Cambridge Judge Business School Business Risk from Climate Change

CAMBRIDGE CLIMATE CHANGE BUSINESS RISK INDEX (Part 2)

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#CamClimateRisk

Centre for **Risk Studies**







British Antarctic Survey



Application of AI to the Study of Environmental Risk

Cambridge Climate Change Business Risk Index Specification

- Provides future likelihood of extreme events that exceed specific weather thresholds
 - Measured as <u>Disruption Days per year</u>
- With a likelihood of occurrence in a given year

90%	50%	10%	5%	1%
P90	P50	P10	P5	P1

Heatwave thresholds: Variable disruptive temperature thresholds

25°C	30°C	35°C
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Three **analysis views** (levels of business concern)

Level 1	Recent historical baseline from 1979-2019 local weather data	ERA5
Level 2	Climate Change Modelled View; four outlooks from RCPs	CMIP5
Level 3	Climate Change Model Stress Test accounting for tail risk	CMIP5

Multiple **time horizons**

5 Years	20 Years
2025	2040

Global geography

- Global land coverage at 1° grid resolution
- 18,800 grid squares
- Referenced by lat-long coordinates of grid centre



1,692,000 global data points for Heatwave

Cambridge Climate Change Business Risk Index Specification

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		Probability of Exceedance (in a given year)				
		90%	50%	10%	5%	1%
	25°C					
Threshold (Mean Daily Temperature)	30°C					
remperature)	35°C					

Analy	Analysis Levels						
L1	Recent historical baseline from 1979-2019 local weather data	Recent Historical					
L2	Consensus model projection; four outlooks from Representative Concentration Pathways (RCP)	2040					
L3	Climate change stress test accounting for tail risk	2040					



L1-L3 Three Analyses of Likelihood of Extreme Weather



Chicago: Number of Heatwave Days per Year



Chicago – 23 Climate Change Models of Future Heatwave Days



L2 Model Consensus: Multi-Model Mean View



L3 Stress Test View: Most Extreme Model + 1 Standard Deviation



L1-L3 Three Analyses of Likelihood of Extreme Weather



Recent Historical Heatwave Risk from Climate Change



Exceeded

>300 Exceeded

Climate Model View of 2040 Heatwave Risk from Climate Change



T Never 0 Exceeded >300 T Always Exceeded

		Probability of Exceedance				
		90%	50%	10%	5%	1%
Temp. Threshold	25°C			L2		
	30°C					
	35°C					





T Never 0 Exceeded >200 T Always Exceeded

		Probability of Exceedance				
		90%	50%	10%	5%	1%
Temp. Threshold	25°C			L2-L1		
	30°C					
	35°C					





T Never 0 Exceeded >200 T Always Exceeded

		Probability of Exceedance				
		90%	50%	10%	5%	1%
Temp. Threshold	25°C					
	30°C			L2-L1		
	35°C					





T Never 0 Exceeded >200 T Always Exceeded

		Probability of Exceedance				
		90%	50%	10%	5%	1%
Temp. Threshold	25°C					
	30°C				L2-L1	
	35°C					



Change in Disruption Days per Year (L2-L1) Temperature Threshold (T) 30°C - 1% Exceedance Probability

T Never 0 Exceeded >200 T Always Exceeded

		Probability of Exceedance					
		90%	50%	10%	5%	1%	
Temp. Threshold	25°C						
	30°C					L2-L1	
	35°C						



Summary

- Index provides global analysis of near-term physical climate hazard from extreme weather
 - Measured by (change in) number of annual Disruption Days
- Temperature change is primary hazard
 - Other extreme weather hazards driven by temperature change
- Ability to map exposures of business activities to the index
 - e.g. identify the temperature changes that key assets are exposed to in any global location
- Now looking for feedback on this index for business applications
 - Recognise that disruptive weather thresholds are controlled by impact on different business activities



