



Modelli di rischio per portafogli retail e integrazione dell'impatto del rischio climatico



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Agenda

1. From climate to credit risk: methodological challenges
2. Climate scenarios on retail credit risk parameters
3. Location-specific climate risk scores to climate-adjust credit risk metrics

1

From climate to credit risk:
methodological challenges

Climate Risk Adjustment for PD/LGD

Setting the scene

First Climate Risk Challenge

- » **Transitioning toward low carbon economies** will require sectoral reallocations of resources and put inflationary pressures on energy prices.
- » **Sectoral unemployment and household debt** service burden can both increase, which will affect households' ability to make their monthly repayment on time.
- » These adverse effects can be short- to long-term and are highly **dependent on policy uncertainty**;



Transition risks associated with climate change cannot be ignored.

Second Climate Risk Challenge

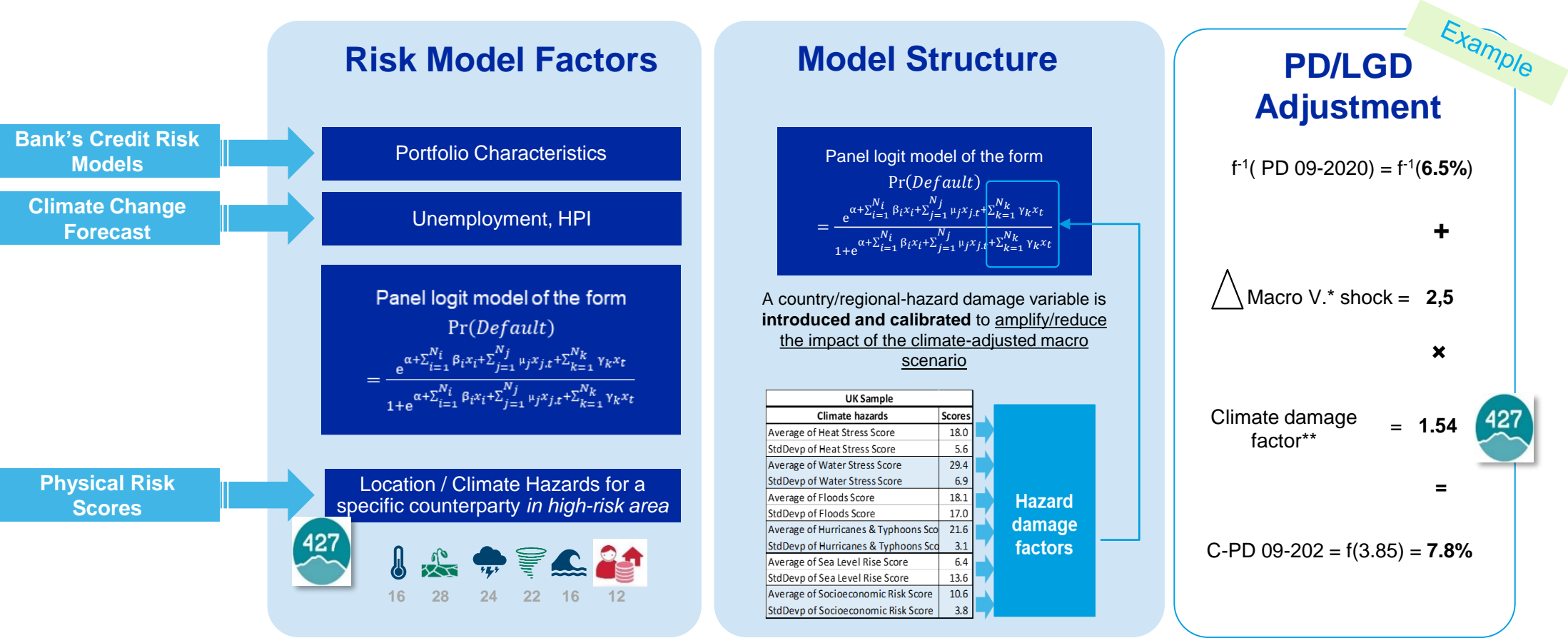
- » The **location of a facility** reveals crucial information regarding **physical climate risk**.
- » For instance, properties located in areas subject to high flood risk entail higher maintenance costs, higher insurance premiums and may also have lower resale values.
- » These factors will **increase both default risk and the associated loss**. However, climate hazard risks are rarely considered in retail credit risk models.



Physical risk information embedded in the property location is crucial in credit risk models.

Climate Risk Adjustment for PD/LGD

The case of mortgages



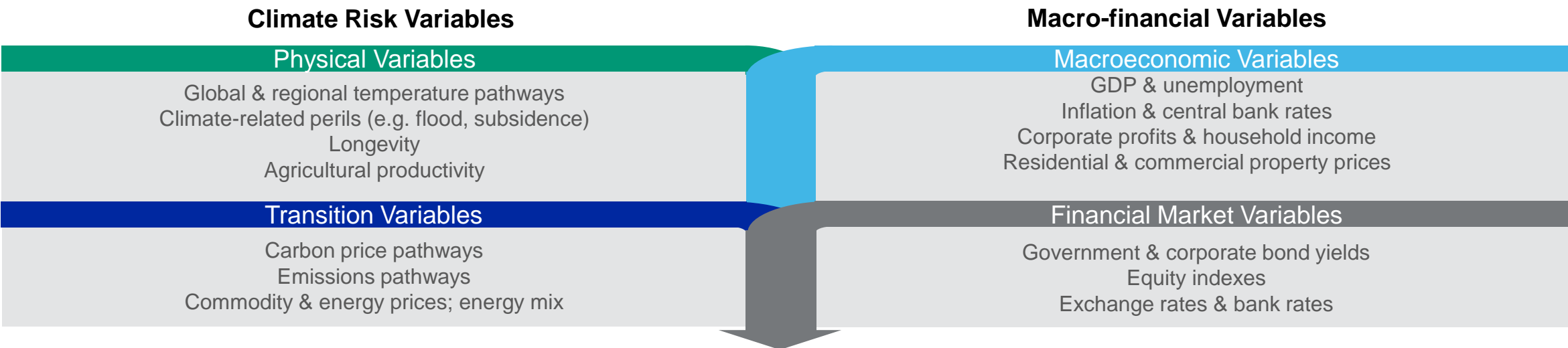
* Weighted average of the macroeconomic variables shocks by associated weights

** Weighted average of Hazard damage factors and 427 Climate Hazards scores – those factors have an indicative value as they will be estimated during the project over the relevant sample

