

Profit or Perish?

Estimating the economic effects of cap-and-trade

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Many countries around the world have adopted policies to limit emissions that are harmful to the environment and to human health, but these policies can also have significant effects on economic activity. When studying a range of different policy instruments, several studies have found effects close to zero (Morgenstern et al., 2002; Cole and Elliott, 2007) while others have turned up evidence of substantial negative effects on economic activity and employment (Greenstone, 2002). Cap-and-trade programs, which today regulate more than 20% of global greenhouse gas emissions (Kosoy et al., 2013), allow industry to choose the least costly way of achieving an emissions target. This flexibility is thought to mitigate the adverse economic effects associated with more traditional environmental regulations. Some have even suggested that well-designed programs of this sort could trigger innovation and improvements in efficiency, not only lowering compliance costs for regulated businesses but even leading them to acquire an absolute advantage over unregulated businesses (Porter, 1991; Porter and Linde, 1995). So do cap-and-trade programs burden businesses with new costs and cause them to become less competitive? Do they help shift companies out of a suboptimal state? Or are they perhaps irrelevant for businesses' economic performance?

In this paper we study the economic impacts of the world's largest cap-and-trade program, the European Union's Emissions Trading System (EU ETS). The EU ETS launched in 2005, and now regulates over 12,000 power stations and industrial installations in 31 countries, accounting for more than 40% of the EU's greenhouse gas emissions. The European Commission's own *ex ante* assessment predicted that the EU ETS would have no major effects on employment among regulated companies in the short term, and that, in the longer term, induced innovation would actually make them more compet-

itive (European Commission, 2001). A few recent papers have indeed found that the EU ETS has significantly increased innovation activity of regulated companies (Calel and Dechezleprêtre, forthcoming; Martin et al., 2011). As regards the program’s impact on economic performance, a handful of preliminary *ex post* assessments now provide a patchwork of evidence on a few selected countries and economic sectors (Anger and Oberndorfer, 2008; Commins et al., 2011; Zachmann et al., 2011; Chan et al., 2013; Petrick and Wagner, 2014; Jaraite and Maria, 2014). The most consistent finding across these studies is the absence of a robust relationship between the EU ETS and either economic activity or labor market outcomes.

Our objective in this paper is to provide a more complete picture of the EU ETS’s economic impacts. The EU ETS applies a number of threshold-like inclusion criteria to determine which installations are large enough to be regulated. This installation-level discontinuity does not translate straightforwardly to the firms operating these installations, though. Firms operating the installations just above a threshold can be bigger than, smaller than, or of similar size to the firms operating installations on the other side of a threshold. They can be active in the same country and sector of the economy. In fact, for a suitably constructed set of firms, these installation-level thresholds produce a treatment assignment mechanism that closely mimics a randomized experiment at the firm-level.

Starting with a comprehensive data set covering 40 million in all 31 countries now participating in the EU ETS, including 8,200 companies whose operations account for 99% of of the EU ETS,¹ we employ matching techniques to reconstitute this firm-level quasi-experiment. Using the attributable effects framework developed by Rosenbaum (2001, 2002, 2003) and generalized by Rosenbaum (2007) and Panagopoulos and Bowers (2012), we are able to estimate the EU ETS’s impact on employment in regulated firms, on their revenues, profits, and asset holdings, without imposing assumptions about either treatment effect heterogeneity or interactions between firms. We study the aggregate effect of the EU ETS, as well as its national, sectoral, and temporal distribution. Finally, we also exploit the delayed implementation of the EU ETS in 6 countries to identify any effects the EU ETS may have had on the performance of unregulated firms.

¹EU ETS installations operated by non-firm entities like hospital trusts, local councils, ministries of defense, etc., are not considered in this study.

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