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Bank of England

Staying Afloat: The Impact of Flooding on UK Firms

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Overview









Geospatial analysis is not something we have done a lot of. But it is becoming more important for us...

And more feasible with data like UPRNs. This case study shows the art of what's possible.

Motivation

- Flooding is the largest source of physical risk from climate change in the UK
- More than 1 in 6 properties in England are at risk from flooding.
- Flooding already costs the UK £2.2bn each year on average.
- 8% of new business premises from 2008-2018 built in high/medium flood risk areas
- Climate change increases the frequency and intensity of precipitation in the UK

Historical floods



Data

Data Type	Data	Key Attributes
Business information	AddressBase Premium	Unique Property Reference Number (UPRN), geo-coordinates, property type
	EPCs + Buildings	Surface area extension
	BVD FAME	Annual balance sheet information, sectoral classification
	Experian experian	Monthly current and borrowing account balances of SMEs
Flood information	Historical Flood Extent Maps	Past flood extent maps, flood date and source
	Flood Risk Zones: Rivers and Sea	Flood risk indicators (low, medium, high), flood defence coverage

UPRNs are invaluable: all firm branches!





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Peat Allan, Ordnance Survey

Matching them together. The more data that can have UPRNs, the better!



Apache Sedona → Fast Geospatial Analysis



- Cluster computing for processing large-scale spatial data
- Runs atop Apache system
- Scala, Java, Spatial SQL, Python, and R APIs



Firms in Flooded Areas

Business premises in areas previously flooded (Flooding since 2011)



Proportion 0.20 0.15 0.10

0.05

Business premises in previously flooded areas by SIC classisifaction (Flooding since 2011)



Forward-Looking Exposure

Business premises with flood defences





0.25



Proportion

1.00

0.75

0.50

0.25

Business Premises with Medium/High Flood Risk

Results: Termination, Assets, Employment, Turnover

- SMEs are significantly more likely to terminate their business operations following a flood, whilst large firms are not
- Among surviving firms, large negative impact on total assets, employment, turnover: at least -35% across all sectors.
- Among surviving firms, large firms and those operating in natural-resource sectors are hit hardest.



Results: SME Current and Borrowing Accounts

- Sizeable negative impact of flooding on current account (CA) and borrowing account (BA) balances.
- On the quarter of the shock, both revenues (CA credit) and expenses (CA debit) decrease significantly.
 One year after the shock, the current account balance of SMEs affected remains on average 9% lower.
- Similarly persistent is the estimated impact on SMEs' borrowing, which remains 12% lower one year after the shock, with a larger impact observed for unsecured versus secured borrowing.
- Given the reduction in current account balances, it is unlikely that the reduction in the borrowing account balances is indicative of SME resilience, but more likely a reduced ability to borrow.



What this work has enabled





Insights to corporate flood exposure and...

What this could mean for our objectives.





Big geospatialcorporate data for others at BoE to use.

The art of the possible!

Data underpinning growth! UPRNs are a game changer.

- We are no longer limited to registered addresses of firms or postcode-level records for housing.
- This research would not have been possible without UPRNs!
- And there are opportunities for us to do much more...
 - Household finance studies
 - More corporate studies, e.g. SME lending
 - Supervisory studies, e.g. bank branches
 - More climate risk analysis

