Dear Danhua and co-authors,

For publication, I kindly ask you to review the referee reports and address their comments and revisions. Their suggestions are shown below and in the attached report. Please provide me with a revised version and mark the changes you make.

Thank you.

Solmaz Mohadjer

NHESS Editor

Response: Dear Editor Solmaz, thank you very much for helping to manage the whole review process! We have revised the manuscript according to the suggestions from both referees. The point-to-point responses are given below.

Report 1:

L515: The sentence is not clearly written (Since the development of ..., which is of vital reference importance..., then what?). Please correct it.

Response: Accepted! Behind this sentence "*Since the development of the fixed asset data is targeted for seismic loss estimation after the occurrence of a damaging earthquake in China, which is of vital reference importance for government officials to reasonably allocate emergency response personnel and goods as well as for insurance and reinsurance companies to quickly estimate the potential compensation amount*", the expression "*it is necessary to check the application potential of the developed dataset.*" has been added to **Line 518, Page 24** of the revised manuscript (clean version). Thank you for your careful check!

Report 2:

Comment 1: Here are some areas for minor revision: Depreciation Rate Variability - While the authors acknowledge the importance of variable depreciation rates, the model continues to use a fixed 5% rate across all provinces and time periods. This assumption may not fully capture regional differences in asset longevity, economic conditions, and maintenance practices. *Suggested Revision: Include a sensitivity analysis testing different depreciation rates (e.g., 5%, 7%, and 9%) and their impact on estimated asset values.* This would provide a clearer understanding of the model's robustness and potential variations in loss estimation. Even if the dataset constraints prevent full integration of variable rates, a quantitative discussion on the potential impact of using different rates would add credibility to the model.

Response: Thank you for further emphasizing this issue. When the depreciation rate is fixed as 7% and 9%, ratios between provincial-level fixed assets relative to that with the depreciation rate fixed as 5% is shown in the following Figure R1 and Figure R2, respectively. The changing trends of fixed assets with time shown in Figures R1-R2 are quite similar to that in Figure 14 of the manuscript

(which has been slightly revised in this version due to typos and description change in Y axis). For cross-check convenience, we also paste Figure 14 as Figure R3 here. In Figure 14, sensitivity test has been conducted by using different depreciate rates (ranging from 7.95% to 10.05%, as listed in Table 4 of the manuscript) developed by Wu et al. (2014) for each province. Discussions on this sensitivity test and the changing trend in Figure 14 have been given in **Lines 561-600, Page 27** of the manuscript (clean version). Due to the similarity between Figures R1-R2 and Figure 14, we prefer not to further repeat such discussion.
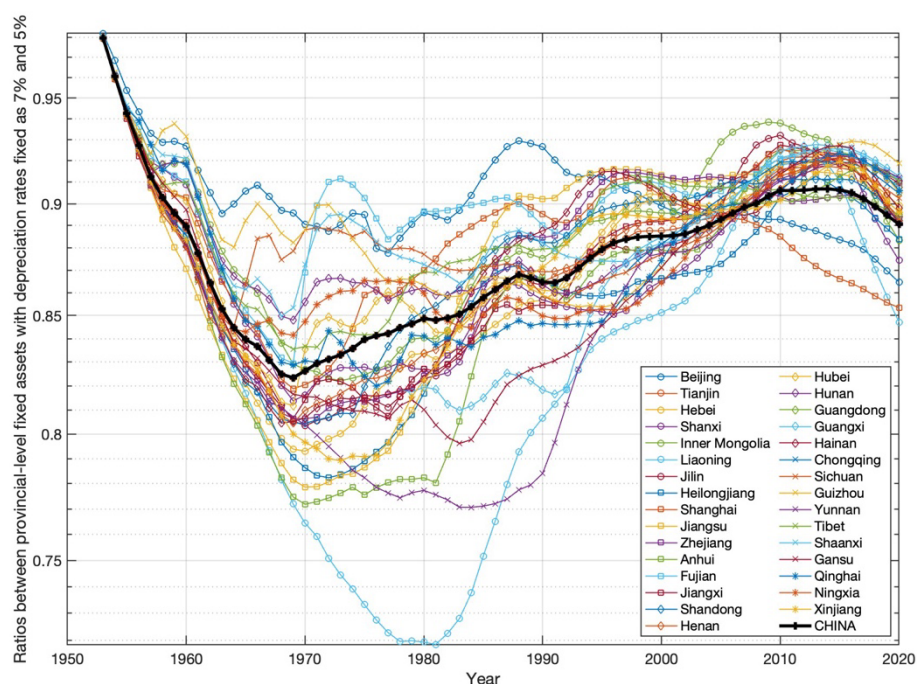

