

Econometric Modelling for Estimating Direct Flood Damage to Firms: A Local-Scale Approach Using Post-Event Records in Italy.

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Response to the Reviewers' comments

We thank the Editors and the Reviewer for their interest in our manuscript and the valuable comments they have provided. According to them, the manuscript will be revised as follow.

In the following a point-by-point answer to reviewers' comment is provided.

Reviewer #2

1. General comments

Comment 1:

“While the study outlines in a clear way the econometric modelling approach, additional details on data collection, model specification, and variable selection process would enhance reproducibility and understanding.”

Response 1:

We thank the reviewer for this valuable comment. We appreciate the importance of transparency in econometric research and have revised the manuscript to better clarify key aspects related to data collection, model specification, and variable selection.

Data collection:

In response to this point, we will add a dedicated subsection titled “4. Detailed Data Collection” in the Supplement, which provides further explanation of the post-event survey methodology, the format of the forms used, the institutions responsible for their compilation (e.g. municipalities, regions), and the standardization procedure adopted prior to the analysis. This addition aims to increase the reproducibility of our data processing steps and enhance clarity on the original source and structure of the information.

Model Specification:

The main manuscript already presents the econometric model in detail in Section 4 (Method), including the log-log transformation of variables, the rationale for this choice (e.g., to reduce skewness and heteroskedasticity), and the regression equation used to estimate the physical damage to assets. However, it is not entirely clear to us what specific aspects of the model the reviewer would like to see further detailed or clarified.

Variable Selection Process:

The variables included in the model were selected based on both theoretical considerations and empirical evidence from the existing literature (e.g., Merz et al., 2010; Paprotny et al., 2020) and as well as on the availability of data, as already discussed in Section 3 (Data). Specifically, the choice of water depth, surface, and economic activity type reflects their well-established relevance in flood damage modelling.

Comment 2:

“The manuscript would benefit from a more in-depth discussion of the limitations associated with the dataset, such as potential biases in post-event data collection, missing data, and the representativeness of the sample.”

Response 2:

We fully agree with the reviewer on the importance of acknowledging the limitations of the dataset used in our study, and we will revise the manuscript accordingly.

A dedicated paragraph will be added to the Discussion section to elaborate on three key aspects.

Post-Event Data Collection Bias:

As the dataset relies on self-reported information collected shortly after flood events, it is subject to potential inaccuracies due to memory recall, subjective estimations of damages by business owners, or the pressure to report higher damages to access public compensation schemes. We acknowledge this as a source of uncertainty, and we will explicitly discuss it in the revised text.

Missing Data:

The only missing information in the dataset concerned the surface area of the building. In these cases, we estimated the area using regional topographic databases, which may have introduced some uncertainty in the values.

Sample Representativeness:

Our sample covers five flood events in Italy. However, these cases were selected based on data availability and quality, and do not represent a statistically random sample of all flood-affected firms in the country. The representativeness of the sample (issue discussed in **Appendix – Section 4**) is limited not only by the selection of the case studies but also by the characteristics of the firms that responded. It is possible that firms more severely affected, or more structured and proactive in damage reporting, are overrepresented and vice versa. Therefore, while the data provide valuable micro-scale insights, we caution against generalizing the findings to all flood-affected firms in Italy or other contexts.

Specific comments

Comment 1:

“L. 14 and throughout the text: ensure consistent use of terms such as "firms," "enterprises," and "businesses" throughout the manuscript to avoid confusion.”

Response 1:

We will standardise the terminology throughout the manuscript. From now on, we will consistently use the term “firms” to refer to economic entities.

Comment 2:

“L. 17: add “of” after understanding.”

Response2:

The preposition “of” will be added after “understanding” to correct the sentence.

Comment 3:

“L. 34-35: I suggest not starting the introduction by stating what the manuscript is about. The objectives of the study should be presented at the end of the introduction.”

Response 3:

We appreciate the reviewer’s stylistic suggestion. However, we deliberately chose to introduce the topic by briefly stating the focus of the manuscript in the opening lines, as we believe it is effective to immediately convey the scope and relevance of the work, without requiring the reader to wait until the end of the introduction to understand what the paper is about.

That said, we agree that the research objectives should be explicitly stated, and we will ensure they are clearly formulated in the final paragraph of the Introduction.

Comment 4:

“L. 60: extant->existing”

Response 4:

We will replace “extant” with “existing”.

Comment 5:

“L. 160-174: more details on data collection and water depth estimation are fundamental for a better understanding of the analysis.”

Response 5:

We thank the reviewer for this valuable comment. While we fully acknowledge the relevance of providing further technical details on data collection and water depth estimation, we have intentionally chosen to focus this paper on the econometric modelling of flood damage. Including an in-depth discussion of hydraulic modelling would have extended the scope beyond the intended objective of presenting a concise and targeted contribution.

Nonetheless, we have already included references to the relevant technical studies (Amadio et al., 2019; Scorzini et al., 2018; Carisi et al., 2018; Gatti, 2016) that describe the hydraulic modelling procedures and water depth reconstruction used in the case studies. Interested readers can refer to these sources for a detailed explanation of the flood modelling framework.

Comment 6:

“L. 209: from which Topographic Databases? More details are needed here.”

Response 6:

Thank you for this observation. We will clarify in the revised manuscript that the Topographic Databases used to localize the economic assets refer to the official regional Topographic Databases (DBT) provided by public authorities (e.g., Regione Lombardia, Regione Sardegna).

Comment 7:

“References: check the reference list carefully, as in some cases I couldn't find the article cited in the text.”

Response 7:

We thank the reviewer for this observation. We will carefully review the manuscript and the reference list to ensure consistency between in-text citations and listed references. Any missing or incorrect entries will be corrected. All cited sources will properly include in the reference list.