The social costs of air travel in academia:
A case study on a German-Indonesian research project

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Introduction & Background

- Air traveling is ubiquitous in academia, especially in international research collaborations such as the CRC 990
- Pro: Important for capacity building, disseminating knowledge and tackling international challenges
- Contra: Contribution to climate change via GHG emissions
- Aim of this project: Estimation of emissions and damages caused by academic jetsetting

Outcomes of interest

- Carbon dioxide (CO₂) equivalents
- Social costs of carbon (SSC): Monetized (future) damages caused by emitting one ton of CO₂ (equivalents) today
  - Including loss in agricultural productivity, human health and the value of ecosystem services, property value etc.
  - 30€ per ton of CO₂ (Nordhaus, 2017)

Data

- Travel data from German-Indonesian research project CRC 990 funded by the GRF for 5 years (2013-2017)
- Exemplary data extract:
  - Including: all business trips paid by the CRC for staff (=70 persons) affiliated to the University of Göttingen
  - Excluding: Indonesian counterparts’ trips, domestic flights and stops
  - Distances computed via google maps
  - Trips with a linear distance > 800 km assumed to be flights
  - CO₂ equivalents of air travel: CO₂ emissions caused by kerosene x Radiative Forcing Index (RFI)
  - Kerosene consumption per passenger: 0.0306 l/km (Girardet and Spinler, 2013)
  - CO₂ emission per liter kerosene: 0.0026 t/l (Nojoumi et al., 2009)
  - RFI accounts for non-CO₂ warming effects and is assumed to be around 3 (IPCC, 2013)

Results

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Days</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.01.2014</td>
<td>15.01.2014</td>
<td>15</td>
<td>Indonesien</td>
</tr>
<tr>
<td>13.07.2014</td>
<td>17.07.2014</td>
<td>5</td>
<td>Bayreuth</td>
</tr>
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<td>...</td>
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  - Roundtrips: 442
  - Distance: 9,636,107 km ≈ 240 times around the world
  - Emissions: 2,282 t of CO₂ eq.
    - ≈ 1,141 persons’ yearly budget compatible with 2° Celsius goal
  - Social costs: 68,569 € ≈ 20% of CRC costs for air travel

Per year & capita

<table>
<thead>
<tr>
<th>Overall (2013-2017)</th>
<th>Per year &amp; capita</th>
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<tbody>
<tr>
<td>Roundtrips: 442</td>
<td>≈ 1.26</td>
</tr>
<tr>
<td>Distance: 9,636,107 km</td>
<td>27,532 km</td>
</tr>
<tr>
<td>Emissions: 2,282 t of CO₂ eq.</td>
<td>6.52 t of CO₂ eq.</td>
</tr>
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<td>Social costs: 68,569 €</td>
<td>196 €</td>
</tr>
</tbody>
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Conclusions

- Air travel in the CRC contributes to climate change and is associated with substantial social costs
- Conservative estimates, e.g. counterparts not included: travel expenses of counterparts ≈ 30% of all travel expenses
- Difficult to contrast with potential benefits
- Lowering air traveling in academia desirable to attain climate goals
- Future research shall investigate university-, country- and worldwide academic traveling

Recommendations

- Research institutes should monitor and publish their emissions (e.g. carbon tracker on homepage)
- Market-based solutions to lower emissions:
  - Paying for emissions (offsetting)
  - Implementing carbon trade scheme between chairs, CRCs or Universities
- Funding agencies should consider social costs of carbon when approving research proposals
- Simple advice: Using video conferences