

Peer Review

Review of: "Compositional Data Analysis for Modelling and Forecasting Mortality with the α -Transformation"

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Title: Compositional Data Analysis for Modelling and Forecasting Mortality with the α -Transformation

Overall:

The authors present a new transformation method for modeling and forecasting mortality. While this technique offers an alternative approach, it is not entirely novel, and the specific advantages over existing methods remain unclear. The authors should clearly outline both the benefits and limitations of this new procedure. A demonstration of the technique using real data was provided, but the selection criteria for the specific countries included are not explained. It would be beneficial to compare these results with data from all countries to better understand the broader applicability. Additionally, the impact of using specific dates for modeling is unclear; what would the results look like if a broader range of dates were considered instead?

Abstract: The abstract is well written with minor formatting modifications needed. Please check the spacing between the use of Greek letters and other words. For example, " α parameter".

Introduction:

The introduction is well written with plenty of citations of appropriate references. The discussion about the non-functional transformation methods needs improvement. It is appropriate to tell the reader why the current methods are inadequate and need extension. The last but one paragraph could be improved.

For example:

Rephrase for clarity: “it is aim to compare”: You may consider any of the following: “The aim is to compare” or “The objective is to compare.” Saying: “Using CLR transformation as a benchmark, the aim is to compare forecast accuracy between the two transformations.” May

Rephrase: “countries/regions” as “Countries and regions” could work better if both are truly being referenced in a general sense. You may say: “The analysis focuses on male and female populations across 31 European countries and regions...”

Rephrase: “from year 1983 to 2018” to: be “from 1983 to 2018.”

Need to expand on the use of “CLR transformation is being used as a benchmark,” and provide a rationale to aid understanding.

Rephrase the rationale here: “These countries/regions are selected to obtain the longest possible common timeframe.” It is a bit awkward as this sentence feels somewhat disconnected from the rest of the passage. It would be helpful to clarify why this selection is important. You could elaborate on why the timeframe is a key factor or how it affects the analysis. You may consider: “The selection of these countries and regions ensures the longest possible common timeframe for a more consistent comparison.”

Methodology:

I see that the section mainly recalls the key standard procedures that have been used. What is the innovation? Starting with CLR transformation, alpha transformation to accuracy measures:

Application to real data:

Please maintain consistency with “value for transforming dt_x for each country.” That is, if there are regions that have been used to compute this, please make sure that is clear in your description. This statement would be okay if you consider “each country or region.”

Forecasts of mortality:

The statement “Despite yielding similar forecasts, the α -transformation results in lower forecast errors as depicted in Figure 1c” requires further clarification. There is evidence suggesting that when mortality rates in the later years of the data are low, this leads to a high standard deviation, as shown in the figure.

Additionally, the assertion “Furthermore, forecasts from the α -transformed data are more accurate, especially beyond age 65, with a slight decrease in accuracy between ages 86 and 90 as shown in Figure 1d” needs justification. The authors did not provide a comparison against the actual data (the “truth”) to demonstrate what is meant by “more accurate” in this context. It is unclear how the accuracy of the forecasts is measured without such a reference.

What is responsible for this: “While the α -transformation gives higher forecast errors at the beginning”. Appropriate explanation is warranted. Similar to the above, the authors should provide what is driving the difference.

Conclusion:

It is essential for the authors to discuss the advantages of the new technique, rather than merely stating that it is similar to the established standard. A direct comparison and contrast would provide valuable insight. Additionally, the authors should appropriately acknowledge the limitations of this work to offer a balanced perspective.

Declarations

Potential competing interests: No potential competing interests to declare.