

# Optimal Number of Certificates to be Issued on Emission Markets

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## Abstract

The second phase of European Trading System for the Emissions Certificates, EU-ETS, is almost ending (scheduled end is December 31th, 2012) and some lessons must be learned from this experience. In this work we focus on the key control variable which is available to the authority to optimally combine economic growth and ecological targets. Such delicate variable is the number of certificates to be issued at the beginning of a new market phase. Empirical experience and theoretical results emerged during these last years, show that such number are at the heart of important immediate to long term consequences, yet not sufficient focus has been devoted to such sizing problem. The price of allowances in the EU-ETS is linked to the value of the expected penalty for the CO<sub>2</sub> produced in excess by diverse economic players. Too severe environmental policies cause a rise in the price of allowances. The compliance of such objectives can increase production costs causing inflation and loss of competitiveness.

According to recent theoretical results, in this work we assume a model for the price of allowances in the EU-ETS which is linked to the value of the expected penalty for the CO<sub>2</sub> produced in excess by diverse economic players. Too severe environmental policies cause a rise in the price of allowances. The compliance of such objectives can increase production costs causing inflation and loss of competitiveness.

A stochastic programming model is advanced where the regulatory authority trades-off economic growth with environmental targets, influencing the choices of the players by means of the number of allowances to be issued. The generation of scenarios is particularly sophisticated mixing qualitative and probabilistic methods. In particular Markov Chain bootstrapping methods are applied to simulate jointly the trajectories of gas, coal and electricity prices.