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THE STRATEGIC IMPLICATIONS OF SETTING BORDER TAX ADJUSTMENTS

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In order not to see their climate mitigation efforts be in vain by the unlimited growth in China and India, the developed world has started to consider imposing border tax adjust- ments on imports from and exports to these fast developing countries. This paper puts this problem into a game-theoretic perspective. For other literature on border tax adjustments, see [1], [3], [5], [6], [9], [10], [11], and [12]. See also [8] for results on assigning emission permits to China and India that allows them to trade on an emission permit market. It sets up the problem as a game between the developed world deciding on three regimes of border tax adjustments on the one hand, and China and India deciding on setting an emissions reduction target on the other hand. The three regimes refer to charging imports in each good into the EU according to its benchmark emission intensity, its actual emission intensity, or its average emission intensity. Additionally, we add a scenario where no border tax adjustments are levied. We assume that exported goods from the EU to the other regions are levied according to the same border tax adjustment scenario as imports. The rest of the world, mainly the underdeveloped world, is an outsider to this game. It turns out that one of the border tax adjustment regimes is optimal, namely the one that is closest to an optimal taxation rule, at which China and India choose a positive reduction target for their emissions. The chosen level of border tax adjustment is however the worst case for the environment.

The paper applies a computable general equilibrium model known as PACE (Policy Analysis based on Computable Equilibrium). We refer to [4] for details on the model. The PACE model is a multi-regional, multi-sectoral computable general equilibrium model. It partitions the world into regions, and each region into production sectors. For this paper, we take a regional aggregation into three regions, namely into the two players Annex B, and China and India, and the outsider region, the Rest of the World. The sectoral aggregation of each region consists of 23 production sectors, among others sectors for the energy goods coal, gas, oil, and electricity. The regions are the owners to three production factors, capital, labour, and land. Each region is represented by a microeconomic consumer household that spends his income from selling its production factors on a welfare maximizing bundle of the consumption goods. Each production sector is represented by a microeconomic producer household that owns a technology defining a production possibilities set from which it chooses a cost minimizing amount of input goods to produce its output good. International trade underly the usual Armington Assumption [2]. An equilibrium in this model is defined by the prices of the goods equalling marginal costs to produce the good, the activity levels of the production sectors that equal the demand for its good, and the expenditure levels that exhaust the consumer's total income. Emission reduction targets are translated into amounts of emission permits for each region. The price of emissions then result from confronting the demand for emission permits following the region's demand for fossil fuels, with these endowments. We added a border tax adjustment to all imports and exports in the Annex B region. The benefits of implementing climate change policies are represented by the

reduced damages in the economy. Following [7], we therefore add a regional damage function that relates changes in emissions to changes in regional welfare. The paper determines the permit endowments of Annex B and China and India, and the border tax adjustments.

The game between the Annex B regions on one side and China and India on the other side, with the Rest of the World as an outsider results in a Nash equilibrium where, for the Annex B imposing a Border Tax Adjustment Regime according to actual emissions on imports and exports is the dominant strategy, and where China and India choose a positive level of emission reductions. The Rest of the World as an outsider to this game loose under this particular regime. If the Annex B regions take their decisions according to what is best for the environment, here which option provides the lowest emissions, then we have an environmental equilibrium where the Annex B regions impose a Border Tax Adjustment regime on imports and exports according to benchmarked emissions, and China and India choose a slightly higher emission reduction target. The Rest of the World win under this regime. The environmental border tax adjustment regime however is inefficient and will never be chosen by the Annex B player. This implies a discrepancy between economy and environment.

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