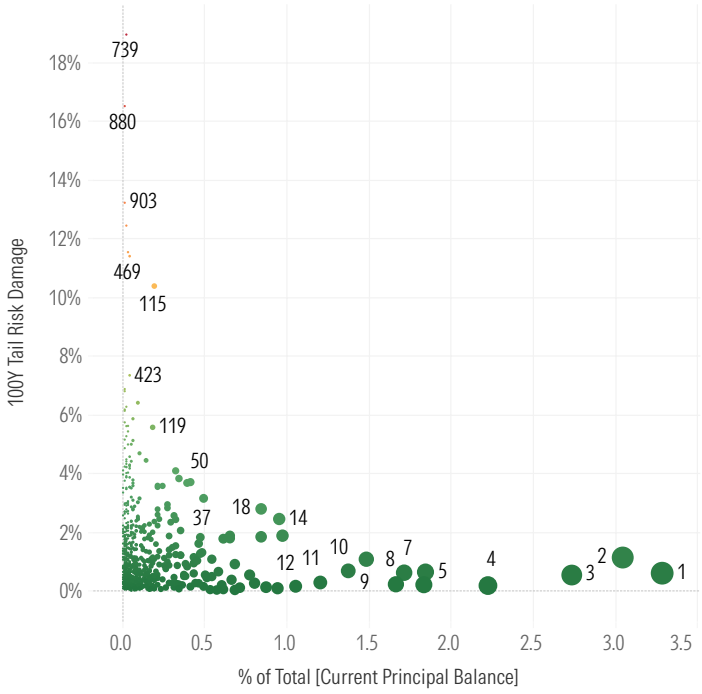
Climate change is understood to change the probability of rare weather and climate events occurring, as well as the severity of these events. Tail risk property damage expresses rare-case losses or low-probability, high-impact events. For 100Y tail risk damage (100Y return period), the physical climate risk data show the annual loss level that has a 1% exceedance probability.

Note that, when comparing climate scores, differences can be due to the regions geographical size, which is not harmonised in the NUTS3 framework (Appendix 1).

Another way to illustrate potential climate risk is by looking at tail risk property damage, which expresses low-probability, high-impact events. For 100-year (100Y) tail risk damage, the physical climate risk data show the annual loss level that has a 1% exceedance probability, which is similar to a value at risk analysis.

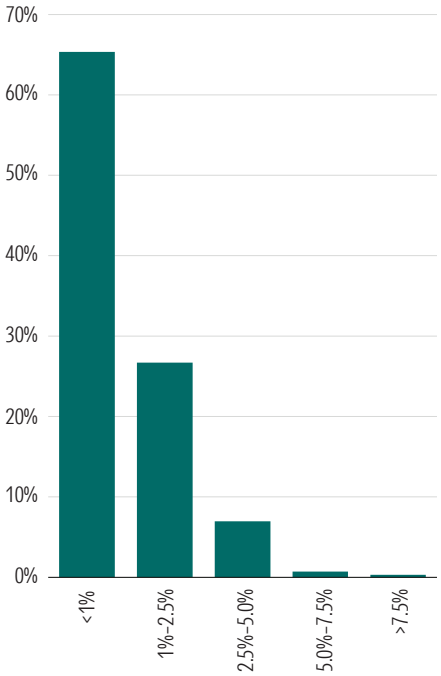
As shown in **EXHIBIT 5**, the highest 100Y tail risk damage of the NUTS3 regions featuring in European RMBS is 19% (average 1.0%), whereas the relative distribution of risk between the NUTS3 is different to that of the climate score, which is based on EAD. Overall, 8.0% of European RMBS is in NUTS3 regions with an annual 100Y tail risk damage greater than 2.5% (**EXHIBIT 6**).

EXHIBIT 5 European RMBS: Exposure to NUTS3 Regions and 100Y Tail Risk Damage



Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

EXHIBIT 6 European RMBS: 100Y Tail Risk Damage Distribution (NUTS3)

