

The comments

Thank you for the opportunity to review this manuscript, titled "Limits to trade's buffering of compounding climatic and non-climatic shocks to global grain supplies." The paper presents a sophisticated and highly relevant analysis using a novel bilateral trade model to assess global food system resilience. The topic is timely, the methodology is robust, and the findings are significant for both policy and research.

The manuscript presents a comprehensive and methodologically robust analysis of the role of bilateral trade in buffering compounding climatic and non-climatic shocks to global grain supplies. The topic is timely, policy-relevant, and well aligned with current debates on food system resilience. The modelling framework is sophisticated and the dataset is extensive. However, despite its strong scientific contribution, the manuscript would benefit from substantial revisions in academic writing quality, stylistic consistency, clarity of exposition, and formal presentation, as detailed below.

- The title is clear and descriptive. Consider if "Limits to trade's buffering..." could be slightly rephrased for immediacy, e.g., "The Limits of Trade in Buffering Compound Shocks to Global Grain Supplies."
- Title: The title should be precise, clear, and reflective of the research content. Consider revising the title to be more specific, such as: "Assessing the Resilience of Global Grain Supplies to Compound Climatic and Non-Climatic Shocks through a Bilateral Trade Model".
- Abstract: The abstract should be concise and clear, summarizing the research objectives, methodology, key findings, and conclusions. Review the abstract to ensure no redundant or excessive information is included.
- Abstract: The final sentence ("The modelling approach developed here can be a useful tool...") is somewhat generic. Strengthen it by briefly stating what kind of strategies it can help identify (e.g., "...identify targeted strategies for enhancing resilience, such as strategic stockholding or trade agreement diversification").
- Abstract: "Recent extreme-weather events and international conflict have heightened concerns about the vulnerability of the global food system to shocks." Could be rephrased to: "Recent extreme weather events and international conflicts have raised concerns about the global food system's vulnerability to shocks."
- The introduction should provide a clear background on the research topic, its significance, the gap in previous research, and the objectives of the current study. Review the introduction to ensure it clearly defines the research contribution to the field.

- Paragraph 1: "providing food and feedstock for a growing population [1]" → Consider "providing food and feed for a growing global population [1]" for parallel structure.
- Paragraph 2: "There is evidence that the frequency...has increased" → "Evidence suggests that the frequency...has increased" is more standard academic phrasing.
- Paragraph 3: "A low level of resilience can cause..." → "Low resilience can lead to..." is more concise.
- In the Introduction: "At present, around 20% of all calories consumed globally are from traded food products [2]." Consider adding more explanation or recent statistics if available to strengthen the sentence.
- Page 2, Intro: "have doubled the number of people facing acute food insecurity" → This refers to a past event (2019-2023), so "had doubled" is more precise.

Materials and Methods:

- **Section 2.1:** "our 'present- day' reference period" → Use a consistent format for defined terms. Consider "our 'present-day' reference period (2017–2021)" on first mention.
- **Section 2.2:** "The benefits of a SPEM are, first, that it explicitly captures..." → Use a stronger list format: "The benefits of a SPEM are fourfold. First, it explicitly captures... Second, it allows for... Third, it captures... Fourth, it allows..."
- **Section 2.3:** "We consider four shock scenarios that are super-imposed upon..." → "superimposed on" is the standard form (no hyphen).
- Throughout: Avoid phrases like "we do" or "we use" where possible. Focus on what *was done*. E.g., "The model was calibrated using..." instead of "We calibrated our model using..."
- Several passages, particularly in the Introduction and Discussion, employ narrative or journalistic phrasing (e.g., "heightened concerns", "grounds for optimism"). These should be revised to a more neutral, analytical, and cautious academic tone. Subjective or evaluative language should be minimized unless clearly supported by evidence.
- Key concepts such as compound shocks, systemic shocks, and interconnected shocks are used interchangeably without a clear, unified definition. The manuscript would benefit from: A formal definition of each key concept at first use. Consistent terminology across all sections.
- The manuscript contains a high frequency of overly long and syntactically complex sentences, especially in the Introduction and Methods sections. Many sentences combine multiple ideas (background, method, result, implication) and should be split for clarity. Simplifying sentence structure would substantially improve readability and accessibility.

