

Modelling Impact of Transition & Physical Risks on a Portfolio of Mortgages

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Energy Ratings – A measure of energy consumption

Lesser Energy Consumed is Better for the Environment



Source: [Science Direct](#)

UK Government targets to transition as many homes as possible to energy band C or better by 2035

Source: [Bank of England \(BoE\)](#)

MATLAB Live Editor makes it easy to identify and share the impact of BoE Guidelines on a property/mortgage

Table A.1: Average costs of transitioning from current to higher energy efficiency bands for residential real estate

		<i>EPC_{MAX}</i>						
		A	B	C	D	E	F	G
<i>EPC_{t0}</i>	A	7,052						
	B	10,843	4,212					
	C	20,202	12,234	4,941				
	D	32,712	18,490	12,661	6,234			
	E	40,129	23,377	17,028	11,258	5,120		
	F	44,514	28,865	22,715	18,721	12,995	6,341	
	G	47,012	31,597	26,652	23,744	20,058	19,658	15,401

Table A.2: Impact by borrower and property

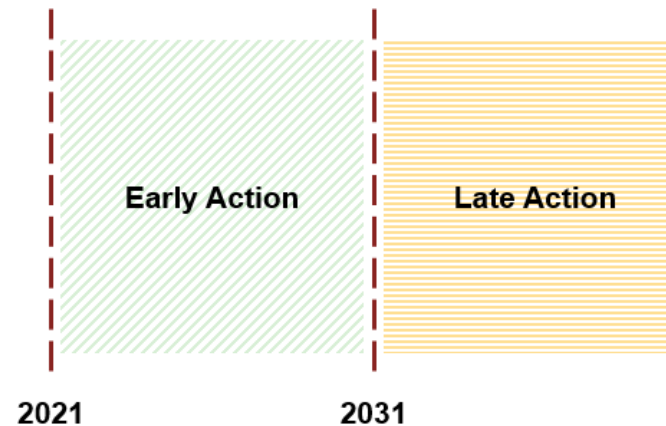
Type of property	Impact
RRE $A > EPC_{MAX} \geq E$	Total cost = transitioning cost + heat pump cost if applicable – subsidy Heat pump costs apply to 65% of RRE properties across EPC bands Impact materialises gradually over the scenario horizon
RRE $EPC_{MAX} < E$	Property value = land value of property Impact has fully materialised by 2035 ($t = 15$)
CRE $A > EPC_{MAX} \geq E$	Total cost = transitioning cost Impact materialises gradually over the scenario horizon
CRE $EPC_{MAX} < E$	Property value = land value of property Impact has fully materialised by 2035 ($t = 15$)

Agenda

- Visualize EPC ratings of buildings in a city & the corresponding Flooding Risk (Physical Risk)
- Understand the impact of policies aimed at increasing the energy efficiency of buildings (Transition Risk)
- Model their impact on a portfolio of Mortgages

Climate Risks

- **Physical Risk**
 - Acute risks such as Flooding, Cyclones
 - Chronic risks such sea level rise, increased temperatures
- **Transition Risk**
 - Financial Risk associated with the transition to climate-friendly options – Getting buildings to have energy rating of C or better



Data for Modelling Physical Climate Risks

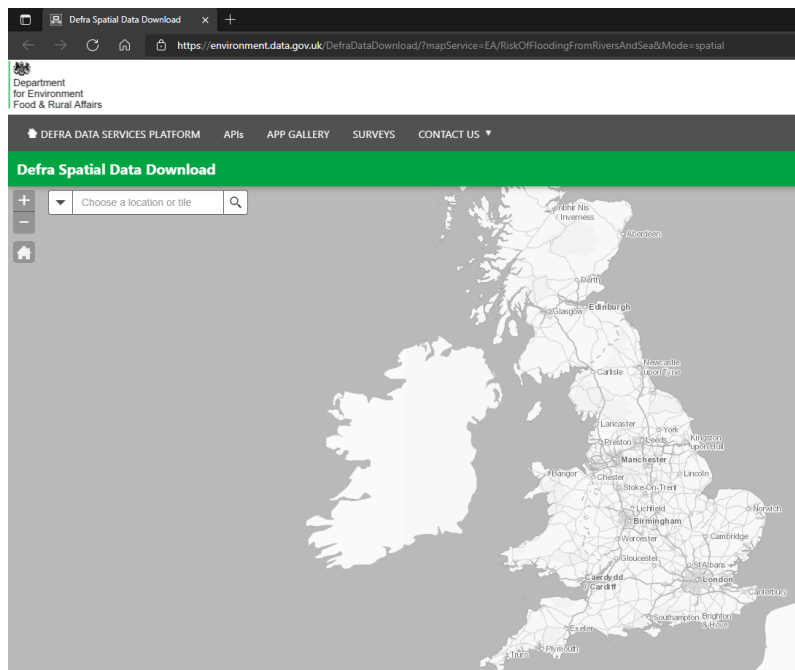
- Diverse Sources

- EPC Ratings

- https://epc.opendatacommunities.org/docs/api/domestic#using_this_api

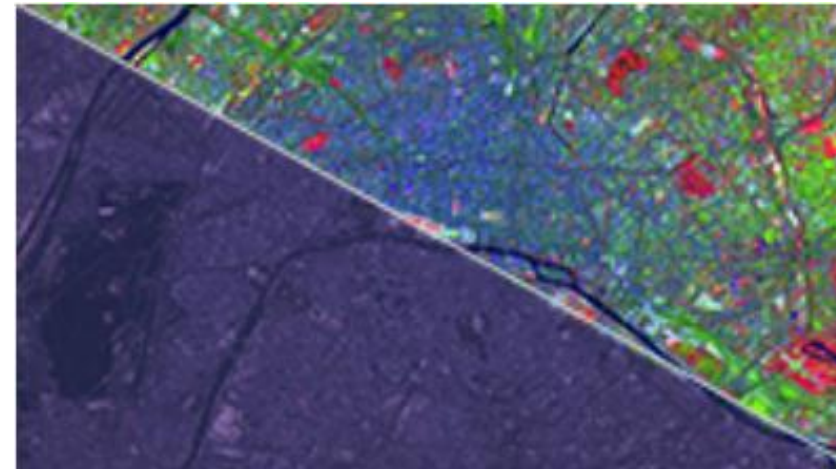
- Flood Risk Data

- <https://environment.data.gov.uk/DefraDataDownload/?mapService=EA/RiskOfFloodingFromRiversAndSea&Mode=spatial>



