How Airlines Sidestep EU ETS Auctions

Andreas Schröder *
Discussant: Prof. Peter Forsyth **

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* Deutsches Institut für Wirtschaftsforschung (DIW), Mohrenstr. 58, 10115 Berlin, Germany. aschroeder@diw.de
** Monash University, Clayton Campus Room E860, Building 11 Monash University, Australia

Abstract

We examine a specific strategy of airlines aiming at minimsing their exposure to allowance auctions under the EU Emission Trading System (EU ETS). Airlines have interest in receiving allowances aplenty and free of charge. An attractive loophole is offered by a poor design element of the benchmark metric used for free allowance allocation by member states. For the entire trading period of eight years, an individual airline's allowance allocation depends on revenue-ton-kilometre (RTK) data of solely one single reporting year. Obviously, this creates massive incentives for airlines to abruptly boost RTK volumes in reporting years. How does this strategy pay off in detail? Should airlines fly with brickstones on board in reporting years? These questions are subject to investigation in this analysis. We find that taking on board one additional passenger or 100 kg cargo on a 1,000 km flight can possibly entail a marginal benefit of up to EUR 9,126 for Continental Airlines and EUR 8,562 for Lufthansa, contingent upon the airline's cost structure and the behaviour of competitors. For airlines with low EU market share, the incentive is slightly stronger than for large EU carriers. Results point to potential competition distortions. We give recommendations on how to modify the allocation mechanism.

1 Background

Numerous studies have demonstrated potential competition distortions to the air transport market arising due to the allowance allocation mechanism under the EU ETS. (Scheelhaase et al., 2009; CE Delft, 2007; Morrell, 2007; Forsyth, 2008; EC, 2006) Effects cited in these studies cover the impact on long-haul international versus short-haul domestic services, low-cost versus legacy carriers, big versus small players and (transit) traffic diversion, amongst others. Cost-pass-through rates as well as specific emission factors have been identified as main determinants of the trading scheme's impact on the airline business. Most of the relevant literature concludes that a 100 % auctioning of emission permits could dampen competition distortions. However, as the vast majority of emission permits will be issued to airlines free of charge according to a benchmark, major distortions to the competitive game are likely to arise. Different methods of allowance allocation are illustrated in *Figure 1*. The method used by the European Commission corresponds to 15 % auctioning and 85 % free allocation based on a on-off sector average benchmark. This means performance in one year is decisive for allocations in a trading period of several years.

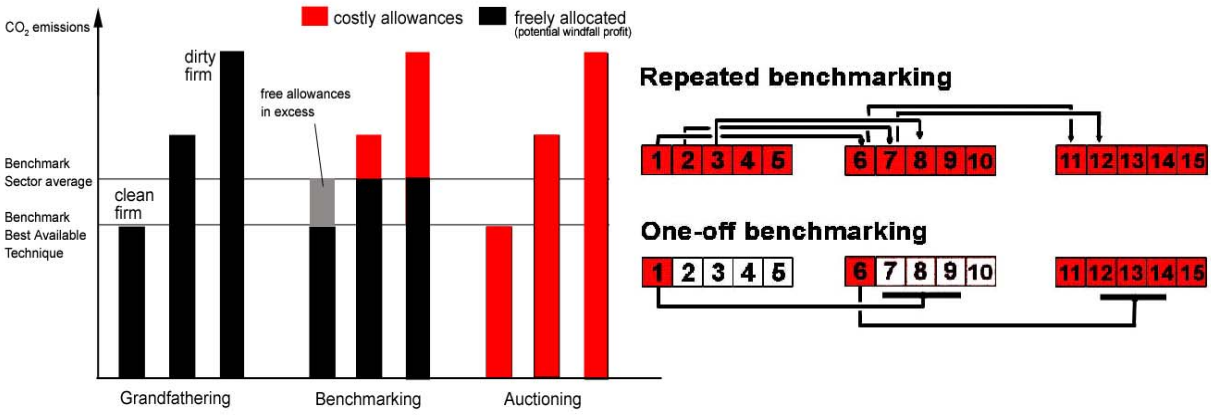

Figure 1: Methods for the allocation of allowances. Source: Own production

In principle, there are three ways to allocate emission permits among aircraft operators:

