Ann-Katrin Voit[1], Imke Rhoden[2]

[1]FOM Hochschule für Oekonomie und Management
[2]Institute of Energy and Climate Research – Systems Analysis and Technology Evaluation, Forschungszentrum Jülich

ann-katrin.voit@rub.de

Introduction

A Chance in the Challenge

The coronavirus pandemic as a shock on the tourism industry has shown a significant impact on CO_2 emissions, not only measured by transportation emissions, but also for wildlife and nature in general. With less tourism due to COVID-19, positive externalities occurred. Thus, there is high need for action plans that help to develop a sustainable tourism industry to reach UN's SDGs by maintaining the economic goals of employment, sales, and revenues at the same time (Yeh, 2021).

COVID-19 reducing tourism and thus CO_2 emissions is a chance in disguise for the environment.

Data and methods

- CO_2 emissions data derived from supply and transformation of oil and petroleum products (Eurostat 2021a).
- Arrivals at tourism accommodation establishments (Eurostat 2021b)
- International tourism receipts (UNWTO 2021)

The estimation follows a spatiotemporal geoadditive setup with heteroscedastic errors for 24 months and 29 European Countries (Umlauf et al. 2018):

$$CO2 \sim N(\mu = \rho_\mu, exp(\sigma) = \rho_\sigma)$$

$$\rho_\mu = \beta_0 + f_1(arrivals) + f_2(receipts) + f_3(time) + f_4(country)$$

$$\rho_\sigma = \alpha_0 + g_1(arrivals) + g_2(receipts) + g_3(time) + g_4(country)$$

Results

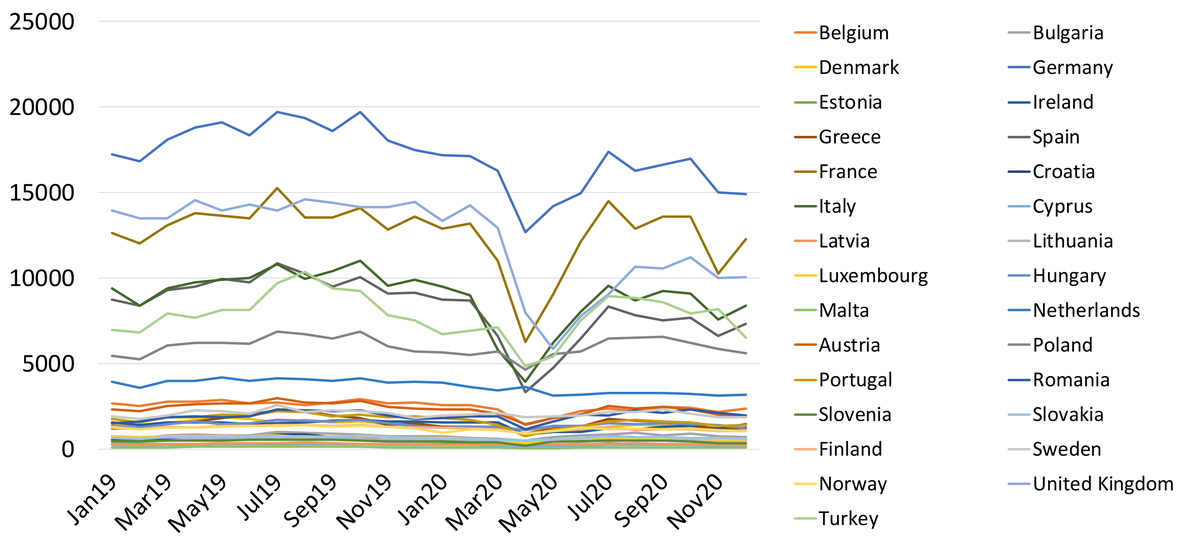

Fig.: CO_2 Emissions from Transport Fuels ($tC0_2$).

The estimation outcomes show positive effects of tourist arrivals on the amount of CO_2 emissions, which signifies that the decrease in tourism and travel activities during the COVID-19 pandemic contributed strongly to the decrease in emissions. Consequently, transport and travel options with lower CO_2 emission potentials could provide a crucial instrument for accounting for the SDGs and, not at last, climate change. Furthermore, the COVID-19 pandemic is affecting all countries similarly and at a similar point in time as they released governmental resolutions as a response to the pandemic rather similarly (as far as time and general severity are considered). The model's spatial effect also illustrates all countries are affected independent of their geographic location.

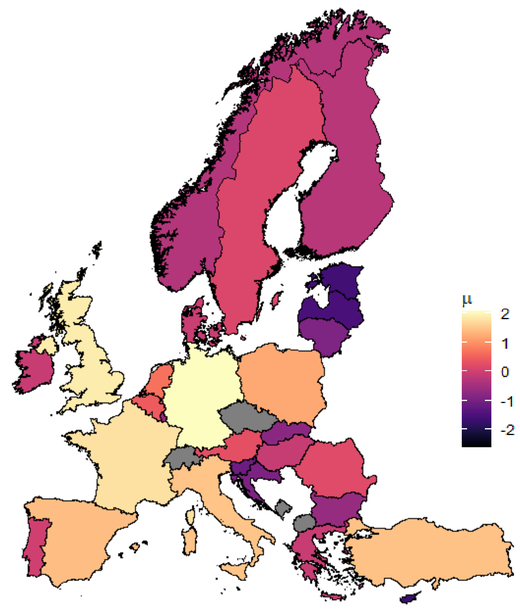

Fig.: Spatial Residuals of the Model.

Conclusions

The goal besides generating less CO_2 emissions should be a more sustainable tourism industry that will be beneficial for the present generation as well as future generations with inter-generation fairness and a stable environment. This should be addressed on a supranational level by the EU as leading institution to resiliently guide the member states into a sustainable future.

Acknowledgements

We would like to thank participants of the 'Hagen Workshop on Global Economic Studies (2021)' and Stefan Vögele for helpful comments.

References

Eurostat. (2021a). Supply and transformation of oil and petroleum products - monthly data (NRG_CB_OILM).
Eurostat. (2021b). Tourism statistics - characteristics of tourism trips (TOUR_OCC_ARM).
Umlauf, N., Klein, N. and Zeileis, A. (2018) 'BAMLSS: Bayesian Additive Models for Location, Scale, and Shape (and Beyond)', Journal of Computational and Graphical Statistics, 27(3), pp. 612–627. doi: 10.1080/10618600.2017.1407325.
UNWTO. (2021). Data on the economic contribution of Tourism. https://www.unwto.org/statistic-data-economic-contribution-of-tourism-and-beyond.
Yeh, S. (2021) Tourism recovery strategy against COVID-19 pandemic, Tourism Recreation Research, 46:2, 188-194, DOI: 10.1080/02508281.2020.1805933.