

Rene Carmona
Princeton University

Title: Market Designs for Emission Trading Schemes

Abstract (joint work with M. Fehr, J. Hinz and A. Porchet):

Emission trading schemes are regulatory frameworks designed to reduce and control pollution levels by creating economic incentives for responsible emission sources. The present work is devoted to the mathematical analysis of the most important lesson learned from the first phase of the European experiment: the relations between carbon and electricity prices. We explain how the prices of goods and pollution permits come out of a competitive equilibrium model of the economy. We prove existence, and we characterize mathematically the price of a pollution permit in equilibrium, and we show that the prices of goods follow a classical merit order. In such an economy, pollution reduction is possible if the regulator can solve an (ill-posed) inverse problem. Using our model, we compare numerically, for a fixed emissions target, the social costs and the windfall profits for three different schemes: a plain tax, a cap-and-trade scheme as implemented by the European Union, and a new cap-and-trade scheme where pollution allowances are granted proportionally to production, and we show that the latter lowers the social costs and the windfall profits.