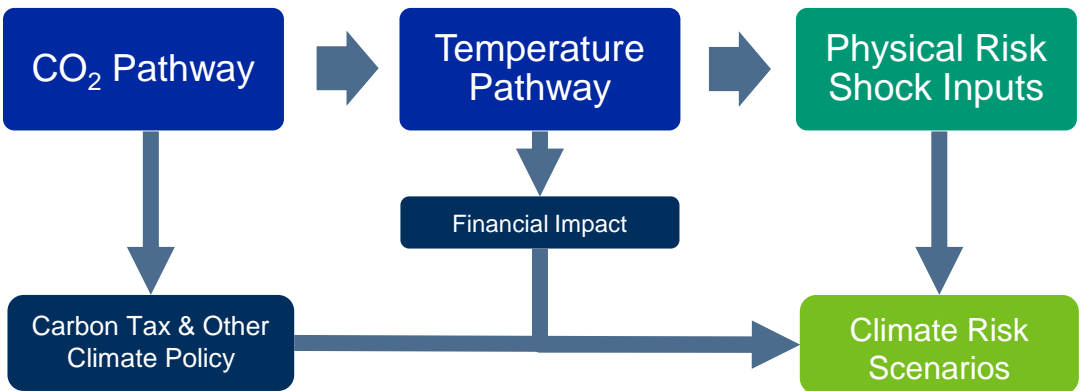
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Climate scenarios on retail
credit risk parameters

Moody's Analytics Climate Risk Scenarios

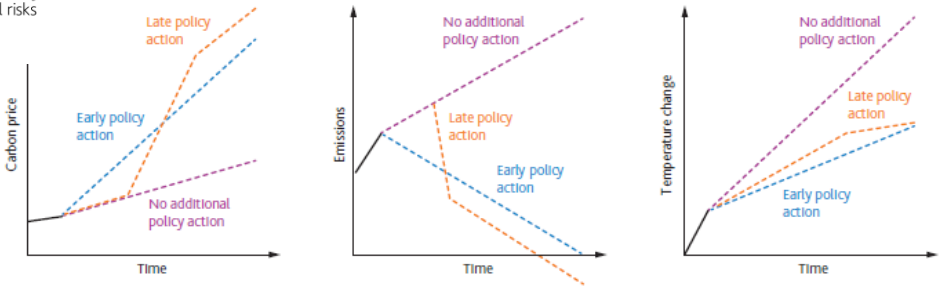


Start with parameters from regulators or clients and expand scenarios to populate additional variables using our Global Macro Model with climate risk components

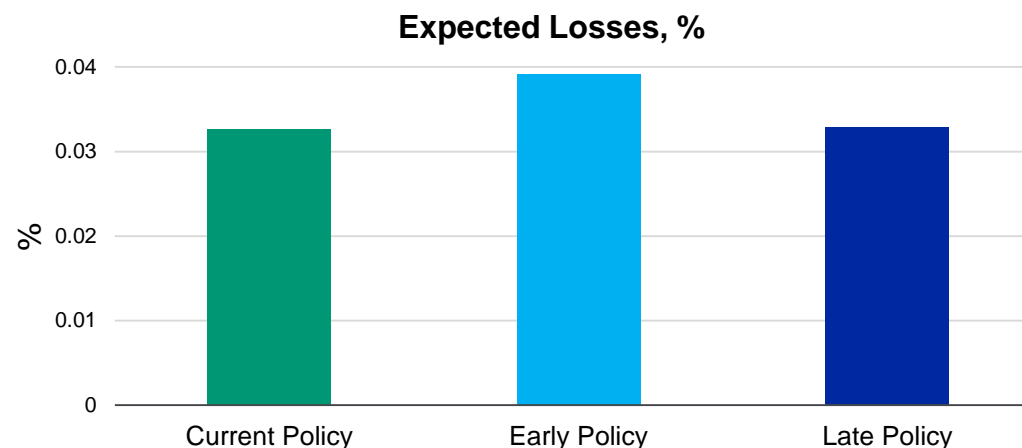
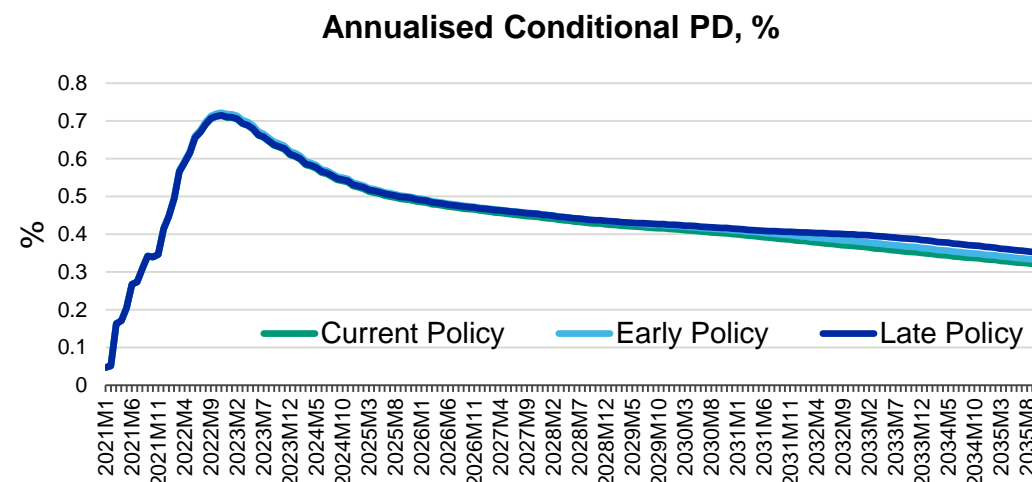
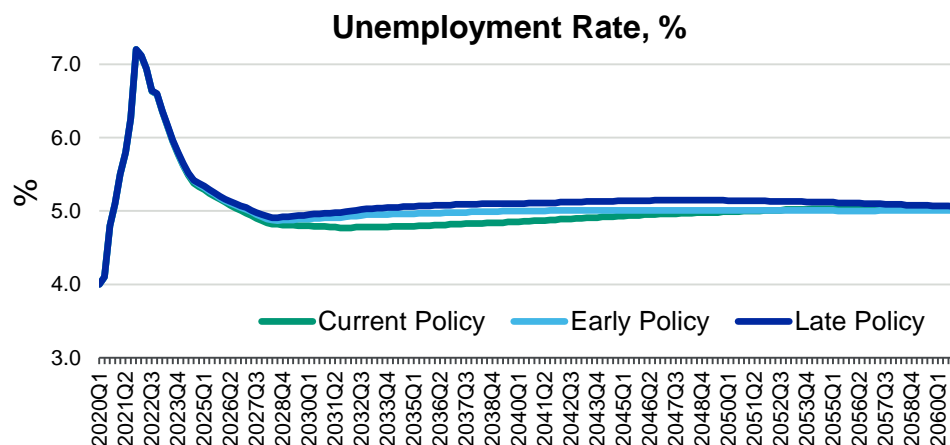
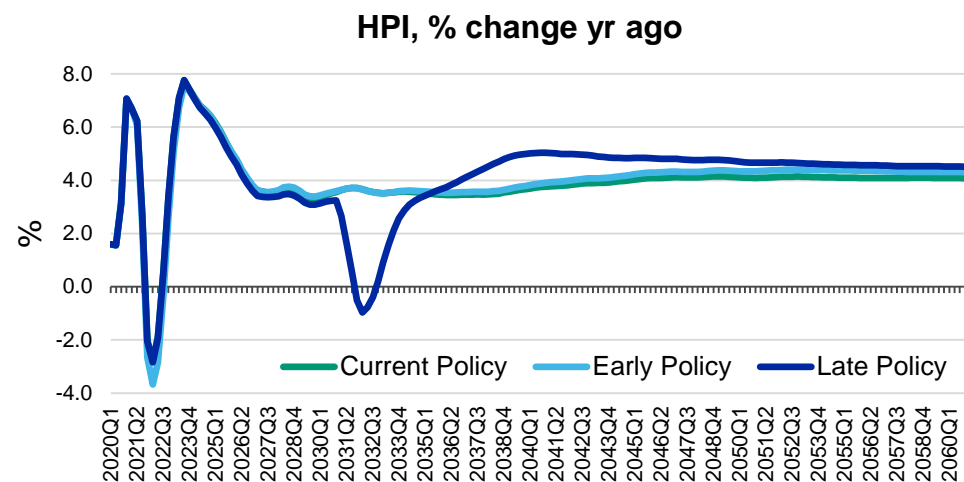