Figure R1: Ratios between provincial-level fixed assets with depreciation rates set as **7% and 5%**, respectively.
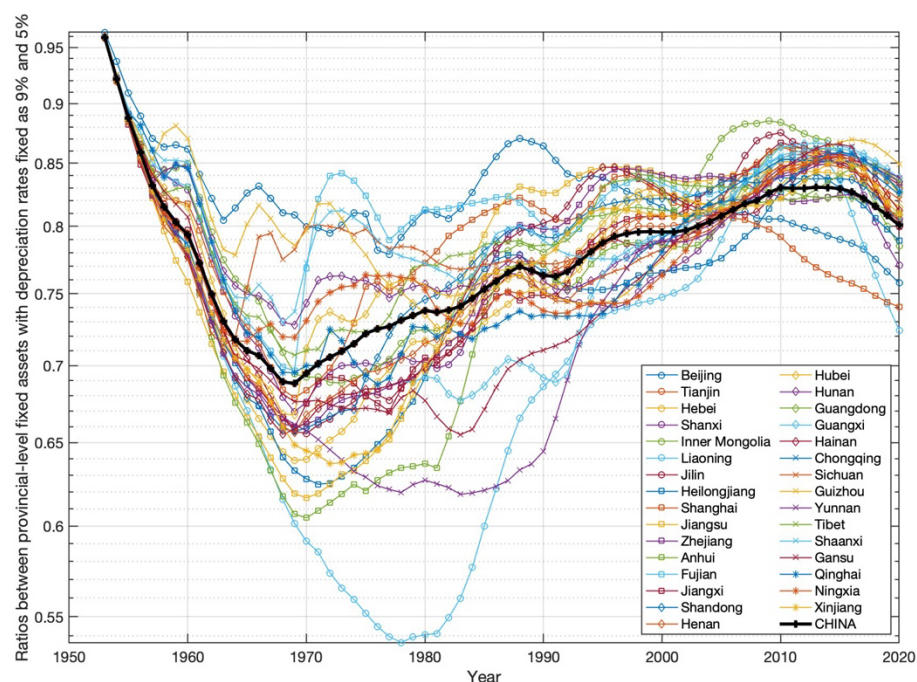

Figure R2: Ratios between provincial-level fixed assets with depreciation rates set as **9% and 5%**, respectively.
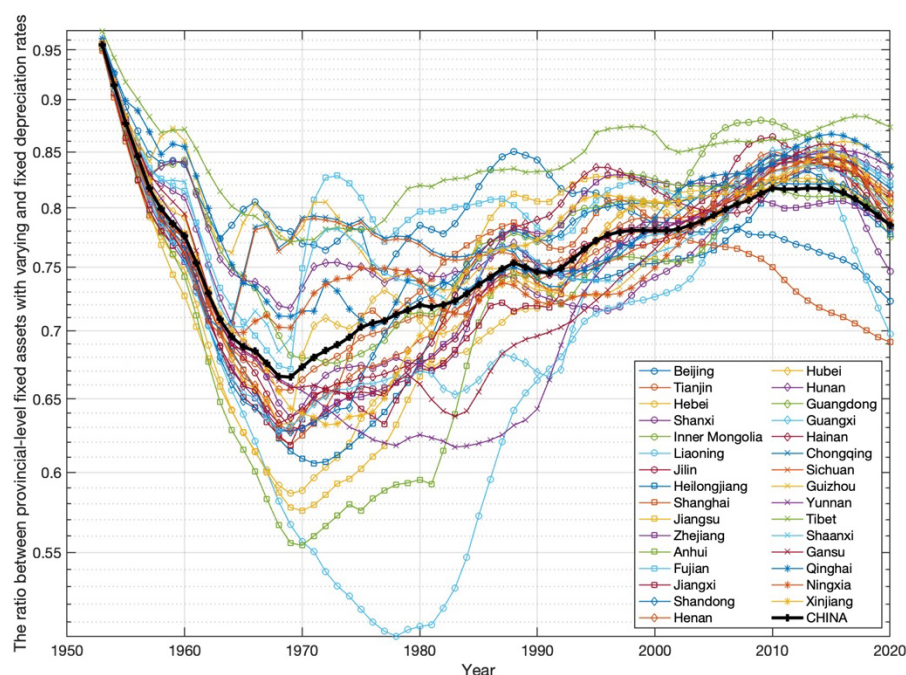
Figure R3: Figure 14 of the manuscript, which demonstrates the ratio between provincial-level fixed assets with varying depreciation rates developed by Wu et al. (2014) and the fixed rate of 5%.

