

European Transport Conference 2014 – from Sept-29 to Oct-1, 2014

## Strategic reactions of airlines to the European trading scheme

Estelle Malavolti<sup>a,\*</sup> Marion Podesta<sup>b</sup>

<sup>a</sup> TSE(ENAC), 7av. ed Belin, 31055 Toulouse cedex 4, France

<sup>b</sup> Université de Savoie (IREGE), 4 chemin de Bellevue, 74000 Annecy-le-vieux, France.

---

### Abstract

The air transport sector entered the European Trading Scheme in 2012 (for the intra-European flights). The regulation of CO<sub>2</sub> emissions is costly for airlines and modifies the organization of their market. Our paper proposes an economic analysis in which the regulation but also CO<sub>2</sub> emissions of airlines are modelled. We show that, in a perfect competition setting, the difference between passengers carried without regulation and when the regulation is put in place, is negative for the best-performing planes. However, for the less efficient aircraft, the implementation of the regulation entails a reduction of airlines activity, and therefore a low level of carbon emissions.

© 2015 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Selection and peer-review under responsibility of Association for European Transport

**Keywords:** Transport; Regulation; European Trading Scheme

---

### 1. Introduction

Since the Kyoto Protocol in 1997, several governments have made significant progress toward improving air quality. In this sense, the air transport sector in Europe will be fully included in the European Union Emissions Trading Scheme (EU-ETS), in 2012. Despite the relatively low level of greenhouse gas emissions (only 3% of the total European emissions), this sector has known a rapid growth until recently: from 1990 to 2005, the EU aviation emissions increased by 87% and it is expected to double from now to 2020 (See Commission Staff working document 2006 and EU directive 2003/87/EC). On top of this, the air transport sector is also responsible for other releases like nitrogen oxides, water vapor or noise, which effects are not easy to account. Nevertheless, a regulation of these external

---

\* Corresponding author. Tel.: +33-562259609; fax+33-562174017.

E-mail address: [estelle.malavolti@enac.fr](mailto:estelle.malavolti@enac.fr)

effects is to be expected. It is thus important to evaluate which impacts a regulation may have on the market and its organization.

The environmental literature defines pollution as an externality which is not taken into account by the market. Several instruments have been put forward (taxation, subsidies, norms or allowances trading) resulting in State intervention, and the literature deeply analyzes the efficiency of these different tools (see for instance Myles, 1995 or Salanié, 2003). Our work builds on this general literature focusing on the specificities of the air transport sector to model the impact of an environmental regulation. The environment problems have raised several questions. For instance, Portney (2005) makes a review of the existing regulations and tries to evaluate what will be the regulations of the future. Among the economic tools used to regulate, the taxation is the means which has the most received attention. Barthold (1994) presents the different taxes used for environmental regulation and their efficiency to regulate emissions.

The European Commission has included the aviation sector in the EU-ETS in 2012 in relation to the airlines' carbon emissions. The aim of carbon markets is to provide incentives to reduce CO<sub>2</sub> emissions. The environmental problems have raised several questions. Scheelhaase and Grimme (2007) focus on financial impacts to include aviation in the ETS on airlines. They show that the financial impact on airlines subject to the ETS is relatively moderate. Since the regulation concerns all flights departing from and arriving at EU airports, Scheelhaase and al. (2010), under a model-based empirical estimations, analyze how the EU directive affects competition between european and non-european airlines and if competition distortions are likely to appear. They compute fuel consumption, CO<sub>2</sub> emissions and number of allowances to know the difference between allowances allocated free of charge and the total amount of them needed by the airlines (with a price assumed to 20€ per ton of CO<sub>2</sub> and two scenarios considered for emissions growth). Moreover, regarding consumers' surplus, they show that the impact on prices is relatively moderate.

On an macro-economic view, Anger (2010) shows that there is not expected to have a negative impact of the EU-ETS on economic growth in the UE or to reduce the UE's competitiveness relative to the rest of the world. However concerning the impact of EU-ETS on the carbon emissions, the results are ambiguous. Mayor and Tol (2007) find a negative impact on the carbon emissions whereas Anger (2010) concludes in a positive way. It seems difficult to have an economic model which combine the regulation of EU-ETS, the financial impact on airlines and the level of carbon emissions.

In this sense, we built an economic model which offers a precise framework of nonetheless the regulation but also of emissions of airlines. The regulation system includes two different elements: the first element concerns free allowances that will be given to airlines according to their current activity. The second element is the payment of rights to pollute on the CO<sub>2</sub> market. There is a strategic stake in the setting of the "free of charge" quotas, since their number depends on the activity of the airlines: with this system, the airlines will receive a number of rights to pollute proportional to their activity. On the other hand, the rights to pollute, i.e. the internalization of the pollution, will represent an additional cost, which will be higher, the higher the activity. As a consequence we have paid very much attention to the modelization both of the regulation and of the production of emissions. We model the emissions as a joint product of the airlines activity that comes from the use of the fuel. Models of joint production are presented for instance by Baumgartner et al. (2000, 2003). Hence a particular attention is given to the estimation of the fuel cost function, which is calibrated using real data. We chose to model the EU-ETS as an increase of the variable cost, which means that it can be similar to a tax (or a subsidy) on the airline activity, because the regulation is designed as such. A particular attention is given to the study of the use of the fuel by airlines because of its direct relationship with CO<sub>2</sub> emissions (See the IPCC report 1999 for an evaluation of the impact of aviation on global atmosphere and the EU Directive 2007/589/EC for the determination of a precise coefficient linking fuel consumption and CO<sub>2</sub> emissions). Harris (2005) makes an exhaustive analysis of the US airlines operational costs. Miyoshi and Mason (2009) focus on the evaluation of the carbon emissions of airlines. They propose an original methodology to compute these emissions. They distinguish between short, medium and long hauls and they take into account the load factor, however in our paper we model it. Therefore, we use our method to evaluate the emission, but the contribution of our paper is more on the economic modelling of the EU-ETS consequences on airlines and therefore on their strategies. Our paper is also directly related to papers such as Viera et al. (2007), in which the authors emphasized the importance of having several instruments to reach efficient result. By focusing on the current regulation and trying to describe it as close as possible from the reality, we propose a more positive view. Hofer et al. (2009) try to reach the same aim with the taxation in the US, however no economic model is presented in their paper. Finally, our model is the extension of the

Download English Version:

<https://daneshyari.com/en/article/1106487>

Download Persian Version:

<https://daneshyari.com/article/1106487>

[Daneshyari.com](https://daneshyari.com)