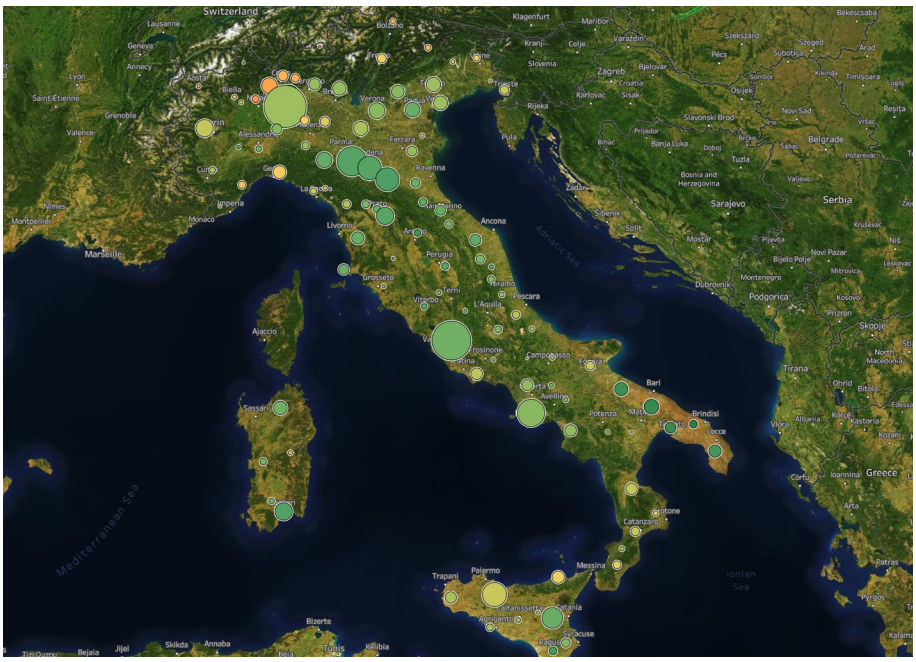


Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

EXHIBIT 7 Regional Distribution and Climate Score: Example Spanish RMBS Transaction

Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

EXHIBIT 8 Regional Distribution and Climate Score: Example Italian RMBS Transaction



Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

At the transaction level, average 100Y tail risk damage ranges from 0.1% to 3.8%. As for EAD and climate score, the average risk tends to be lower, the larger the region.

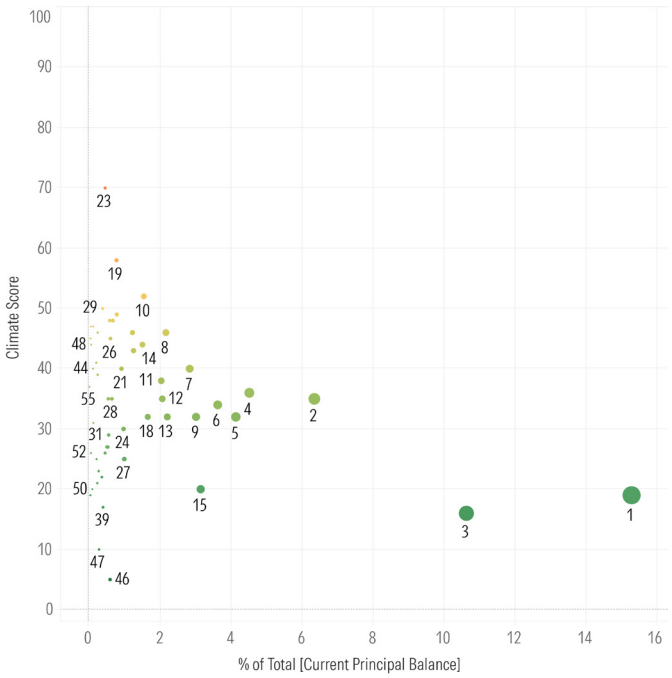
Mapping Climate Risk at Transaction Level

A similar analysis can be useful at the European RMBS transaction level. **EXHIBITS 7** and **8** show the regional property distributions for a Spanish and an Italian RMBS transaction. The climate scores are 32.5 and 35.2, respectively, implying an overall lower climate-related risk for the Spanish transaction.

Both maps in Exhibits 7 and 8 show the typical concentration of RMBS in the respective country's population centres and larger cities. The Italian transaction is more diversified in terms of NUTS3 regions but also shows somewhat greater exposure to regions with a higher climate score.

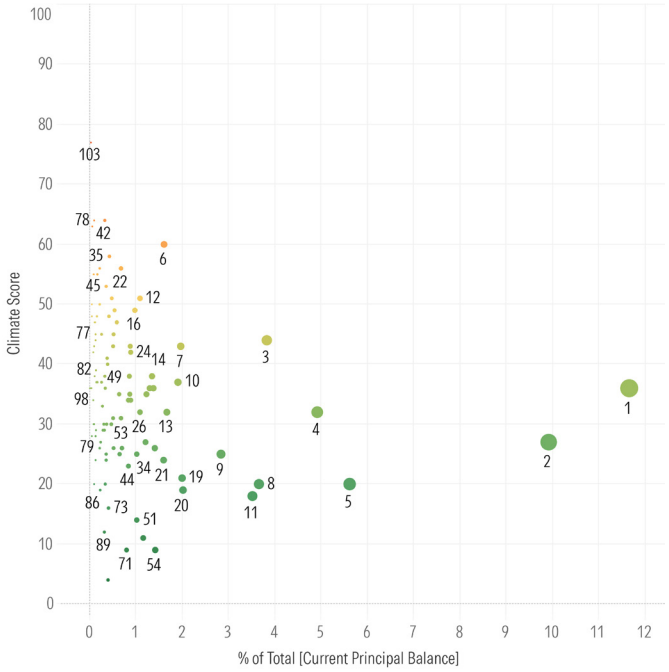
That the Italian deal is more diversified in terms of NUTS3 regions is primarily due to Italy having more NUTS3 regions overall than Spain (107 versus 59, see Appendix 1) and does not necessarily mean that the Spanish deal has less regional diversity.

EXHIBIT 9 Exposure to NUTS3 Regions and Climate Score: Example Spanish RMBS Transaction



Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

EXHIBIT 10 Exposure to NUTS3 Regions and Climate Score: Example Italian RMBS Transaction

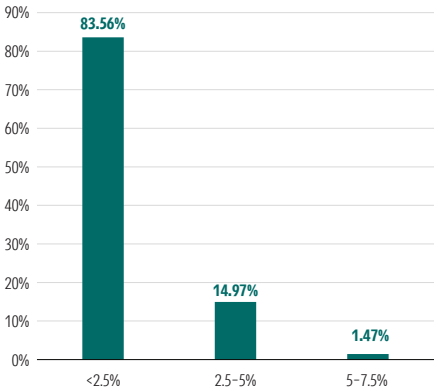


Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

In terms of climate score, both transactions do not have large exposure to NUTS3 regions with very high climate scores; those would show up in the upper right of the scatter diagrams (**EXHIBITS 9** and **10**). But the Italian RMBS has a 1.5% exposure to a region with a climate score of 60 that represents an EAD of 0.25% (bubble marked 6 in Exhibit 10).

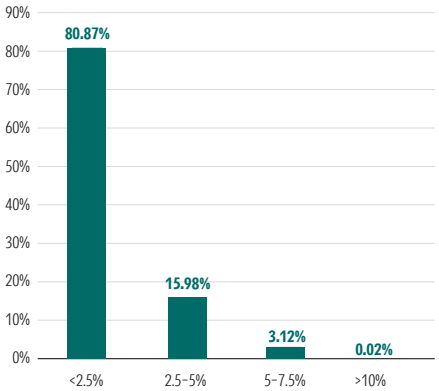
Considering tail risk damage estimates, 1.5% of the Spanish RMBS are in NUTS3 regions with a 100Y tail risk damage higher than 5% but less than 7.5% (**EXHIBIT 11**), whereas that metric is twice as high for the Italian transaction, which also has a small exposure with 100Y tail risk damage higher than 7.5% (**EXHIBIT 12**).

EXHIBIT 11 Estimated 100Y Tail Risk Distribution: Example Spanish RMBS Transaction



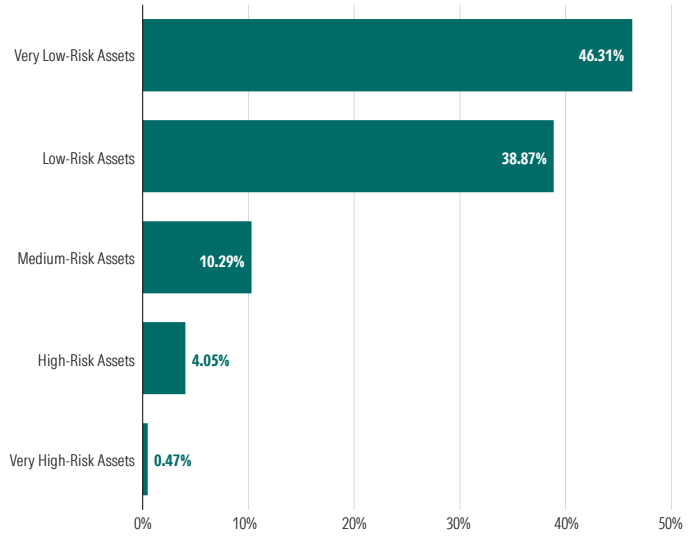
Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

EXHIBIT 12 Estimated 100Y Tail Risk Distribution: Example Italian RMBS Transaction



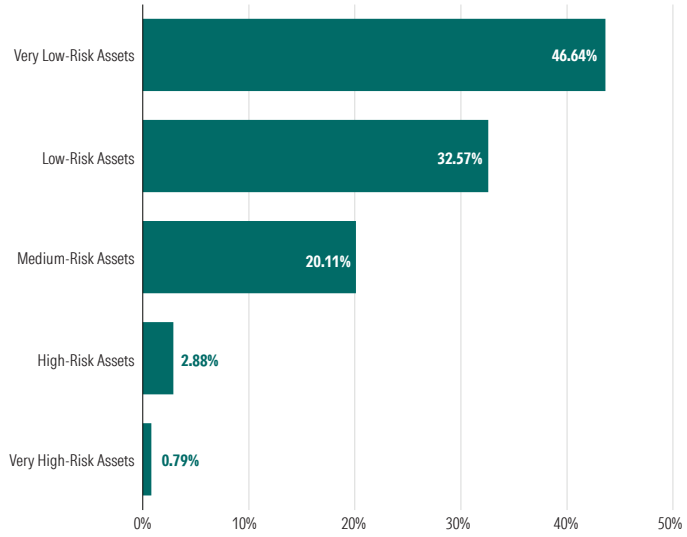
Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

EXHIBIT 13 Estimated Property Classification: Example Spanish RMBS Transaction



Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

EXHIBIT 14 Estimated Property Classification: Example Italian RMBS Transaction



Sources: European DataWarehouse, Morningstar DBRS Hazard Exposure and Trends.

PROPERTY RISK CLASSIFICATION

Climate Score	Risk
0-20	Very Low
20-40	Low
40-60	Medium
60-80	High
80-100	Very High

As previously mentioned, average regional climate risk trends towards zero the larger the region. Hence, Italy's more numerous but smaller regions can affect the average EAD, climate score and 100Y tail risk compared to a country with less but larger regions, like Spain.

Our HEAT dataset provides additional regional statistics to mitigate this shortcoming and allow for deeper analysis (see Appendix 1 in *Physical Climate Risk Signals in Credit: Longitude, Latitude, and Exposure*). These additional metrics give insight into the climate risk distribution within a region; for example, the distribution of the properties' risk classification. Combining these with an RMBS transaction's regional exposure data, we can assess the probability, though not the actual distribution, of properties in the portfolio having a very high, high, etc. climate risk.

For example, **EXHIBITS 13** and **14** show that if the analysed RMBS transaction's properties were distributed within each NUTS3 region identically to the properties in our HEAT asset-level dataset, 4.5% and 3.7% would be classified as high-risk or very high-risk assets in the Spanish and Italian RMBS, respectively. The actual property risk categorisation will differ based on where exactly in the NUTS3 regions the properties are – this could be subject of a more detailed analysis.

Climate Risk Screening

Our data and RMBS examples show that climate risk is low at the transaction level; climate scores imply an average EAD by 2040 of 0.03% for the Spanish and 0.04% for the Italian transaction. The average 100Y tail risk damage is 1.4% and 1.9% for the Spanish and Italian RMBS, respectively.

While regional diversification is a strong mitigant for climate risk, our data enable screening European RMBS transactions for outsize exposures in more affected regions and can serve as signals to analyse potential risk from adverse weather or natural catastrophes in more detail. If more property location details are available, this can include assessing where in the respective NUTS3 regions the securitised assets are located in addition to other mitigants.

Related Research

- *Physical Climate Risk Signals in Credit: Longitude, Latitude, and Exposure,* 19 March 2026.
- *Recent Flood Events in France: Impact on Rated Securitisations,* 16 March 2026.
- *Climate Risk Navigator: Can Insured Losses Become a Proxy to Climate Costs?* 3 February 2026.
- *Climate Risk Navigator: Climate and Credit--Short-Term Headwinds, Long-Term Risks,* 2 July 2025.
- *Impact of the DANA on Spanish Securitisations,* 5 November 2024.
- *ESG: Climate Risk and Credit,* 2 May 2023.

Common Mitigants in European RMBS

For granular real estate or lending portfolios, regional diversification serves as a strong mitigant for adverse weather or natural catastrophe risk. Other mitigating factors for lenders, including securitisation issuers, include:

- The actual resilience of the property and its surroundings, including potential adaption measures.
- The property owner (borrower) is typically highly incentivised to repair the damage if they can. Past natural catastrophic events (floods, storms, wildfires, and earthquakes) have shown an uptick of debt arrears after the hazard, which then recovered relatively quickly with potential government support or insurance coverage. To date, this has resulted in only temporary and an overall remote negative credit impact.
- Low loan leverage reducing over time for amortising loans typically protects the lender from property damage costs or a certain extent of value decline. Forward looking, the expected increase in climate risk often occurs after loan maturity/repayment.
- Insurance coverage, although our analysis shows that homeowner coverage in Europe is less comprehensive than in the U.S., especially in southern European countries (see *Climate Risk Navigator: Can Insured Losses Become a Proxy to Climate Costs?*).
- Property damage that can be repaired is different from permanent value decline, unless buyers' perception that adverse weather events or natural catastrophes recur affects the attractiveness and/or insurability of the property or the region.

Summary and What Happens Next

While aggregate adverse weather and natural catastrophe risk appears remote for granular portfolios securitised in European RMBS, physical climate risk is increasing and is one of the megatrends investors face. While usually mitigated, knowing the exposure to climate risk is becoming increasingly important. Combined with (regional) exposure data in European RMBS, our HEAT dataset can be used to screen for this exposure and provide signals for further analysis, focusing on whether mitigants are in place. To assist investors with this, we are working towards disclosing our transaction-level climate risk signals in European RMBS credit rating reports.

We will also work towards expanding our physical climate risk dataset by adding more hazards, including those that do not necessarily cause asset damage but potentially economic losses for a region. An increasing susceptibility and vulnerability to acute and slow-onset hazards can have an impact on the attractiveness of a region and the valuation of an asset, even without present property damage. This analysis is less dependent on micro locations, making regional data more relevant.

Our HEAT dataset already allows for assessing how stacked climate risk and its contribution changes over time, as well as analysing climate change scenarios that differ from ones contemplated in the Intergovernmental Panel on Climate Change's Shared Socioeconomic Pathway 2-4.5 (IPCC SSP2-4.5).

Appendix 1
EU's Nomenclature of Territorial Units for Statistics (NUTS)

European regional data in this commentary is based on the EU's NUTS classification for regional statistics. NUTS 0 regions are the respective countries, while lower-ranking NUTS regions are roughly based on population as a measure of similar size. With approximately 1,400 regions, NUTS3 is the most granular standardised level in Europe. All 27 EU countries have defined NUTS3 regions, as do additional countries in the European Economic Area including Switzerland, Albania, North Macedonia, Montenegro, and Serbia.

The UK, as a previous EU member, had defined NUTS regions, but these were discontinued in 2021 and replaced with the Office for National Statistics' International Territorial Levels (ITL), which closely mirror the former NUTS boundaries. In this commentary we use the UK's NUTS3 regions as per 2021.

The harmonisation of European administrative units via NUTS is anchored largely by population in the regions: NUTS3 has minimum and maximum population rules, and the range is relatively wide. The aim of the NUTS classification is to make regional economic statistics more comparable. It was not designed with climate risk analysis in mind. As a result, NUTS3 regions can differ substantially in terms of metrics that matter for climate risk analysis, including geographical size. For example, Spain is larger than Italy but has a lower number of NUTS3 regions, resulting in a substantially larger average NUTS3 area (**EXHIBIT 15**).

EXHIBIT 15 NUTS3 Regions of Countries with Outstanding RMBS Transactions

	Country Area (square km)	NUTS3 Regions	Average Size NUTS3 (square km)
Belgium	30,667	44	697
France	638,475	101	6,322
Germany	357,569	400	894
Ireland	69,947	8	8,743
Italy	302,073	107	2,823
Netherlands	37,391	40	935
Portugal	92,226	26	3,547
Spain	505,983	59	8,576
UK	244,423	179	1,365

Source: Eurostat.

Our HEAT dataset is very granular, with metrics often derived at the microlocation level. This data can then be aggregated to regional data using defined boundaries like those provided by NUTS. For climate risk screening in European RMBS, property location reporting is the restricting factor. NUTS3 regions can be very large and substantially differ in size, resulting in the shortcoming of regional data and their comparability, as outlined in *Climate Risk Navigator – Physical Climate Risk Signals in Credit: Longitude, Latitude, and Exposure*.

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