BANK OF ENGLAND
Financial Policy Committee
Prudential Regulation Committee
Discussion Paper
The 2021 biennial exploratory
scenario on the financial risks
from climate change
December 2019

Illustrative Variable Pathways in each Scenario

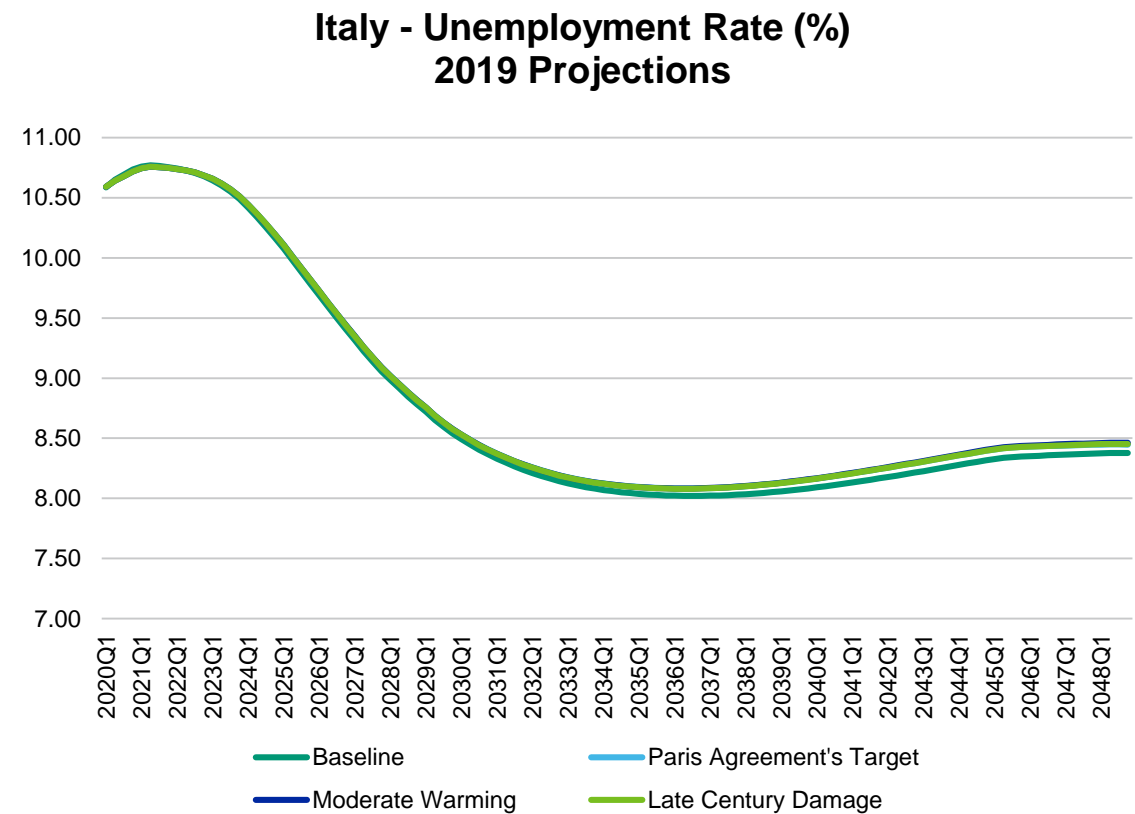
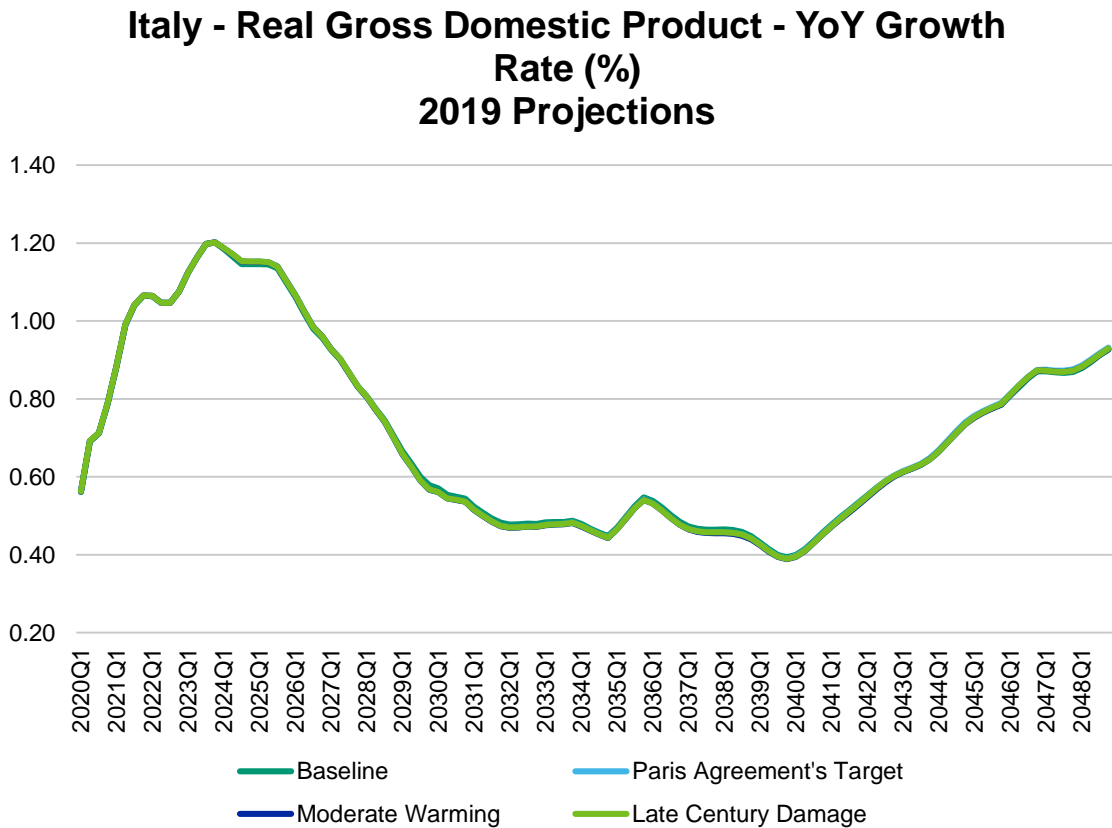


