

39TH ECBC PLENARY MEETING

EMF-ECBC ACADEMY TRAINING & MARKET UPDATE

CLIMATE & CREDIT RISK FOR HOUSING LOANS PORTFOLIOS

Gianluca Mattarocci

Tor Vergata University of Rome

Index

- Introduction
- Literature on credit risk and climate risk
- Evidence on housing mortgages
- Conclusion

Introduction

Summer 2026



Over 36,210 **heat-related deaths** across the continent, including at least 16,300 in Germany alone

Temperatures soared past **45°C** in southern Europe, while Mediterranean sea surface temperatures hit an unprecedented 33.02°C

Major rivers like the Rhine, Danube, Loire, and Seine dropped to historic **low seasonal flows**, heavily damaging agriculture and fueling raging wildfires in Portugal, Greece, Italy, and France



Warmest summer recorded in the contiguous United States in 132 years.

Over 3 million hectares to burn across Canada during an **intense fire season**



Heavy monsoon downpours unleashed severe **urban flooding and fatal landslides** across India (including Delhi, Mumbai, and Assam) and Bangladesh. On August 26, a catastrophic rock-ice avalanche triggered massive debris floods along the Nepal-China border, causing over 1,400 deaths.



Index

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- Conclusion

Literature on credit risk and climate risk

Topic	Reference
Corporate loans pricing and climate risk	Huang et al. 2022
Firms' loan availability and climate risk	Ginglinger and Quentin, 2021
Banks' climate stress testing	Hyeyoon et al. 2021
Climate risk mapping and loan availability	Faiella and Malvolti, 2020
Bank resolution risk and climate risk	Chabot and Bertrand, 2023

Our topic



Index

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- Literature on credit risk and climate risk
- Evidence on housing mortgages
- Conclusion and perspectives

Disaster database



EM-DAT

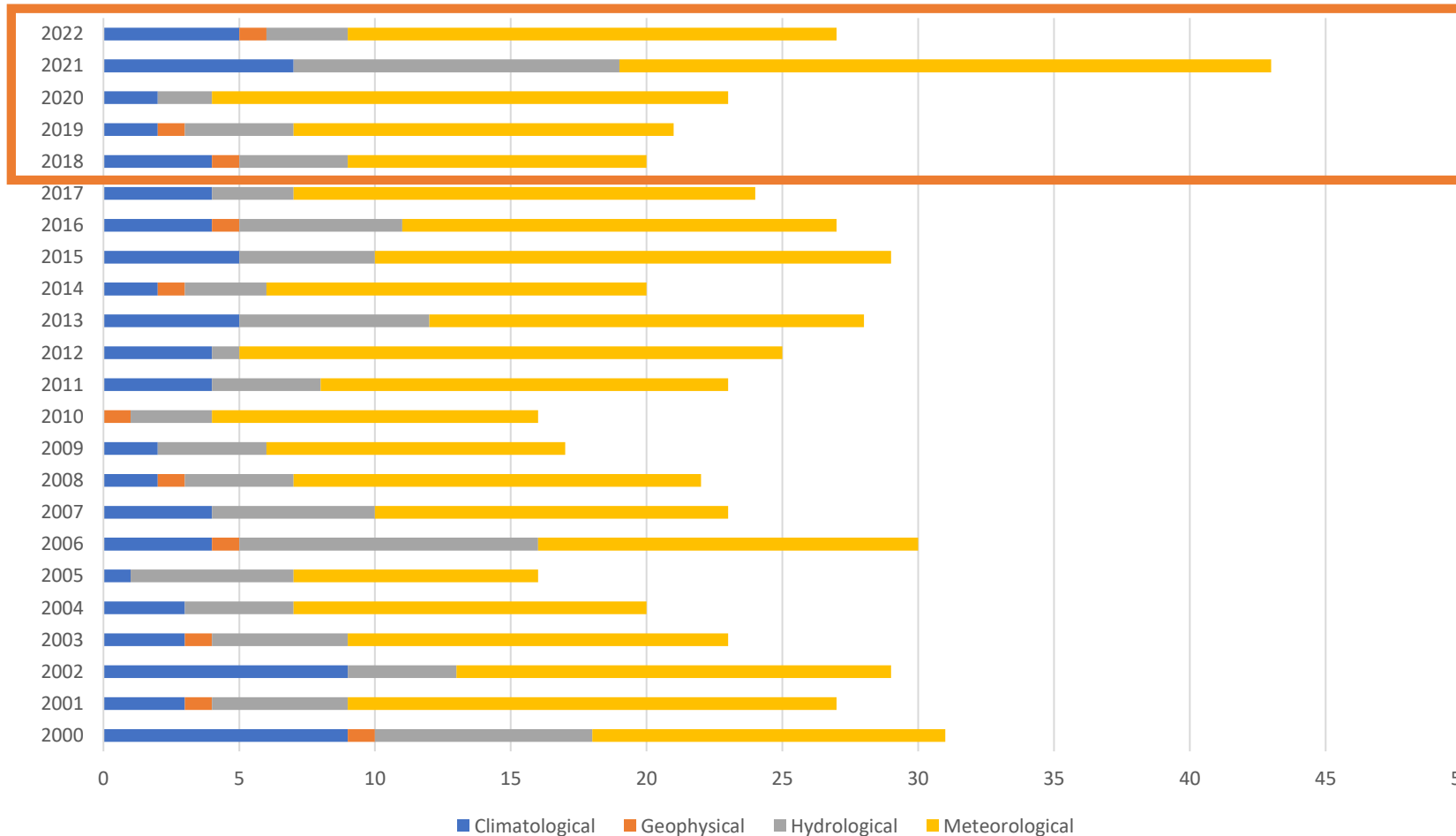
The International Disaster Database

Centre for Research on the Epidemiology of Disasters



Time trend of disaster events in USA

Physical risk events in USA



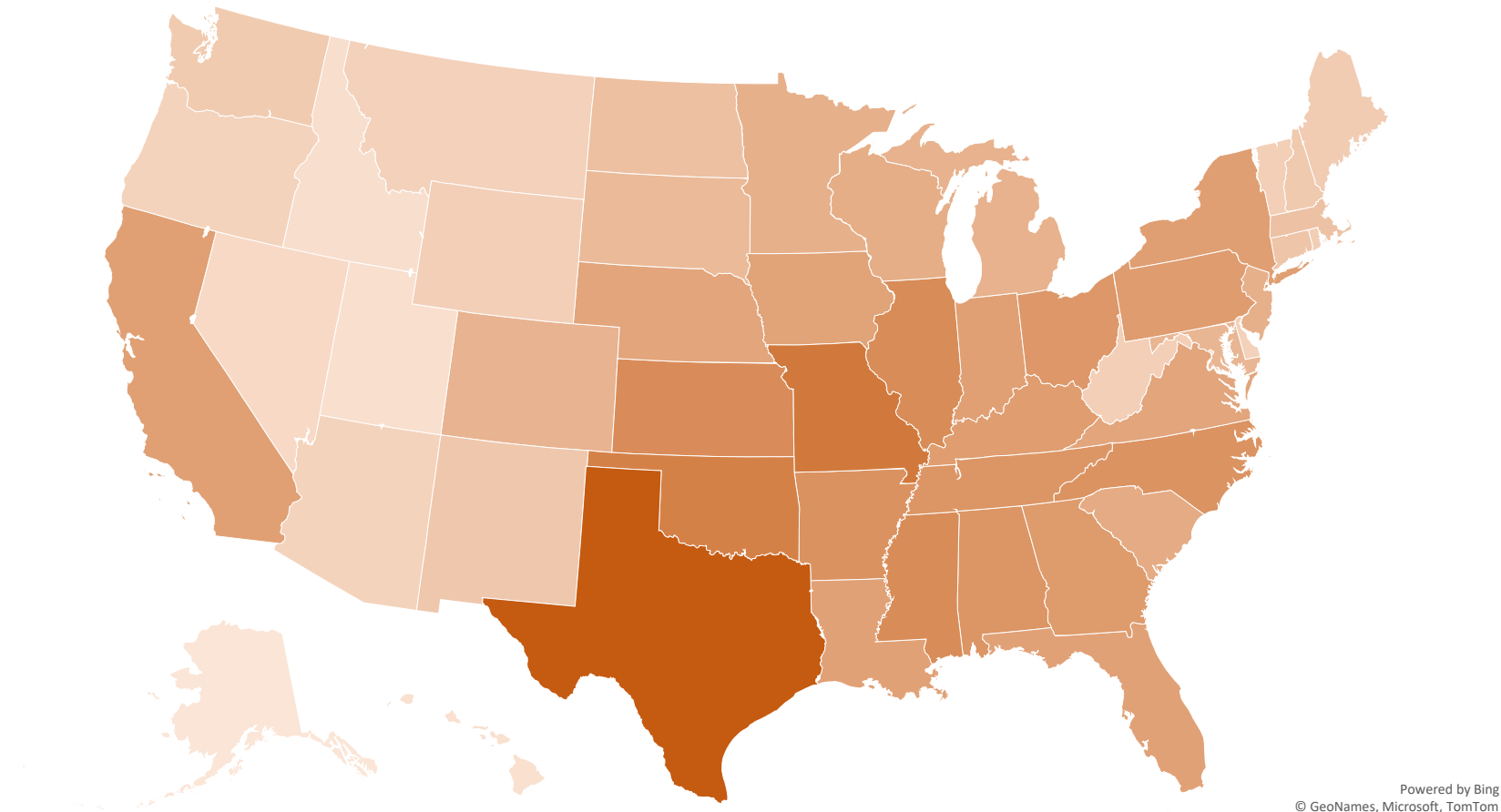
 15.6%

 1.9%

 20.2%

 62.2%

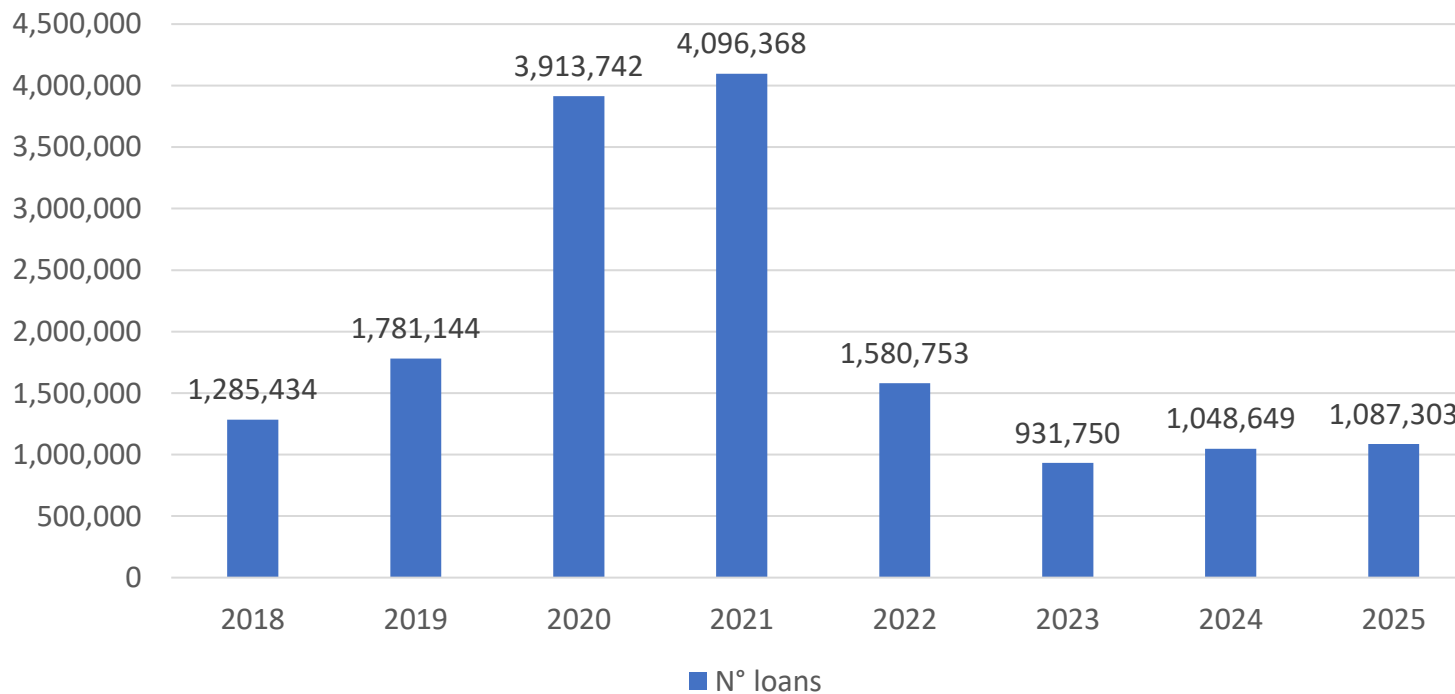
Disaster maps – Overall number



County	N° events
Texas	174
Missouri	137
Oklahoma	127
Illinois	114
Mississippi	114
Kansas	113
Arkansas	106
North Carolina	105
Alabama	103
Tennessee	102
Ohio	100

