

Taxing CO2 in production and consumption in Europe: The socio-economic and environmental impact of three tax reform options

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Author: Kurt KRATENA

Co-Authors: Mark Wolfgang Sommer

Environmental tax reform and CO2 pricing policies in one world region in the form of unilateral climate policy lead to problems of price competitiveness of the manufacturers in this region and to 'carbon leakage', i.e. relocation of energy and emission intensive production to the other world regions without climate policy, thereby causing possibly higher emissions per output globally and harming domestic industry. Large part of the literature consists of CGE model simulations on this channel of carbon leakage (for example: Burniaux, Oliveira Martin, 2000, Paltsev, 2000). In order to avoid the negative impacts on price competitiveness, several studies have analysed the potential of border tax adjustments with ambiguous results as far as the welfare impact is concerned (Lockwood and Whalley, 2008 and Dong and Whalley, 2009). Recently, as an alternative to border tax adjustment, the idea of taxing the carbon footprint has been discussed (Eichner and Pethig, 2015, or McAusland and Najjar, 2015).

This paper compares the traditional environmental tax reform for CO2 emissions with two alternative taxation schemes: (i) taxing CO2 emissions embodied in consumption instead of domestic production and (ii) combining traditional environmental tax reform with border tax adjustments, based on CO2 emissions embodied in consumption. All three taxation schemes are introduced in the framework of a unilateral policy of the EU27. The embodied emissions in (ii) and (iii) are taxed independently of their origin. The CO2 tax rates applied are identical and revenues of the new CO2 tax are in both cases recycled via lower social security contributions of employers as well as of employees. The analysis is done with a DYNK (Dynamic New Keynesian) model covering 59 industries and five groups of household income for the EU27. The domestically (within the EU 27) embodied CO2 emissions are calculated by unitary shocks for each commodity in the DYNK model. The emissions embodied in imports from Non-EU 27 as well as the resulting carbon leakage from an EU 27 perspective are calculated using a simple MRIO (Multi-Regional Input-Output) model. The results show the different macroeconomic results, driven by the different impact of the taxation schemes on price competitiveness of EU 27 firms. These differences in trade effects also drive the significant differences in leakage. The three taxation schemes are also regressive for household incomes, but in a very different magnitude.