Coping with climate change: fair burden sharing among industrialized and developing countries

(Main supervisor: Birgit Bednar-Friedl)

Many developing countries will be affected severely by climate change and they often lack both the institutional and financial means to cope with a changed climate. Conversely, many industrialized countries are less exposed but more able to respond to a changed climate. To build up capacities in developing countries, the UNFCCC's Green Climate Fund (GCF) was initiated at COP 15 in Copenhagen. While the total amount of funds were agreed to be USD 100 bn by 2020, there is considerable disagreement on the contribution of different industrialized countries. This PhD project will investigate the problem of international burden sharing both among the "donors" as well as the recipients of GCF money and between these two groups. As countries are linked through international trade in commodities and financial assets, it is important to consider not only the direct effects of such transfers but also their indirect ones through the effects of such transfers on related markets (macroeconomic feedback effects). Further, the project will integrate insights from development economics as well as international economics, such as whether such transfers may lead to 'resource curse' or 'dutch disease' effects.

Questions like the following will be addressed: How do world regions differ in their exposure, sensitivity and adaptive capacity with respect to climate change and how do these factors change over time? What are the domestic and foreign economic consequences of technology transfer and other instruments envisioned by the Green Climate Fund? What are the distributive consequences of the CGF – which societal groups and which sectors will benefit, which will lose, and why?

In terms of methodology, the project will build on existing multi-regional multi-sectoral computable general equilibrium (CGE) analyses in climate policy analysis and integrate insights from development and international economics. The project will also extend upon ongoing collaborations with the Department of Philosophy.

Thresholds and fat tail risks in public decision making about climate change
(Main supervisor: Birgit Bednar-Friedl or Karl Steininger)

In economics, discounting of distant future damages has been regarded as one key obstacle in addressing climate change. Yet, in the more recent literature an additional problem has been identified: fat tails in probability distributions of future climate change impacts. Fat tails means that high damages due to e.g. temperature increases by +10°C or more compared to pre-industrial levels may emerge at small, but non-negligible probability. As shown by Weitzman (2009) in his dismal theorem, ignoring this characteristic of climate change damages may lead to inappropriate decisions at the very least.

Managing or reducing such climate risks necessitates better knowledge of the "true" probability distributions of climate damages. Moreover, coping with such risks requires approaches beyond the conventional approach of expected utility maximization such as a precautionary approach which focuses on insuring against such risks (Ackerman et al. 2009). In this PhD project, questions like the following will be addressed: What are relevant damage thresholds and risks in climatic, technological, economic and social systems and what do we know about their probability distributions? How can the societal decision framework be revised to better deal with these challenges? What are the advantages and disadvantages of different approaches? What can be learned from other problems, e.g. at smaller scales?

Depending on the expertise and the interest of the successful applicant, this project allows for different methodological approaches and disciplinary backgrounds. Starting from decision theory, different methodological options can be explored to improve upon the standard expected utility framework, but also related fields like real options analysis may be appropriate points of departure. In the ecology and environmental economics literature, existing work on dealing with thresholds and bifurcations may provide useful starting points.

References:

Ackerman F., S. J. DeCanio; R. B. Howarth, K. Sheeran (2009), Limitations of integrated assement models of climate change. Climatic Change 95, 297–315.

Weitzman, M.L. (2009), On modeling and interpreting the economics of catastrophic climate change. Review of Economics and Statistics 91 (1), 1-19.