

The article proposes a literature review of multi-hazard weather-index insurance for agriculture, specifically for crops. The paper would like to identify which indices are used to assess and monitor extreme weather events, what functions and methods are used to determine the vulnerability of food production to multi-hazard events and how to compute risk premiums. The authors applied the PRISMA protocol to identify 34 studies on the selected topic. In addition, they propose a conceptual framework to solve the problem of multi-hazard risk and minimizing the premiums (lines 404-406). The conceptual framework is applied to the production of soybean in Brazil.

The topic of multi-hazard index insurance deserves for sure further attention, as underlined by the authors, thus a review of studies addressing multi-hazard parametric insurance for crops is a valuable contribution for the scientific community.

However, my feeling is that the paper in its current form is a little bit confusing for the reader. First of all, the authors state in the abstract and in the introduction that their “primary focus is considering a multi-hazard approach and selecting studies in food security” (line 5) and they would like to answer the question “What functions and methods are used to assess the vulnerability of food production to extreme weather events?” (lines 74-75). However, inside the paper there are continuous reminder to insurance for renewable energy production and hydrological risk and it is not clear if the two aspects are related with food security or not. If this is the case, the authors should explain the connection better.

Secondly, the paper seems to be divided into two distinct parts: a first one dealing with the literature review and a second one explaining the conceptual framework used to solve the problem of multi-hazard risk and minimizing the premiums.

Proposing a conceptual framework and applying it to a specific case study inside a literature review article sounds strange since usually a literature review explores the studies on a specific topic and provides information on gaps, shortcomings and future research areas for that specific topic.

In addition, both the parts, the literature review and the proposed conceptual framework, are not deepened enough.

In the sections 3.2.1, 3.2.2 and 3.2.3 (Hazard assessment, vulnerability analysis and financial methods and risk pricing) the discussion is too simple. In section 3.2.1 I would have expected a discussion on the advantages and disadvantages of the application of the described indices in parametric insurance and an insight on the indices adopted for multi-hazard risk assessment. In section 3.2.2 there is no discussion on the pros and cons of the described methodologies used to determine crop vulnerability to multi-hazard events. Finally, in section 3.2.3 again a discussion on the strengths and weaknesses of the methods proposed in the literature to determine fair premiums is lacking. Therefore, I suggest to improve the sections.

Basis risk, which is a crucial point for the effectiveness of index-based insurance is often mentioned, but details on the basis risk of the insurance programs designed in the reviewed studies are not proposed to the reader. This point should be better investigated by the authors, including in the text some considerations on basis risk proposed in the reviewed studies.

Finally, in the conclusion section I would expect to find the answers to the three questions raised in the introduction:

- 1) What indices are used to assess and monitor extreme weather events?
- 2) What functions and methods are used to assess the vulnerability of food production to extreme weather events?
- 3) How to determine risk premiums?

Instead, the first part of the conclusions underlines the lack of studies on index insurance tailored to Latin America, while the second part describes the results obtained by applying the conceptual framework to the case study area. I recommend the authors to include in the conclusions the answers to the three research questions they raised in the introduction.

As a final comment, I suggest to carefully consider if the conceptual framework and the case study should remain a part of the literature review or become a separate article. In fact, the description of the conceptual framework is very simple and does not allow the reader to understand properly what the author did and the results they obtained. A work fully dedicated to it would allow readers to properly appreciate the work done by the authors understanding all the necessary details.