Projections for HPI and UR and Impact on Portfolio risk metrics



Climate Change Scenarios - Italy

Projections for GDP and UR

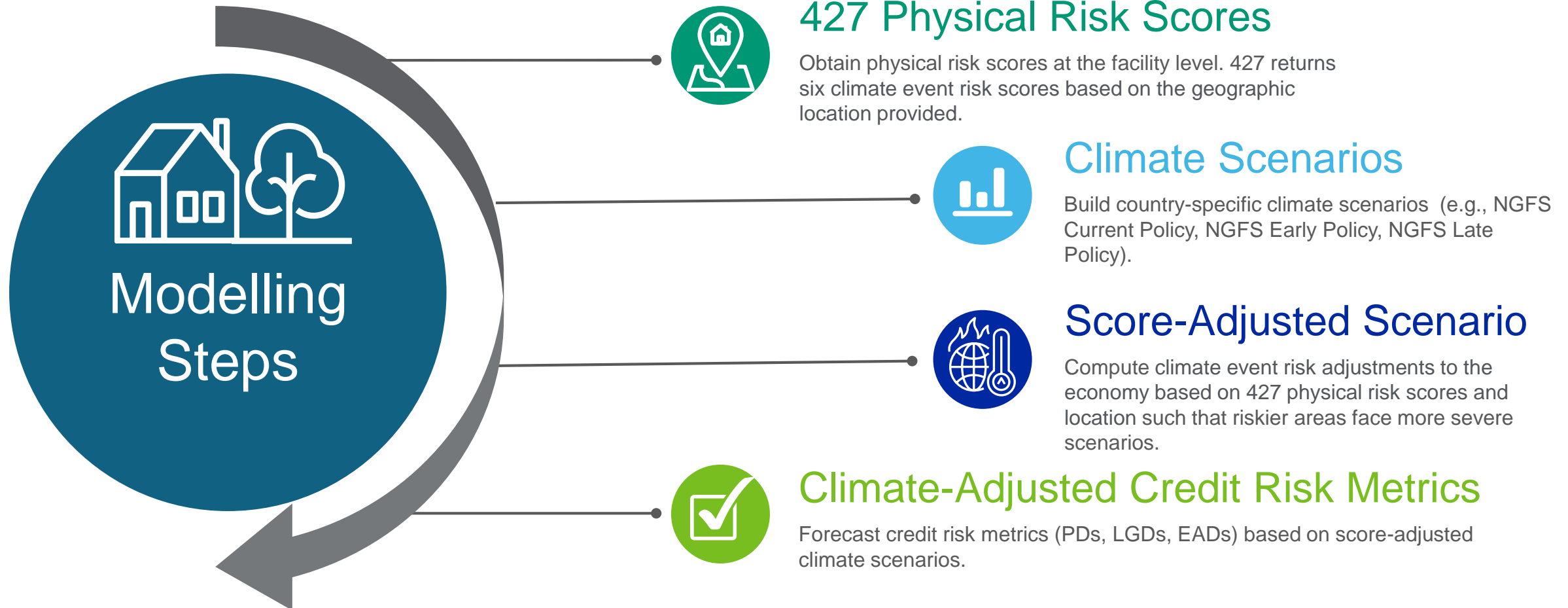


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Location-specific climate
risk scores to climate-adjust
credit risk metrics

