

This paper is published at Journal of Environ Dev Sustain.

DOI: 10.1007/s10668-023-03026-1

Mamkhezri, J. [Mohsen Khezri](#) (2023)

[Assessing the spillover effects of research and development and renewable energy on CO\(2\) emissions: international evidence](#)

Abstract:

The primary motivation of this paper is the lack of consensus on the impact of renewable energy (RE) and research and development (R&D) expenditure on CO(2) emissions in the literature. Current literature has mostly ignored the spillover effect of R&D on CO(2) emissions by increasing the intensity effect of technology, leading to biased results. Further, little is known about the impact of previous epidemics on CO(2) emissions. This study fills these gaps by evaluating the spillover effects of RE and R&D on CO(2) emissions in a global panel of 54 countries from 2003 to 2017. Using a two-way time- and spatial-fixed-effects panel analysis, we find both income-induced and scale effects of economic growth are present in our panel, though the scale effect is the dominant one. Our findings indicate that economic growth increases CO(2) emissions at a decreasing rate, validating the Environmental Kuznets Curve hypothesis, and that urbanization and foreign trade worsen the environment. We also find that epidemic episodes before COVID-19 had a nonsignificant impact on CO(2) emissions internationally. More importantly, our results confirm the presence of both the intensity and scale effects of R&D, with the intensity effect being the dominant one. We find overwhelming evidence that global R&D investment led to an overall (direct plus spillover) reduction of CO(2) emissions, driven by its spillover effect, through two channels: RE and economic growth. Finally, we find that RE installations assist with reducing CO(2) emissions internationally, though RE composition and state of R&D can lead to different findings. Our findings have significant policy implications for sustainable development. Our RE and R&D-spillover results support the policy recommendation of shifting to high-tech clean energy sources.

Keywords: CO2 emissions, Covid, Epidemics, Renewable energy use, Research and development

[Mohsen Khezri](#) Contact Info:

✉ m.khezri@lse.ac.uk

mohsen.khezri.eco@gmail.com

[Mohsen Khezri](#) Available at :

Google scholar: https://scholar.google.com/citations?user=KUkvx_MAAAAJ&hl=en

Scopus: <https://www.scopus.com/authid/detail.uri?authorId=57211325495>

ORCID: <https://orcid.org/0000-0002-0862-3814>

ResearchGate: <https://www.researchgate.net/profile/Mohsen-Khezri>

Web of Science: <https://www.webofscience.com/wos/author/record/HMW-1964-2023>

SSRN: https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=5163275

ZENODO: <https://zenodo.org/deposit?page=1&size=20>

Bepress : <https://works.bepress.com/mohsen-khezri/>

Figshare: https://figshare.com/authors/Mohsen_Khezri/12337319