EQC and community recovery after extreme weather events: project description and workplan

Research Question:

Have EQC payouts supported the economic recovery of communities affected by extreme weather events compared to non-affected areas and/or areas affected by disasters but not covered by EQC insurance?

Approach:

This second part of the project will link EQC claim data to historic rainfall intensity data. This project aims to investigate how the EQC programme has aided economic recovery from extreme weather events.

We are matching claim, weather event and property information (from EQC or LINZ) to socio-economic information at meshblock level (from StatsNZ) and other socio-economic indicators (NASA's nightlight data). With this corpus of data, we will identify different subsets to track changes to socioeconomic indicators following extreme weather events (storms/floods/landslips).

We will compare recovery between areas where households have claimed losses after extreme weather events to areas that have suffered from similar extreme weather events but logged no (or lower rates of) claims. We will relate areas to extreme weather events based on historic rainfall intensity data. Using weather information for the whole country, we will take a sample given by mesh-blocks facing similar rainfall intensity events across years.

We will then apply an econometric model of economic recovery to this sample defined by:

$$\Delta Y_{i,(t-(t-1))} = \alpha \boldsymbol{Q}_i + \theta \boldsymbol{X}_{i,(t-1)} + \gamma \boldsymbol{EQC}_{i,(t)} + \varepsilon_i$$

where Δ is the change corresponding to differences between period t (after a disaster) and t-1 (before a disaster). Y is a socioeconomic or welfare indicator, such as income, employment, or nightlight data at community level (either a meshblock or grid box), Q is a set of invariant physical characteristics (such as location, topography, etc.) and X is a set of community (or household) socioeconomic and education characteristics at period t-1 (before the disaster). EQC is the variable controlling for the presence of EQC claims in t. We will try two econometric specifications, one using EQC as a continuous variable – that is including the (scaled) amount of claims paid – and another equation using EQC as binary indicator (presence of a claim).

Workplan

The below are somewhat-chronological steps, divided into Data Management, Visualisations and Analysis.

★ Data Management

- Preparation
  - Figure out best software platform and architecture for data management ✓
  - Choose data structures/packages for the job ✓
- Importing datasets
  - EQC data:
    - Import relevant EQC claim data, format ✓
      - Done - data type RDataFrame ✓
    - Import EQC property data, format ✓
      - eqc “portfolio” data - csv to sf r data ✓
      - Done - data type RDataFrame ✓
  - NIWA data
    - Import niwa’s historical rainfall intensity data ✓
      - Rain netcdf to r data (including day as r dates) ✓
  - StatsNZ:
    - Import meshblock level census data ✓
      - Meshblock boundaries ✓
      - Census data (from master’s project) ✓
  - Slope data
    - Collect from Jacob (with code?)
  - NASA night-time light data
    - Code to download average monthly radiance .tifs from NASA site (terminal - can be run in R) ✓
    - Import to R as .tif ✓
    - Open individually as stars objects ✓
    - Crop to NZ boundary ✓
    - Merge into single stars object using date information
- Geo-processing and other data manipulations
  - Geo-process property data to closest rain point ✓
    - Generate ID for closest rain point ✓
    - Sensecheck - visualise line segments portfolio to closest rain ✓
      - ATTACH EXAMPLE
    - Merge raindata and property/claim data ✓
  - Geo-process property data to nightlight data
    - Generate ID for closest light point
    - Sensecheck - visualise line segments portfolio to closest light
      - ATTACH EXAMPLE
    - Merge raindata and property/claim data

        - Build subsets of relevant properties to rain
            - Subset by those affected by particular weather events (non-zero precipitation during a set date-range, or those with a certain amount in that time)
            - Subset by neighbourhoods/niwa grid areas/mesh-blocks facing similar rainfall intensity events across years

★ Visualisations

- Summary statistic type visualisation:
    - Early, simple visualisation of portfolios ✓
        - ATTACH EXAMPLE
    - Early, simple visualisation of claim locations ✓
        - ATTACH EXAMPLE
    - Early visualisation of rain data ✓
        - Plotted and mapped ✓
        - ATTACH EXAMPLE
    - Early visualisations of nightlight data
        - All NZ, nightlight for one month ✓
        - Overlaid with meshblock information
        - Overlaid with coastlines
        - One grid, nightlight over time
        - All NZ, time series rasters

★ Analysis

- Produce regression tables as per “Approach” above
- Draft report sections
    - Data
    - Methodology ✓
    - Results and Discussion
    - Introduction and Conclusion