Location-Specific Climate Risk

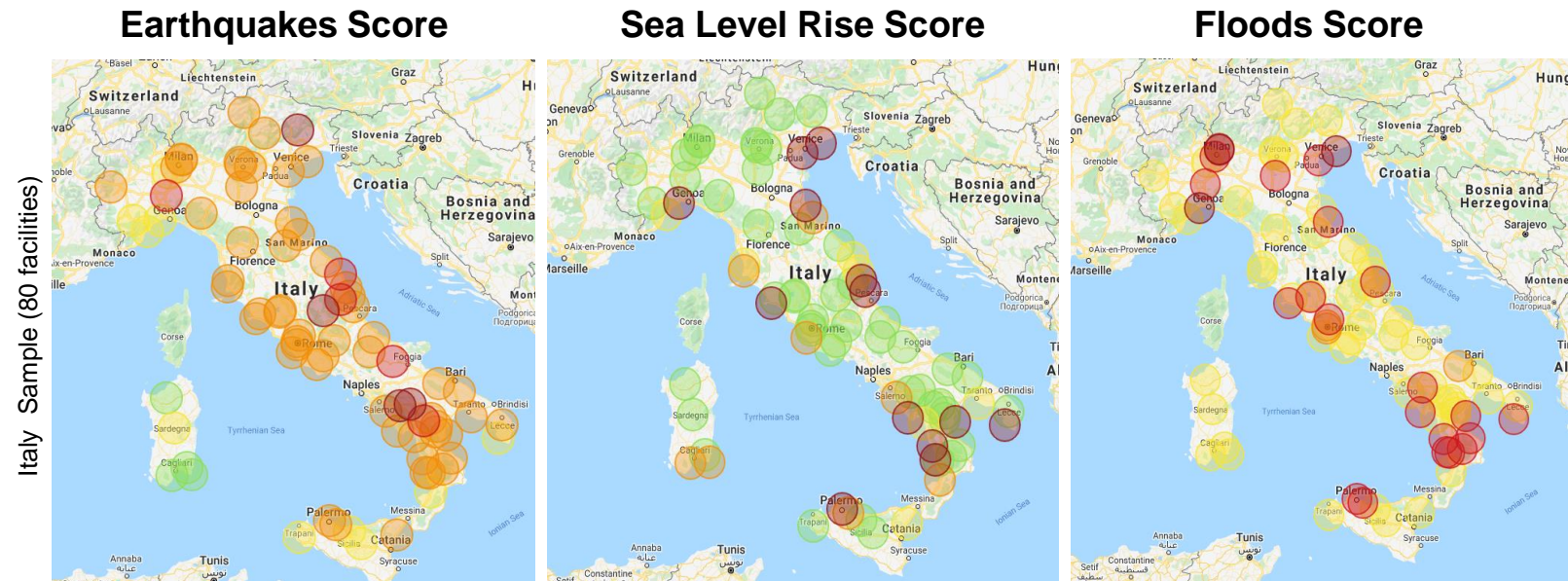
Modelling Methodology



Physical Climate Risk Score

427 Data

- » 80 random names of the portfolio and ran the physical risk climate scores within the on-demand scoring application
- » **Climate hazards** assessed at the facility-level:
 - floods,
 - sea level rise,
 - water stress,
 - heat stress,
 - wildfire,
 - hurricanes & typhons e
 - earthquakes
- » Material hotspots across different climate hazards are detected that can amplify damages for local economies and assets
- » Earthquakes and floods appear to be prominent climate hazards affecting the facilities considered

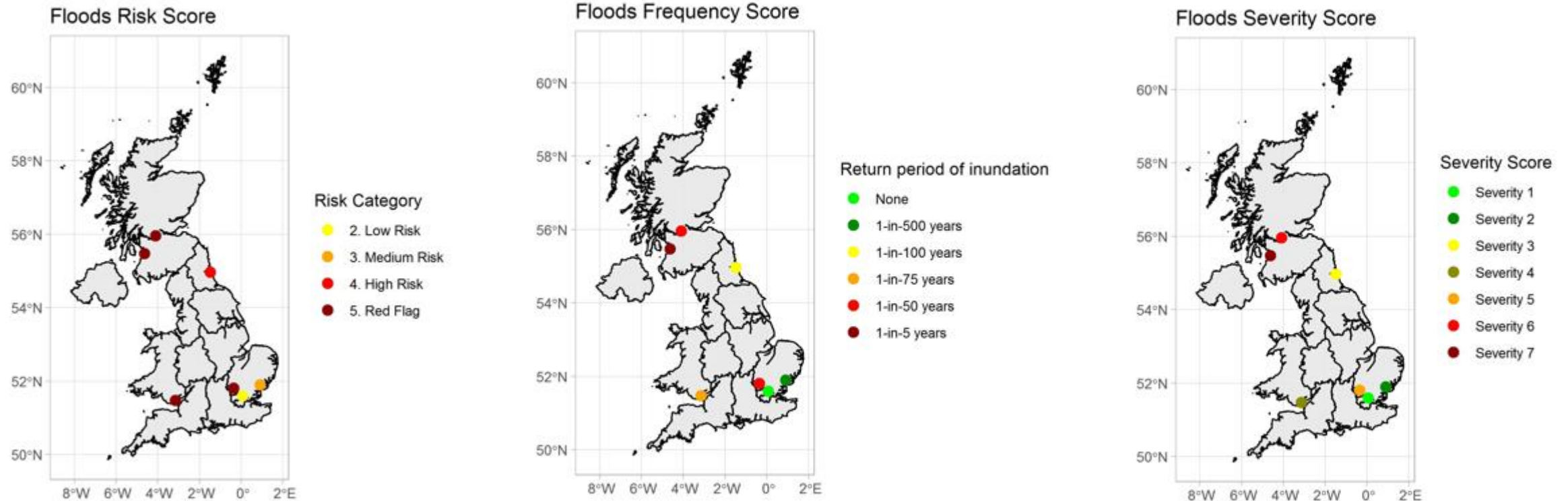


Credit Risk Impact of Flooding Exposure

A Worked Example on a UK Residential Mortgage

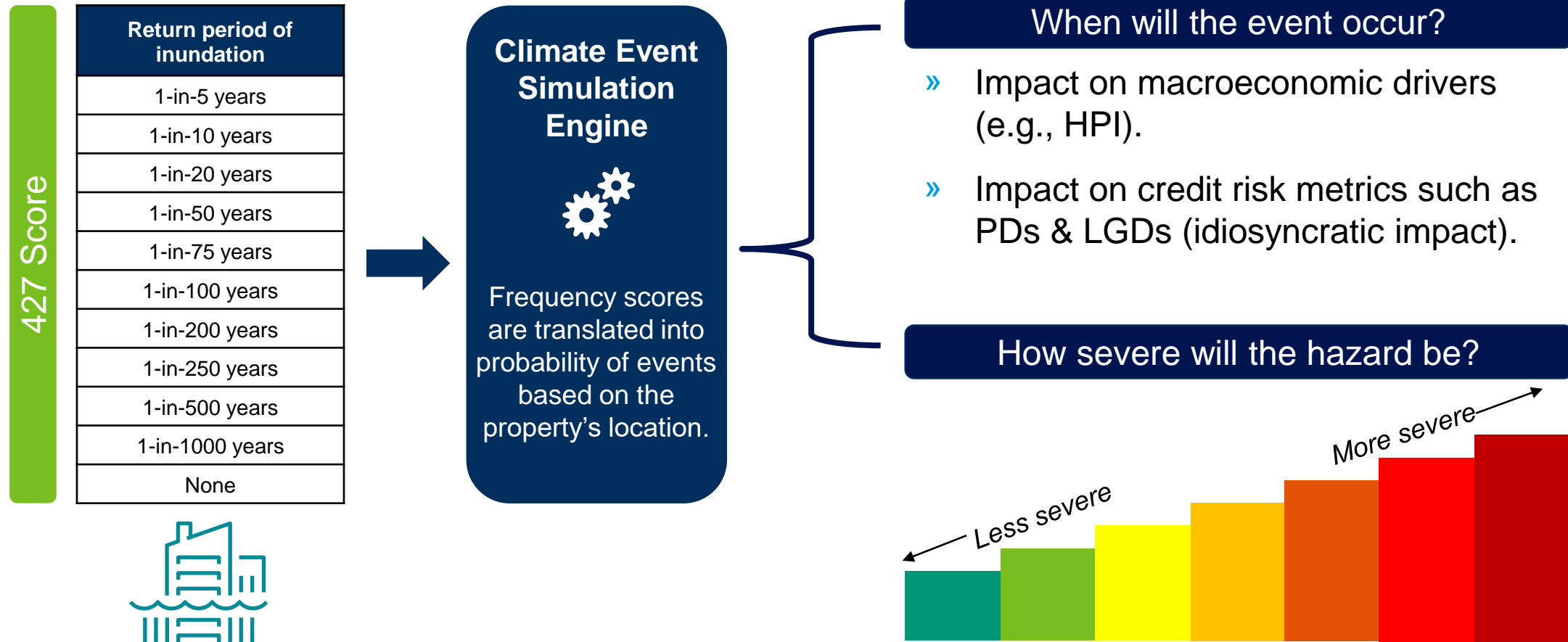


Assume 7 loans with the same characteristics (exposure, LTV, interest rate, DPD status, etc.) but located in different areas of the UK.



