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Assessing loss drivers of flood-affected households in Germany across different flood types

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Floods have been recognized as one of the most economically damaging natural hazards, frequently hitting all continents, including Central Europe and Germany. Despite this, the monetary damage assessment of floods is not standardized, and the figures are frequently revised. Several attempts of flood loss modelling found in the literature, from uni- to multivariate, micro- to meso-scale solutions, are still inaccurate and the transferability of models in space and time is poor, showing that the damaging processes are not thoroughly understood, and loss estimation remains a required, but unsolved task. Previous attempts to transfer models have indicated that the difference in flood dynamic could be one of the hindrances. Therefore, it is of interest to assess the potential of flood type as a predictor of flood losses to test or improve the transferability of loss models. In this work, we explore the independence of selected potential predictors to a categorical flood type indicator and analyse whether there is a significant difference among its levels, which would justify the inclusion of the variable as a predictor of loss ratio. The analyses are based on surveys of residents affected by major flooding events in Germany. The data have covered varied aspects that might drive the damage - addressing hazard, the warning process, flood experience and precaution, building characteristics, and socio-economic information on the household - a broad dataset rarely found elsewhere. The analysis reveals that information on the household and its socio-economic condition are mainly homogeneous across flood types, whilst variables addressing the flood hazard (i.e. the hydraulic load), the warning process, coping appraisal, and also the loss amounts show significantly different levels across the different flood types, implying that their effects may be dependent (or confounded) and deserve further study. Straightforward variable selections such as backward elimination and forward selection reinforce that flood type, together with hazard characteristics, coping appraisal, and few other singular predictors, is relevant for loss modelling - a set similar to, but a bit broader than the ones found in previous works. Splitting the dataset per flood type also shows different responses to the selected predictors, suggesting that different flood types may follow different drivers and deserve flood-type-specific models. Understanding this specificity is a crucial step towards transferability of flood loss models in space and time, as different flood dynamics may take place. Such improvements help further clarify the contribution of each hydrological load and resistance factors, and, in the future, identify for which events a given model is fit.