

How Trade Can Mitigate Climate Change Impacts

Aarhus — Kiel Workshop

Hendrik Mahlkow

Date: 2020-12-03

IfW Kiel, hendrik.mahlkow@ifw-kiel.de

- Agricultural production is strikingly affected by climate change.
- Long-term persistent productivity changes will alter comparative advantages (Costinot, Donaldson & Smith, 2016).
- Adjusted trade flows can compensate for productivity changes.
- International trade may help in climate change adaptation.

Data: productivity change

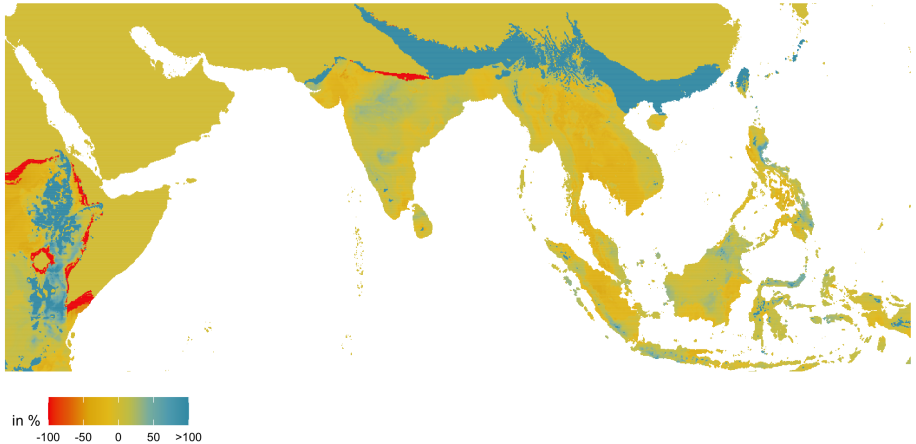


Figure 1: Projected yield changes of wetland rice. Data: FAO/IIASA GAEZ v.3, Hadley CM3 A1FI model.

Data: productivity change

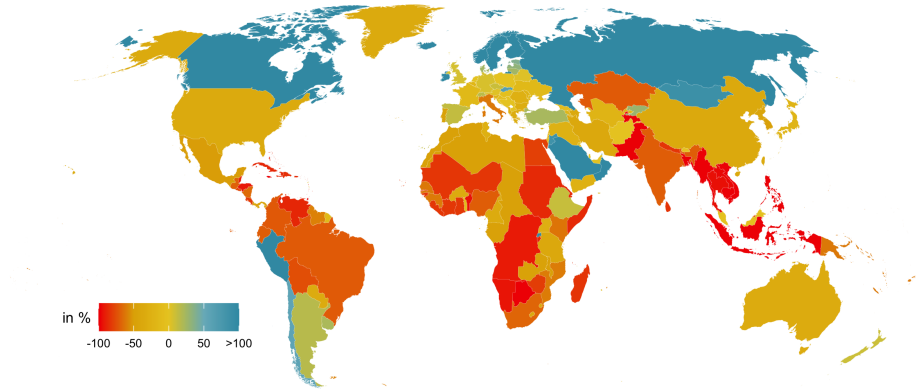


Figure 2: Productivity change of most important crop sector by country (in terms of present GDP-share).

CGE: Ricardian trade model

Eaton and Kortum (2002)-type input-output gravity model based on Caliendo and Parro (2015).

- 141 countries / regions
- 65 sectors (8 crop sectors, 11 agrifood sectors)

Implementation of productivity changes

$$q_d^j = z_d^j (A_d^j l_d^j)^{\beta_d^j} \left[\prod_{k=1}^J (m_d^{k,j})^{\gamma_d^{k,j}} \right]^{1-\beta_d^j}$$

CGE: Ricardian trade model

Eaton and Kortum (2002)-type input-output gravity model based on Caliendo and Parro (2015).

- 141 countries / regions
- 65 sectors (8 crop sectors, 11 agrifood sectors)

Implementation of productivity changes

$$q_d^j = z_d^j (A_d^j l_d^j)^{\beta_d^j} \left[\prod_{k=1}^J (m_d^{k,j})^{\gamma_d^{k,j}} \right]^{1-\beta_d^j}$$

Scenarios: different trade regimes

- Baseline: no change in trade costs
- NTB increase by 50%
- NTB decrease by 50%

Results

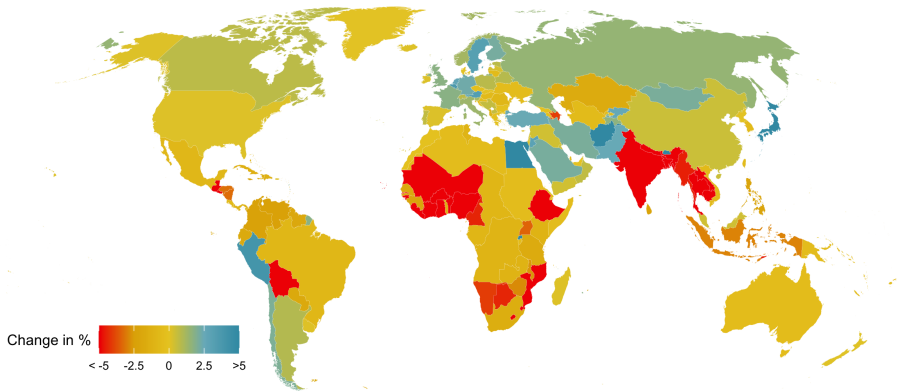


Figure 3: Welfare changes in baseline scenario.

Results: change in real production

Category	Baseline	NTB increase	NTB decrease
Services	-3.45 %	-15.49 %	71.2 %
Agri. + Food	-28.14 %	-23.36 %	-14.89 %
Manuf.	0.22 %	-0.78 %	24.44 %
Crops	-34.43 %	-32.79 %	-28.75 %
Energy	-1 %	2.37 %	21.08 %

Table 1: India

Category	Baseline	NTB increase	NTB decrease
Services	0.05 %	-7.74 %	79.66 %
Agri. + Food	0.68 %	-9.11 %	170.88 %
Manuf.	-0.05 %	-16.24 %	207.95 %
Crops	6.31 %	13.29 %	119.3 %
Energy	0.01 %	-1.8 %	95.98 %

Table 2: Germany

Conclusion

- Heterogeneity in welfare changes across countries
 - Low-income countries more negatively affected
- Trade policy important to mitigate welfare effects
- Trade changes sectoral specialization

Conclusion

- Heterogeneity in welfare changes across countries
 - Low-income countries more negatively affected
- Trade policy important to mitigate welfare effects
- Trade changes sectoral specialization

Next steps

- Additional production factor: land
- Alternative trade regimes: reduction in tariffs

Thank you for your attention!
hendrik.mahlkow@ifw-kiel.de