1. Grandfathering: free allocation on the basis of historic emissions;

2. Auctioning: no free allocation;

3. Benchmarking: free allocation on the basis of an indicator of output, efficiency, or fleet characteristics.

On the one hand, theory suggests that the allocation method should not affect the level of cost-pass through that airlines choose because opportunity costs are the same regardless of the type of allowance allocation. However, there is one exception: In case of repeated benchmarking, where allowances are issued according to a continuously updated benchmark, opportunity costs are not likely to be passed through to consumers. (CE Delft, 2007) If it is assumed that opportunity costs cannot be passed through in their entity, the allocation method is an important factor in determining the financial burden that could arise to airlines. Further explanations on the theory of cost-pass through and updated versus one-off benchmarking are given in CE Delft (2007).

The benchmark metric itself has received few attention in the literature[1], although being of tremendous relevance for impact assessments. This paper investigates the current benchmark in use for the free allocation of allowances under the EU ETS. It points to undesired effects on the competitive game in years relevant for emission reports of airlines.

2 Analysis

The EU ETS caps overall emissions per sector when allocating allowances in the beginning of each trading period. The overall emissions cap for the aviation sector amounts to 97 % in 2013 and subsequently 95 % of average sector emissions in the period 2004-2006. Note that the cap does not prevent airlines from buying allowances from other sectors, Emission Reduction Units and Certified Emission Reductions. 15 % of all allowances will be auctioned off and additional 3 % are assigned to a special reserve for emerging airlines. The rest is allocated free of charge according to the following systemacy:

$$A_{i,2013-2020} = \left(\sum_{i=1}^{I} A_{i,2013-2020}\right) \cdot \frac{RTK_{i,2011}}{\sum_{i=1}^{I} RTK_{i,2011}} \quad (1)$$

$RTK_{i,year}$ corresponds to the revenue-ton-kilometres flown by airline i in the reporting year and subject to the EU ETS; $\sum_{i=1}^{I} RTK_{i,year}$ designates revenue-ton-kilometres flown by all airlines in the reporting year and subject to EU ETS legislation; $A_{i,period}$ is the number of allowances airline i receives free of charge in the trading period; $\sum_{i=1}^{I} A_{i,year}$ is the amount of free allowances

[1] A short discussion can be found in Fischer (2009).

available to the aviation sector. This last figure is an absolute number which was supposed to be released by the European Commission by August 2009. Disclosure has been delayed hitherto. We therefore retrieve estimations outlined in Scheelhaase et al. (2009).

The benchmark obviously incentivises airlines to boost RTK volumes and thereby increase their market share in reporting years. Although this incentive has eventually no impact on overall emissions of the aviation sector, which are capped, it is likely to affect the competitive game. *Table 1* approximates the effect. It specifies additional allowances that airline *i* receives in the trading period 2013-2020 when adding an additional RTK in the reporting year 2011. Ceteris paribus, one additional passenger or 100 kg cargo on a 1,000 km trip in the reporting year yield free additional allowances with present value of up to a maximum EUR 8,640 for Lufthansa or EUR 9,180 for Continental during the ensuing 8-year-long trading period. The additional allowances can be sold at the market price of allowances. If the allowance price turns out to exceed the assumed 20 EUR (2011 present value cf. *Figure 2*), possible benefits could be further amplified. After substracting costs of volume expansion, marginal benefits of up to EUR 8,562 (Lufthansa) and EUR 9,126 (Continental) respectively remain within the bounds of possibility.

