

Response to Referee #4 Report

The manuscript presents a highly impressive and commendable research effort in documenting the economy module of FRIDA v2.1. The integration of Schumpeterian dynamics, disequilibrium frameworks, and stock-flow consistency represents a highly ambitious and technically sound approach to capturing complex climate-economy interactions. The transparency with which the authors lay out both the advantages and limitations of this framework is highly appreciated and sets a great standard for model documentation.

We thank the Reviewer for the kind words and the constructive feedback on the manuscript. Below is a point-by-point response to the Reviewer's feedback, and the revisions to the manuscript it prompted.

My main overarching concern rests on the narrative presentation, which often reads as quite obscure, making it difficult to fully appreciate the practical value of FRIDA's innovations compared to existing models. While the structural complexity is evident, the text feels overly dense. It is somewhat challenging to understand what specific real-world utilities, analytical advantages, or policy-testing capabilities this intricate framework actually unlocks for the wider scientific community.

We agree with the Reviewer and can appreciate that the actual use-cases for the model could be better communicated. To improve the manuscript in this regard we implement the Reviewer's suggestions as explained below.

To ground this complexity, I highly recommend that the authors explicitly detail the types of practical applications the FRIDA model is uniquely suited (or unsuited) to address. For instance, what specific, high-priority research questions can this model answer that mainstream, aggregate IAMs cannot? Clarifying these distinct use cases and target scenarios would greatly elevate the paper, transforming it from a dense technical specification into an accessible, impactful tool for climate policy analysis.

We thank the Reviewer for this excellent suggestion. An explicit discussion of the model's potential use-cases can only strengthen the manuscript. We have implemented such a discussion in a new, dedicated paragraph in the Introduction:

"These design choices make the model uniquely suited to address several underexplored research areas. A first potential application is the analysis of the financial and monetary consequences of climate change, and the role that these factors play in determining the macroeconomic costs of environmental damages. A second application is analyzing the complex relationship between innovation and climate change, including how the former could mitigate the latter, and how the

latter could incentivize or disrupt the former. A third application is policy analysis. FRIDA v2.1 can be used for the comparative analysis of alternative funding strategies for climate policies, including income taxation, wealth taxation, government debt, central bank monetization and their potential combinations. Policy timing in relation to business cycles can also be explored: whether, for instance, a carbon tax introduced during a recession has different economic and environmental consequences than one introduced during an expansion. Some research efforts in these directions have already been made. Callegari et al. (2026) have assessed the relative economic and environmental performance of various innovation policy mix including growth-oriented and environment-oriented policies. Putranti et al. (2026) have analyzed how insurance policies could mitigate the financial instability effects of climate change. Ongoing research work is dedicated to analyzing how coordination between monetary and fiscal authorities could affect the cost-effectiveness of climate policies.”

Finally, I would make it clearer the access to the model's repository and Github, to enhance reproducibility and transparency.

Transparency is a high priority for us, so we appreciate this suggestion. To more easily guide the reader to where they will find the code and data we added a sentence to end of the “paper roadmap” in the introduction:

“The model code and data are freely available on Github. Instruction on how to access them is provided in the Code and Data Availability section.”