Linking Probability of Climate Events to Credit Risk

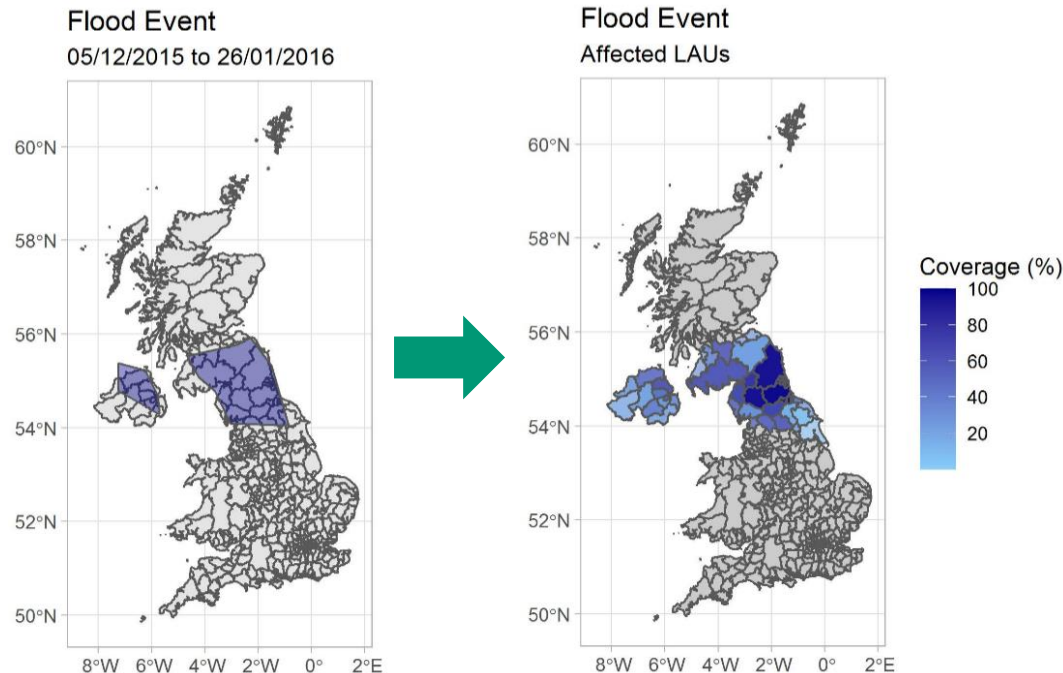
Example for flood events



Linking Severity of Climate Events to Credit Risk

Impact of flooding in HPI

1. Analyse 70+ flooding events in the UK.
2. Classify the events based on severity.
3. Analyse the impact on HPI after the event is observed **by severity buckets**.



Fixed effect model

$$y_{it} = \alpha + \lambda_t + c_i + \tau_t D_{it} + \mu_{it}$$

where

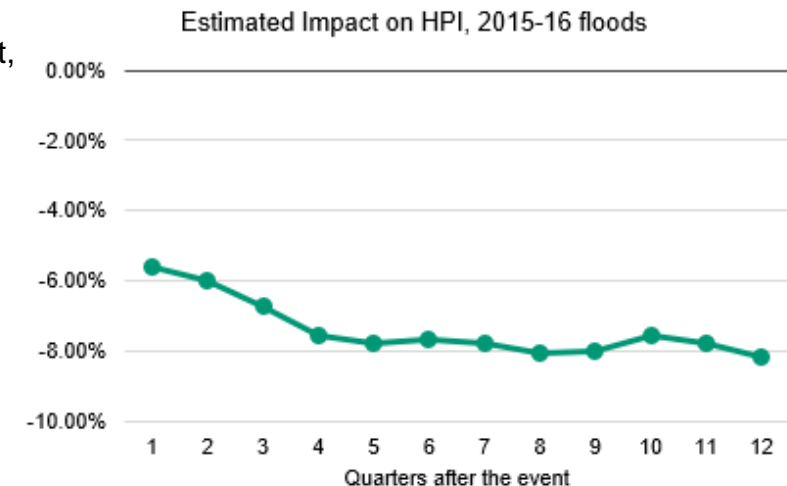
y_{it} : HPI for LAU i at time t ,

λ_t : Time effect (year-quarter dummy),

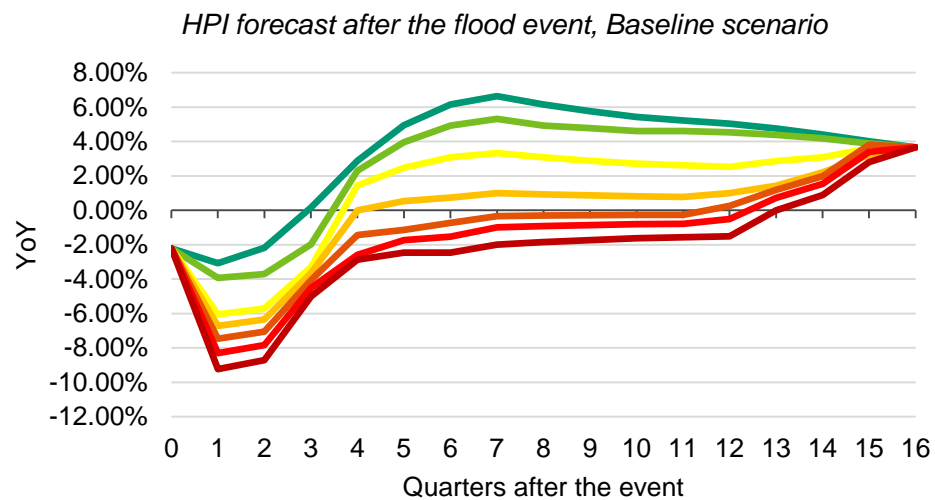
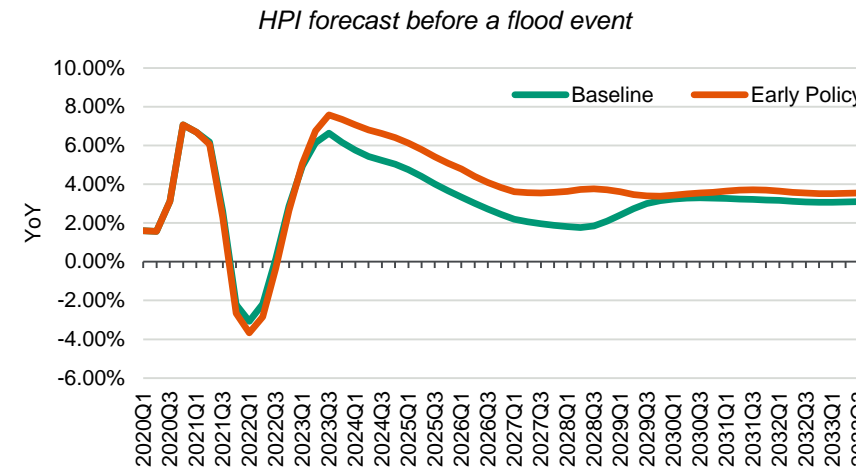
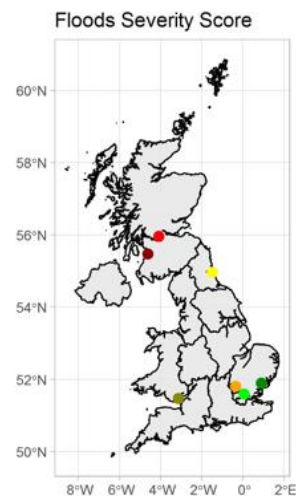
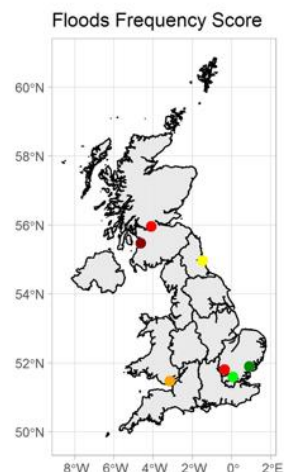
c_i : Region fixed effect,