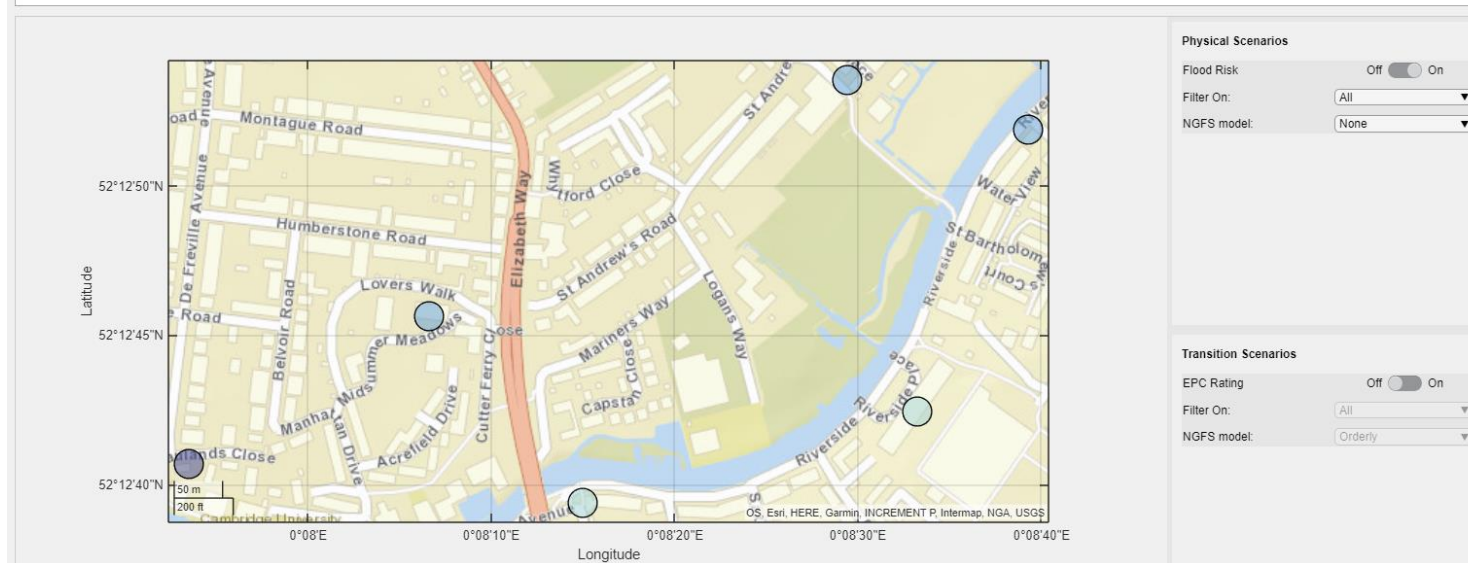
Climate Risk Modelling

- Challenges
 - Working with Big Data & Diversity of datasets
 - Mapping data such as kml, kmz, etc.
 - Big Data
 - Alternative Data on Cloud
 - Create customized dashboards to share results
 - Availability of tested and reliable Credit Modelling functions



Accessing Data & Visualizing The Problem/Scale

Building_Reference	Building_Type	Address	PostCode	EPC_Rating	Flood_Risk	PropertyValue	CurrentMortgage	CurrentLTV
10000694827	Domestic	76 ABBEY ROAD, CAMBRIDGE	CB5 8HQ	C	Low	£668,104.24	£519,828.18	77.81%
10000485973	Domestic	88 ST BARTHOLOMEWS COURT, CAMBRIDGE	CB5 8JD	B	Medium	£482,005.12	£380,253.84	78.89%
10000280426	Domestic	41 BEAULANDS CLOSE, CAMBRIDGE	CB4 1JA	D	High	£533,022.06	£418,516.54	78.52%
10000143940	Domestic	20 RANSOME CLOSE, CAMBRIDGE	CB4 1WH	B	Medium	£155,568.66	£135,426.50	87.05%
10000362087	Domestic	507 MAYFLOWER HOUSE, MANHATTAN DRIVE, CAMBRIDGE	CB4 1TR	C	Medium	£519,910.41	£389,932.80	75.00%
10000398097	Domestic	52 RIVERSIDE PLACE, RIVERSIDE	CB5 8JF	C	Low	£576,310.41	£432,232.81	75.00%



Summary

- Challenges
 - Working with Big Data.
 - Create customized dashboards to share results.
 - Availability of reliable & documented credit modelling functions.

- Addressing the challenges using MATLAB
 - Built-in functions to read-in a wide variety of data types and from different data sources
 - MATLAB App designer for quick and interactive dashboard creation.
 - Industry-tested Functionality with Point-and-Click apps and rich documentation.

Further Resources

- [Climate Integrated Assessment Models Explorer](#)
- [Modelling Climate Risks with MATLAB](#)
- [Quick and interactive dashboard creation](#)
- [MATLAB Onramp](#)