				Scenario: Airline i adds 100,000 RTK in reporting year, all other airlines ceteris paribus			
	Million RTK 2011*	Market share 2011*	$A_{i,2013\text{-}2020}$ *	Additional $A_{i,2013\text{-}2020}$	Maximum revenue in EUR**	Add. cost in EUR "	Max. add. benefit
Lufthansa	18,866	7.85 %	88,537,976	432	8,640	78	8,562
Continental'	5,129	2.14 %	24,070,353	459	9,180	54	9,126
Market	240,205	100 %	1,127,280,000				

Table 1: Benefit of strategic action. Source: * Based on Scheelhaase et al. (2010) ** EUA market price of 20.- (Present Value, discount factor zero) assumed. ' A merger of Continental and United is disregarded in this analysis. " Cost of Available Seat Mile (CASM) data from Gillen (2010), Continental (2010).

Approximations for emission performance of two exemplary airlines, namely Lufthansa and Continental, are based on Scheelhaase et al. (2010). Figures for the entire market rely on Scheelhaase et al. (2009). Adding one passenger is assumed to cost 16.1 UScents/mile for Lufthansa and 11.1 UScents/mile for Continental (Gillen, 2010; Contintental, 2010). The analysis assumes that the respective airline is alone in the market to embrace strategic action. Otherwise, if all airlines adopt strategic action, $\sum_{i=1}^{I} RTK_{i,year}$ increase and marginal benefits would vanish.

Interestingly, the incentive to boost RTK volumes decreases with the market share of airline *i*, meaning that airlines with low EU market share have strong incentives to raise their share during reporting years. This effect is dampened by the number of competitors embracing such strategy. If all airlines behaved the same way, market shares of individual airlines would not be modified. This means no additional free allowances could be obtained. Moreover, adding RTK in years else than the reporting year does not yield additional allowances. In the presence of perfect competition, where individual market shares of atomistic agents approach zero, the described effect is strong. In a monopolistic setting, where one single firm dominates the entire market, the distortious effect is close to absent.

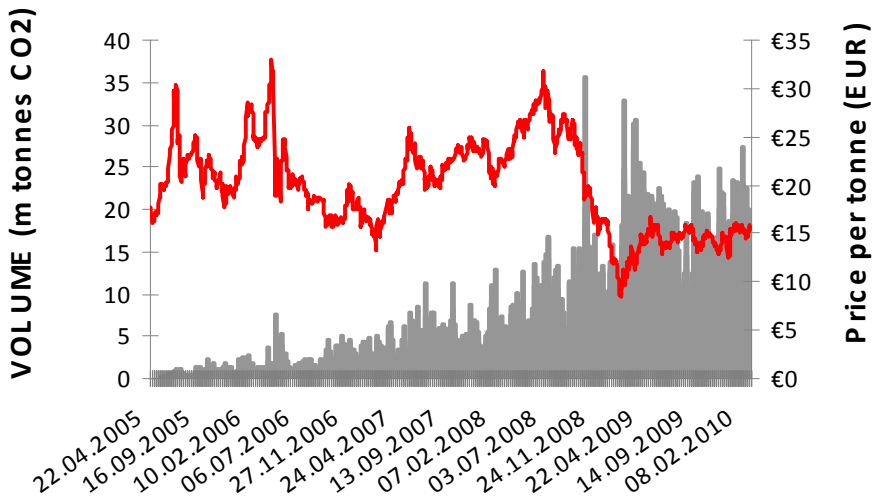

Figure 2: Market price of CO_2 allowances (red) and trade volume (grey) 2005-2010. Source: European Climate Exchange (2010)

Results point to strong skewed incentives for airlines to decrease prices and to increase load factors in the reporting years, notably for airlines with low EU market share. Doing so represents an effective path for airlines to sidestep costly EU ETS auctions. Potential distortions to competition may result. Some airlines may find it easier to behave strategically in reporting years than others. Additional passengers or cargo can be more easily absorbed by airlines with relatively low load factors, i.e. pure cargo carriers and legacy carriers in passenger traffic. Passenger airlines, notably low-cost carriers with their high capacity utilisation rates have less potential of acting strategically. Moreover, non-EU carriers with naturally low EU market share have slightly more scope to reap the benefits of strategic action compared to EU carriers, resulting in potential competition distortions to the advantage of non-EU airlines.