τ_t : Time-varying flood event effect,

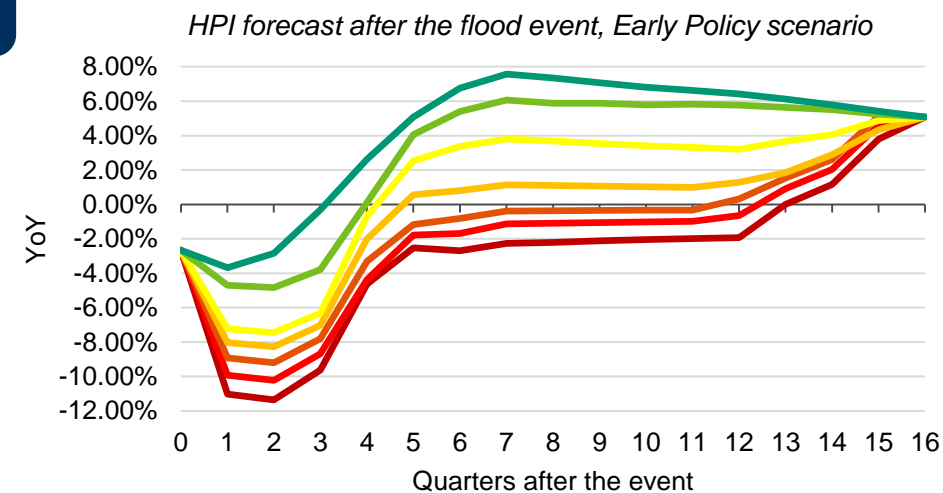
D_{it} : flooded LAU (dummy)



Impact of Flooding in Location-specific HPI



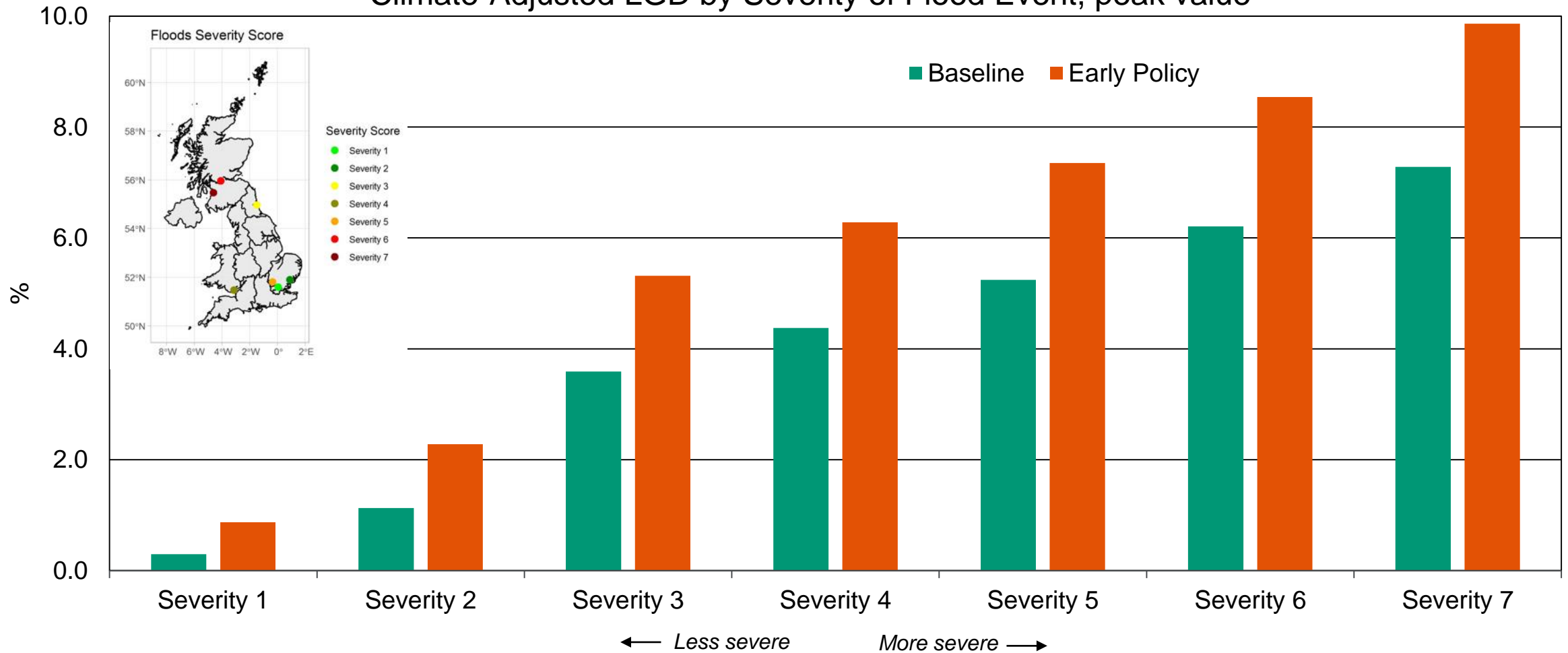
If a flood event is predicted to occur in 2021Q4