- There is inconsistent use of verb tenses across sections: Methods sometimes shift between past and present tense (Methods in the past tense, results in the present tense, conclusions in the Present tense).
- The text ends abruptly in the middle of a sentence in the "Discussion" section: In the work of Heslin et al. (2020), the United States stock levels were also found to be a key determinant of the international shock propagation of. The sentence must be completed. Additionally, a Conclusion section and a References list are missing. A paper cannot be considered complete without a clear ending and a full bibliography.
- Figure captions (e.g., Figure 1. Risk profile...) are embedded directly within the text body. In the final manuscript, figures and tables should be inserted in their appropriate locations or placed at the end of the document. The text should refer to them (e.g., As shown in Figure 1...) rather than pasting the caption as a standalone paragraph. References to supplementary tables like Table S1 are acceptable, but ensure these files are actually included as appendices.
- While passive voice is acceptable in scientific writing, its excessive use, particularly in the Methods section, reduces clarity and authorial responsibility. The authors should consider introducing active constructions where appropriate to improve transparency and flow.
- Some analytical choices (e.g., use of Spearman rank correlation) are reported without sufficient methodological justification. Brief explanations should be added to clarify why each statistical method is appropriate for the data structure.
- In some instances, trends described in the text are not immediately evident in the corresponding figures. The authors should carefully check consistency between narrative descriptions and visual representations.
- The Conclusion section largely reiterates results rather than clearly articulating the manuscript's original contributions.
- Line 16: "Recent extreme-weather events and international conflict have heightened...". Improvement: Consider making it more forceful: "The convergence of recent extreme-weather events and international conflicts has heightened..." to link the factors more tightly.
- Line 369: "...increase in global consumer price (weighted by demand) of 22.6% for soybean..." Improvement: To enhance statistical rigor, it is advisable to report confidence intervals or standard deviations alongside the percentages/medians, especially when discussing median values over 54 samples.
- The transition between "3.4 Shifting trade patterns" and "3.5 Country coping capacity" is generally good. However, you could add a linking sentence at the end of section 3.4 indicating that these trade shifts affect countries differently based on their coping capacities, setting up the next section.

Results & Discussion:

- Section 3.1: "most of Europe and North Africa have low prices" → "exhibit low prices" or "are characterized by low prices."
- Section 3.2: "Regionally, however, we can identify different drivers..." → "Regionally, however, the drivers of consumer surplus losses differ..." (More active, less tentative).
- Section 4 (Discussion): The discussion is strong. Ensure each paragraph begins with a clear topic sentence that links back to the results or forward to the broader implication.
- General Flow: Transitions between some paragraphs, particularly in the Methods, can be improved. Use linking phrases: "To implement this," "Consequently," "Following this calibration," etc.
- "impacts as a result of" → "impacts resulting from" is more formal.
- "super- imposed upon" → "superimposed on."
- "Exemplar shocks" → "Exemplary shocks" or, better, "shocks exemplified by..."
- "Locate food systems vulnerabilities" → "identify vulnerabilities in food systems."
- Ensure every figure and table mentioned in the text (e.g., Figure 1, Figure S1, Table S2) is explicitly called out in a logical place, preferably before the reader encounters the related data in the text. The current manuscript is generally good, but double-check the flow.
- Example for Figure 1 caption (Page 13): "Fig. 1 | Risk profile of consumer prices related to climate-driven yield variations. (a) Bivariate plot of the mean consumer price (averaged across the 54 yield years) and the coefficient of variation (COV) of consumer prices over the same period for all four crops combined (weighted average) under the baseline scenario. (b–e) As in (a), but for maize (b), wheat (c), rice (d), and soybean (e) separately. Darker red indicates high price variability but low consumer prices. Darker gold indicates low variability but high prices. Black indicates both are high."
- The table on Page 34 appears to be raw data or a misplaced element. It should be formatted as a proper table with a caption (e.g., "Supplementary Table X: Correlation coefficients...") and moved to the Supplementary Information.
- Use consistent terms: "consumer surplus" (not "consumer's surplus"), "coping capacity," "systemic risk."
- Supplementary Information: The manuscript frequently refers to "Text S1," "Figure S1," etc. Ensure that all these supplementary items are prepared, clearly labeled, and submitted with the manuscript. Their descriptions in the main text should be precise enough for the reader to understand what is being referenced.

I commend the authors on their substantial work. Addressing the comments above will significantly enhance the manuscript's clarity, credibility, and suitability for publication.