3 Transferability of results

Region	**USA**	**EU**	**New Zealand**
Name	Waxman-Markey bill Kerry-Lieberman bill	EU ETS	NZ ETS
Starting date	Not clear.	1 January 2012	Transition phase July 2010 to December 2012.
Trading period	Not clear.	8 years (2013-2020) in Phase III.	Commitment period of Kyoto Protocol.
Coverage	No direct coverage of aviation sector but through coverage of jet fuel dealers. International flights excempted through provision of "compensatory allowances".	Domestic and international coverage. All departs from EU airports subject to EU ETS. Arrivals at European airports covered in the absence of climate action by state of origin.	Covers purchasers of more than 10 million liters of jet fuel (for now only Air New Zealand). International traffic excluded.

Allocation	ca. 20 % of allowances auctioned, increasing to about 70 % by 2030.	82 % of reference year freely allocated.	100 % auctioning.
Benchmark	Not clear.	One-off sector-average benchmark.	No benchmark.

Table 2: Selected cap-and-trade schemes relevant for the air transport sector. Source: Compiled from NZME (2007), Council of the EU (2008), Windram (2009).

The problemacy investigated in this paper does not generalise to trading schemes for aviation around the world. *Table 2* gives an overview on selected national cap-and-trade schemes relevant for the air transport sector. The United States are on their way to realising a comprehensive cap-and-trade scheme which indirectly impacts the aviation sector. The analysis in this paper does not transfer to the US cap-and-trade system mainly because the US system does not directly involve airlines but petrolium dealers. Moreover, international flights are likely to be excluded from the scheme, similarly to the cap-and-trade scheme in place in New Zealand. This implies that competitive distortions between domestic and international services are dampened. The New Zealand Emission Trading System entails a full auctioning of allowances. Under such allocation regime, the distortious effects described in this paper are irrelevant.

4 Recommendations

It could be profitable for airlines to price below marginal cost so as to obtain additional allowances. This strategy is profitable up to the point where short-term revenue cuts are compensated by subsequent gains in emission permits. What should one recommend to airlines for them to fully exploit the described potential without affecting profitability? Suitable options are manifold and include price discrimination through blind booking, last minute booking and lotteries, where passengers and cargo are allocated to flights with free capacity on very short notice. The airline can replenish cargo capacity with unbound, random payload and declare this as regular freight service at the very last minute prior to gate closing so as to increase RTK at low cost.

In our view, performance of airlines in the reporting year is weighted too heavy as opposed to subsequent years, creating skewed incentives and inducing manipulative strategies. Airlines with poor performance in reporting years forego ample benefits and they are locked into their default for several years. In contrast to the designated 'one-off benchmark', a so-called 'repeated benchmark' (cf. *Figure 1*) could constitute a remedy. Such mechanism for allowance allocation takes account of continuous airline performance averaged over a range of reporting years. Moreover, it entails the advantage of potentially lowering the cost passed through to end consumers, and thereby possibly trimming down windfall profits. (CE Delft, 2007, p. 9 ff.) A drawback of an updated benchmark, though, is the fact that it shortens the planning horizon of airlines. Another alternative is to choose a fixed historic emission level per airline and apply individual growth rates. (Fischer, 2009) We also recommend modifying the benchmark for free allowance allocation so as to distinguish between types of services, e.g. passenger vs. cargo or international vs. domestic flights. Such benchmark could succeed in minimising competitive distortions arising between different airline segments. The European Commission, confronted with reviewing the benchmark allocation in 2012 right after the first trading period, is invited to reflect on these propositions. Nicely, following our recommendations does not imply significant administrative efforts, since airlines need to record and report their emissions any year anyway.

Data necessary for differentiation of allowance allocation is already available to member states.

5 Conclusion

We have spotlighted warped incentives for airlines during reporting years under the designated EU ETS allowance allocation mechanism, resulting in potential disturbances to the competitive game. As a remedy, we recommend introducing a continuously updated and further differentiated benchmark averaged over a series of reporting years. Such dynamic benchmark could contribute to minimising both, possible windfall profits and strategic behaviour.

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