Impact of Flooding Events in LGD

Location-specific LGD

Climate-Adjusted LGD by Severity of Flood Event, peak value



Q&A

Additional questions? Email us at marketing.italy@bvdinfo.com

Additional Analysis, Whitepapers, Case Studies and Solution Information:
www.economy.com/products/consumer-credit-analytics/portfolio-analyzer





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Appendix

427 Data – Physical Risk Score

On-Demand Scoring

Key Features of 427 Data

-  Score single assets or large portfolios via an interactive, browser-based application or API
-  Analyze data and underlying climate indicators via multiple visualizations
-  Score thousands of properties in minutes
-  Identify hotspots and analyze the detailed drivers of exposure to six physical climate hazards

Use Cases

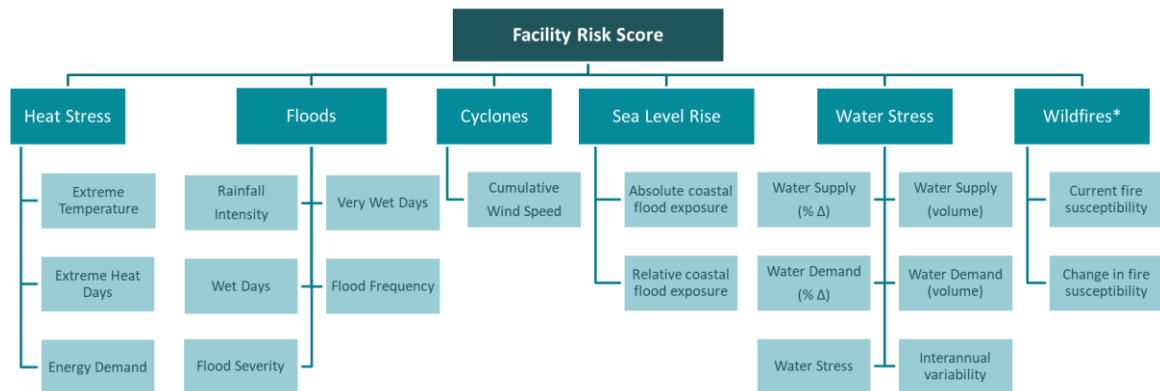


Asset Owners – evaluate the long-term risk exposure of your portfolio holdings and engage with asset operators to improve resilience and risk management

Portfolio Managers – enhance the analysis of your portfolio and monitor risk as portfolio holdings change over time. Screen assets for their exposure to climate hazards, pre-acquisition

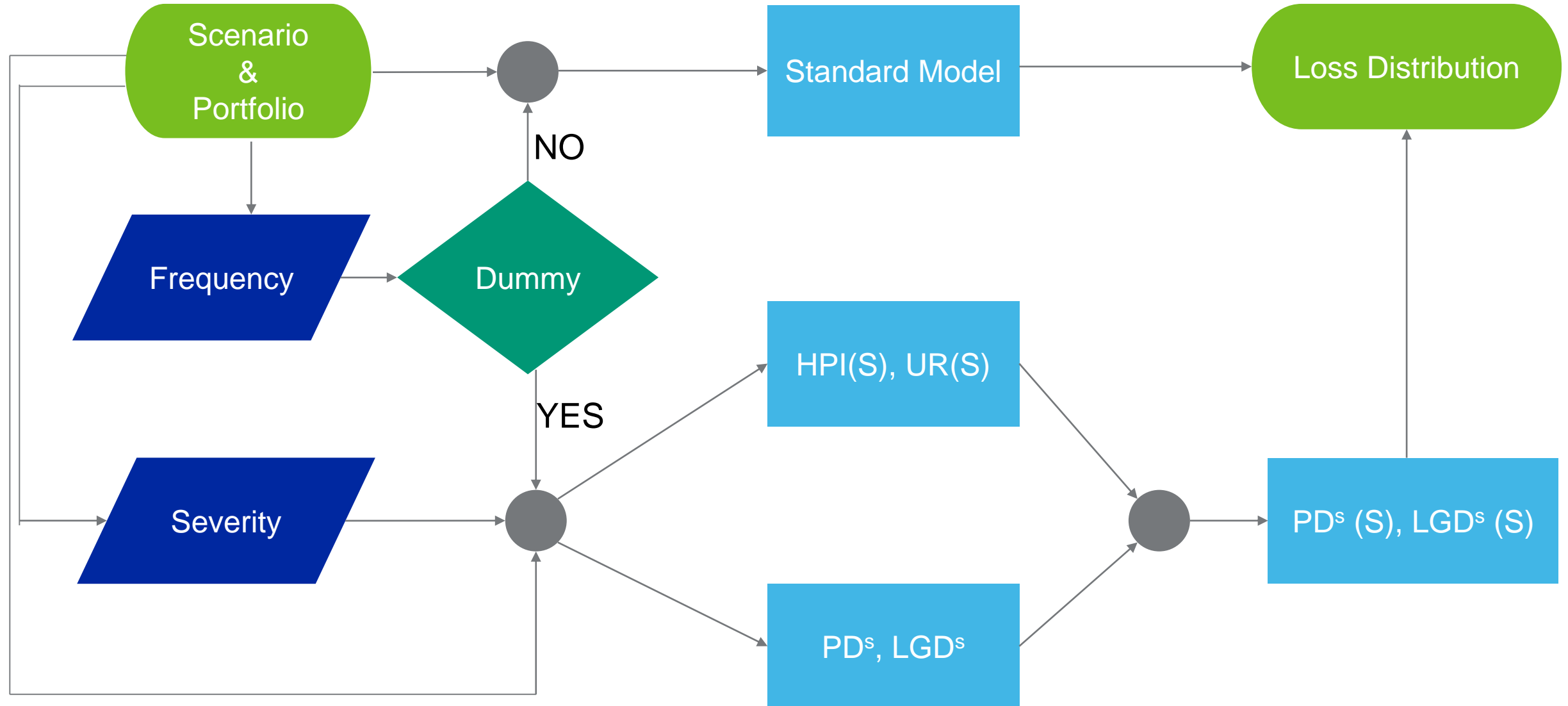
Banks – identify the climate-related risks in commercial and residential mortgage portfolios. Incorporate climate risks into loan acquisition

Facility Risk Score



- » Best-in-class, peer-reviewed, publicly available climate models, supplemented by commercially available data.
- » Assessments on virtually **any property or corporate facility globally based on its exposure to key climate hazards**.
- » Ground-up climate risk scores for **real assets**, listed companies, REITs, U.S. municipalities and global sovereigns
- » Available through an API or online user interface for **real assets**.

Climate-Adjusted Credit Risk Approach: Summary



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