Mortgages database

The sample considers all the loans included in the single-family loan-level dataset provided by Freddie Mac for the period 2018-2025



Research design

Step 1 - Loans supply features and climate risk for new loans



Results



Step 1 - Loans supply features and climate risk for new loans

	Areas less exposed to climate risk	Areas more exposed to climate risk	Areas before being more exposed to climate risk	Areas after being more exposed to climate risk
Credit score	+	-	+	-
Loan to Value	+	-	-	+
Interest rate	-	+	-	+
Debt to income	+	-	-	+
Term	=	=	+	-
N° borrowers	=	=	=	=

Research design

Step 2 – Climate risk and Probability of Default and Loss given default of new loans

Areas less exposed
to climate risk

Areas more exposed
to Climate risk

$$PD_i = \begin{cases} 1 & \text{if } past\ due \geq 90\ days \\ 0 & \text{otherwise} \end{cases}$$

Areas before being
more exposed to
climate risk

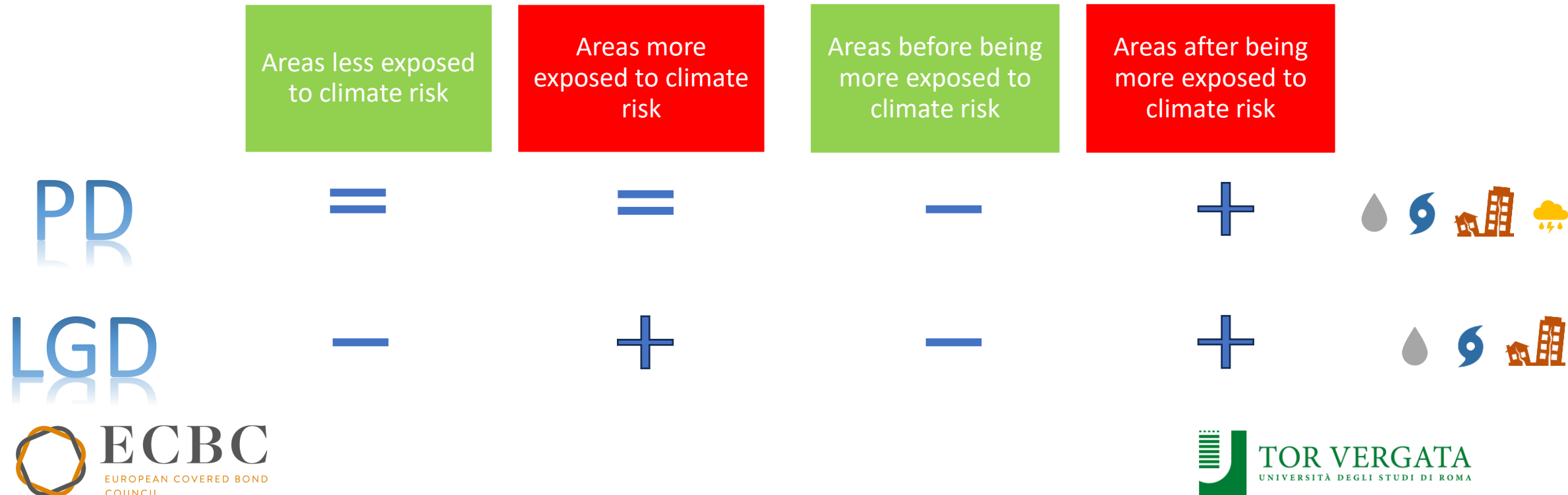
Areas after being
more exposed to
climate risk

$$LGD_i = \frac{Net\ sales\ proceeds_i}{Deferred\ UPB_i}$$



Results

Step 2 – Climate risk and Probability of Default and Loss given default for new loans



Index

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Conclusion and perspectives



Climate risk influence the risk management strategies adopted by a bank and the policies adopted in riskier and safer area may be different.

Climate events could significantly affect household lending, and PD and LGD may be modified by these new events when they happen in a market.

More detailed measures on expected loss under extreme climate events are necessary for a proper stress testing of the credit portfolio in the medium-long term.

Contacts

Gianluca Mattarocci

Professor of Banking

Tor Vergata University of Rome

E-mail: gianluca.mattarocci@uniroma2.it

