ECONOMIC AND ENVIRONMENTAL IMPACTS OF RAISING REVENUES FOR CLIMATE FINANCE FROM PUBLIC SOURCES

Jan Schneider, Department of Economics, University of Oldenburg
Phone: +49 4417984886, E-mail: jan.schneider@uni-oldenburg.de

Overview

At the United Nations Climate Change Conference in Copenhagen in 2009, developed countries – as listed in Annex 2 of the United Nations Framework Convention on Climate Change (UNFCCC) – committed themselves to the goal of jointly mobilizing 100 billion US$ a year from 2020 onwards for addressing the needs of developing countries (UNFCCC 2010). Most recently – in the «Paris Agreement» at the COP 21 – the parties agreed to continue their collective mobilization goal through 2025 and set a new quantitave target from a floor of 100 billion US$ per year (United Nations 2015). The Secretary-General of the United Nations established the so-called High-level Advisory roup on Climate Change Financing in February 2010 with the mandate to identify and discuss potential sources of finance. The Advisory Group classified these sources into four categories: public sources, development bank instruments, carbon market finance, and private capital (United Nations, 2010).

In this article, we focus on the four most promising public sources for climate finance identified by the UN Advisory Group: An international price on CO_2 emissions, a wires charge on electricity consumption, a tax on international transport services, and the removal of fossil fuel subsidies. We complement the assessment of the UN Advisory Group in two ways. First, we provide a comprehensive quantification of global and regional economic costs associated with raising revenues in Annex 2 countries via the four above mentioned public sources. Second, we assess the impacts of those different climate finance options on global CO_2 emissions – acknowledging that climate finance policies still pursue the objective of curbing global CO_2 emissions in a cost-efficient manner.

Methods

To assess the economic and CO_2 emission impacts of different climate finance options we use a standard static multi-region multi-sector computable general equilibrium (CGE) model of the global economy. The particular virtue of CGE models is their rigorous microeconomic foundation in Walrasian equilibrium theory which accommodates the coherent welfare accounting of market supply and demand responses to policy shocks. A detailed algebraic model description is given in Böhringer, Rutherford, and Springmann (2015). For model parameterization we use the GTAP data set version 8.1, see Narayanan, Aguiar, and McDougall (2012). The analysis will soon be updated to the most recent GTAP version 9 (Narayanan, Aguiar, and McDougall 2015).

Results

We find that the four instruments differ markedly in their cost-effectiveness of raising climate funds. They also have very diverse implications for the cost incidence among developed and developing countries. CO_2 pricing or a tax on electricity consumption in Annex 2 countries induce significant cost on Non-Annex 2 countries through changes in international prices (the so-called terms of trade). By contrast, a tax on international transport services or the removal of fossil fuel subsidies within Annex 2 lead to welfare gains for Non-Annex 2 compared to the business-as-usual. The economic incidence of raising climate funds must be considered when it comes to a more comprehensive appraisal of alternative funding instruments.

Furthermore, the implementation of the four instruments has quite different implications for global CO_2 emission levels. Obviously, the climate effectiveness of instruments does not only depend on the change in emissions within Annex 2 countries, but also on the emission changes triggered in Non-Annex 2 countries. For example a tax on transport services within Annex 2 leads to increased fuel use in Non-Annex 2, thereby reducing the cost-effectiveness of this instrument with respect to global emission reduction. As the provision of climate funds should not overlap in a counterproductive manner with carbon abatement policies, it is important to monitor the emission impacts of alternative instruments for raising climate funds.

Conclusions

In this paper we provide an assessment of macroeconomic adjustment cost that go along with raising climate funds from four alternate public sources in Annex 2 countries: CO_2 emission prices, wires charges on electricity consumption, a tax on international transport services, and the removal of fossil fuel subsidies. We find that these four options do not only induce very different global costs to raise given amounts of revenues, but – in absence of compensating income transfers to Non-Annex 2 countries – have very diverging implications for the cost incidence between developed and developing countries: CO_2 emission prices and a tax on electricity consumption in Annex 2 countries shift significant shares of the burden to Non-Annex 2 countries, while a tax on international transport services and the removal of fossil fuel subsidies within Annex 2 even lead to welfare gains for Non-Annex 2 compared to the business-as-usual.

Since a central objective of international climate policy is the cost-effective mitigation of climate change, it is important to consider the global CO_2 emission impacts of alternative fund raising policies. While a CO_2 price is the most targeted and thus effective instrument in terms of CO_2 emission abatement, the effectiveness of the "indirect" CO_2 policy instruments of an electricity tax, transport tax and removal of fossil fuel subsidies hinges critically on the way they affect emissions in Non-Annex 2.

This paper has focused on the separate assessment of alternative public sources for raising climate funds. In policy practice, these instruments will be rather combined than used in isolation in order to provide the target climate fund revenues of 100 billion US$ from 2020 onwards. Subsequent research thus should investigate the interactions across the various climate finance instrument and identify a cost- efficient instrument mix with respect to revenue and CO_2 emission constraints.

References

Böhringer, Christoph, Thomas F Rutherford, and Marco Springmann. 2015. "Clean-Development Investments: An Incentive-Compatible CGE Modelling Framework." *Environmental and Resource Economics* 60 (4). Springer: 633–51.

Narayanan, Badri, Angel Aguiar, and Robert McDougall. 2012. "Global Trade, Assistance, and Production: The GTAP 8 Data Base." *Center for Global Trade Analysis, Purdue University*.

Narayanan, Badri G., Angel Aguiar, and Robert McDougall, eds. 2015. *Global Trade, Assistance, and Production: The GTAP 9 Data Base*. Center for Global Trade Analysis, Purdue University. https://www.gtap.agecon.purdue.edu/databases/v9/v9_doco.asp.

UNFCCC. 2010. "Report of the Conference of the Parties on Its Fifteenth Session, Held in Copenhagen from 7 to 19 December 2009, Addendum, Part Two: Action Taken by the Conference of the Parties at Its Fifteenth Session." *UNFCCC*. Bonn: UNFCCC Secretariat. doi:10.1038/news.2009.1156.

United Nations. 2015. "Adoption of the Paris Agreement" 21932 (December): 32. http://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf.