

## Reply to Referee 1

We thank the Referee for his appreciation of our work and his constructive and very useful comments. We think that the changes to the manuscript and the underlying dataset will improve the manuscript's quality and will meet the Referee's agreement.

Please find the Referee's comments (COM) and our reply (REP) with according changes to the manuscript below:

### **General Comments**

COM: The primary methodological advances deal with converting currencies from units of GK1990 to PPP2005, the presentation of which needs further clarification.

REP: We have adapted and extended the manuscript at various instances to clarify the procedure and to inform about loopholes and uncertainties. We also created an appendix that now contains time series for each country considered and information about the country-specific conversion rates and their variability over time.

### **Specific Comments**

1. COM: Please provide equations used for primary calculations, e.g., translating between currency units

REP: We have added equations at various instances to clarify our procedure.

2. COM: A table summarizing Section 2 (which data set was used for which aspects of the analysis) should be provided

REP: A table was added that makes it easier for the reader to understand how the different data sets interact and how they were used in our analysis.

### **Specific Comments regarding Section 2.4**

1. COM: When generating GK1990 to PPP2005 conversion factors, the author should explain why it is sufficient to develop factors only assessing the first 5-year period - overlapping data is available between the two data sets for much longer periods of time

REP: We decided to develop the conversion schemes for the first 5 overlapping years of data for several reasons: 1) Data for several countries is not reported in the Maddison database and we estimate income trajectories for these countries based on the trajectories of country groups. Therefore, conversion to observed data at the earliest point in time is desirable; 2) As our final unit of merit is PPP 2005 USD, we chose to use original data with this unit as our main source and adjusted all other data sources to it; 3) For consistency (in line with point 1) and to avoid arbitrariness, we applied a systematic approach instead of a country-specific definition; 4) Using the earliest point in time also provides a lower bound for currency conversion for most countries (the all country-mean and median conversion factor grows over time, see also new figure in the manuscript) and thus avoids overestimation of past values, e.g. due to more recent high growth phases of certain countries; 5) We observe rather stable conversion factors over time for many countries (see the table for the sensitivity analysis in the revised manuscript.)

2. COM: Please show for a few representative countries time series of calculated conversion factors across the entire overlapping time series to show that the conversion factor is robust across time

REP: In the appendix to the revised manuscript one can now find time series for each country considered and information about the country-specific conversion rates and their variability over time. We also updated Figure 3 using this newly available information and added a new paragraph discussing the robustness and sensitivity of our methodology.

3. COM: Please report how many (and what kind) of countries required a mean conversion factor

REP: We added the required information to the manuscript, as it was formerly only available in the DOI archive. It now also appears in the appendix of the manuscript for each country specifically.

4. COM: The author should provide a (perhaps brief) analysis as to how sensitive are the results do the methodology used to generate conversion factors.

REP: We added a paragraph discussing the robustness and sensitivity, see also our reply to comment 2 above.

5. COM: Figure 2b is entirely illegible; additionally, there is no presented logic as to why ISO codes are placed along the x-axis. Please rework this into a easier-to-digest representation of the main point of the figure. Please highlight in that figure outliers and countries of note with specific labels. The previous section breaks down the MPD into different regions which would be a reasonable approach here (e.g., different histograms for different regions). Additionally, if the figure is presented next to another figure (Figure 2a), the y-axis should have the same bounds.

REP: We generated a new figure according to the Referee's suggestion as well as adapted the surrounding discussion in the manuscript. The new figure now also shows the variability in conversion rates for different world regions.

6. COM: If the 2008 financial crisis is the primary source of error between PWT and the SSP projections, why is 2005 taken as the base year of interpolation? Would it not be better to use 2008 in order to capture the dynamics of the financial crisis? Please provide a sound basis as to why 2005 is chosen as the base year for merging historical data with SSP data.

REP: The database was primarily designed to be usable in combination with the SSP projections, which are available from 2010 onwards and were generated many years before the financial crisis. Thus, the unexpected occurrence of the financial crisis but also other unforeseen events and uncertainties in projected growth patterns have contributed to a mismatch of observed and SPP-projected GDP values in 2010. Although this seems outdated, this is required for consistency reasons: all other data sources in the field of climate impact research with which the present database might be matched are based on the 2010 SSP projections as well. If we had chosen 2008 or even 2009 (when most countries experienced the full impact of the financial crisis) as a basis for interpolation, we

would have only added 3-4 years based on observations but would have produced large and (and even more) unrealistic kinks in most countries' time series thereafter.

**Technical comments**

COM: The final column in the posted datafiles is suffixed with ';;' which is interpreted as a string in most programming languages. This should be fixed so that all values are numeric when read in by an automated process

REP: The ";;" symbols in the final column were wrongly added when finalizing the data and overlooked at the final check. The updated version of the DOI source will be corrected for this error.