Comment 2: Early-Year Data Reliability - The authors justify their approach of using population density data as a proxy in the absence of nighttime light or built-up area data before 1971. While reasonable, this introduces uncertainty in the fixed asset estimates for early years. *Suggested Revision: Provide a comparative analysis of early-year fixed asset estimations against alternative historical economic indicators (e.g., historical GDP, industrial output). If direct comparisons are not possible, a brief discussion of potential error margins in early-year estimations would help.* Addressing possible inconsistencies in early-year estimates will strengthen confidence in the model's historical reliability, particularly for long-term economic trend analysis.

Response: This is a quite good suggestion. Currently, a comparison between modelled provincial-level fixed assets and GDP has been conducted and shown in Figure 4 of the manuscript. As indicated by Figure 4, the ratios between provincial-level fixed assets and GDP appears to be much irregular in early periods due to the lack of an official and standard recording method at that time. The discussion on such irregularity has been given in **Lines 356-370, Pages 13-14** of the manuscript. In **Lines 181-185, Page 7**, we also introduced the sensitivity tests by changing early-year asset estimation conducted by previous studies, namely "*Fortunately, previous studies (Shan, 2008; Wu et al., 2014; Zhang et al., 2004) have demonstrated that the effect of the initially determined fixed asset value of the base year on the asset estimation for the following years will decline given sufficiently long time series. For example, the sensitivity test performed by Wu et al. (2014) indicated that a doubling of the initial asset value in 1978 only resulted in less than a 0.6% change in the stock estimation in 2012.*".

In addition, the following discussion related to grid-level fixed asset evaluation and application will also be added to **Lines 605-612, Pages 27-28** of the revised manuscript:

"*For evaluation of the grid-level fixed asset model disaggregated from provincial-level data in the early periods, a direct comparative analysis with related statistical records would be quite valuable. However, such comparison is unfortunately hindered by the lack of prefecture/county level statistical records of GDP or industrial output data in the early periods, as can be checked from the official website of the National Bureau of Statistics (https://data.stats.gov.cn/english/). Therefore, considering the rough estimation made in the determination process of the initially accumulated fixed assets as well as the lack of an official and standard method in the compilation of economic indicators in the early periods after 1949, special attention should be paid when applicating the developed grid-level fixed asset data to studies like long-term economic trend analyses for specific regions.*"

Comment 3: Asset Type Categorization - The model does not differentiate between asset types (residential, commercial, industrial), limiting its utility for applications that require specific asset vulnerability assessments. *Suggested Revision: If differentiation is not feasible due to data limitations, clarify in the discussion how future studies could incorporate land-use data, building inventories, or economic sector data to refine the model.* Even if asset-type differentiation is beyond the scope of this study, acknowledging its importance and outlining potential future directions would improve the paper's practical relevance.

Response: Accepted! In the revised manuscript, the following discussion will be added to **Lines 626-631, Page 28** to further specify the model improvement directions:

"*In the future, to better aid the natural disaster risk assessment and emergency response needs, more efforts should be made to employ more remote sensing data as well as detailed building and infrastructure related statistics to refine the latest fixed asset model. For example, land-use data can be integrated into the modelling process to better discriminate land types and exposed elements, detailed building-related census records can be adopted to better quantify the asset share of different building structures, and road density data can be used to well improve the asset evaluation and disaggregation accuracy of infrastructures.*"