

‘Noise wars’: The EU’s ‘Hushkit Regulation’ Environmental Protection or ‘Eco’-protectionism?

Andreas Knorr and Andreas Arndt

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Abstract

On May 4, 2000, the EU enacted the so-called 'hushkit regulation' with the stated aim of reducing aircraft noise levels by significantly curbing the use of hushkitted (i.e. muffled) or re-engined older-generation jet aeroplanes at Community airports. The USA, however, home of both the entire hushkit industry and the vast majority of the operators and owners of the potentially affected aircraft, immediately demanded the regulation's repeal, denouncing its purely protectionist intent and effects and threatening the EU with retaliatory action. After a lengthy political and legal controversy the EU, in October 2001, gave in and withdrew the legislation. In this paper we evaluate the late 'hushkit regulation' from three different perspectives – environmental policy, trade policy and rent-seeking potential – to determine its respective merits and demerits.

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'Noise wars': The EU's 'Hushkit Regulation' – Environmental Protection or 'Eco'-protectionism?

Andreas Knorr and Andreas Arndt*

Introduction

On May 04, 2000, the European Union's (in the following: EU) Council Regulation 925/1999 – the so-called 'hushkit regulation' – took effect.¹ Drafted, according to the EU, with the sole motivation to prevent, "as a protective measure ... a deterioration of the noise situation around Community airports as well as improving the situation regarding fuel burn and gaseous emissions",² this objective was to be achieved by effectively barring (ICAO³-)Chapter 3-compliant hushkitted aircraft both from getting registered in the EU and from serving EU airports. The US government, however, siding with the US-based aerospace industry, in particular with the local hushkit and engine manufacturers, immediately denounced the regulation as ecologically ineffective and purely protectionist, and demanded its repeal. After a lengthy legal and political dispute, the EU finally gave in and withdrew the 'hushkit regulation' in October 2001. In March 2002 it was replaced with a new EU Directive⁴ (allegedly) set up exactly along the lines of the ICAO's 2001 'balanced approach'⁵ to noise management.

In this paper we will examine the economics behind the controversial 'hushkit regulation'. It is organized as follows: As any environmental externality, including aircraft noise, should, for maximum ecological and economic efficiency, be internalised at its very source using the most efficient and cost-effective policy instrument available, we will first discuss against this backdrop the pros and cons of uniform noise emission standards in the aviation context. This section includes, first, a comparison of alternative policy instruments (emission standards, pollution taxes etc.), followed by a ranking of their respective usefulness for noise abatement at airports and, second, an appraisal of the 'right' level of federalism in the field of noise abatement. We then address the EU 'hushkit regulation', which will be evaluated accordingly. In addition, the paper will assess the regulation's inherent potential for protectionist abuse and for welfare-

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¹ To be legally precise, the exact date of the regulation's entry into effect was May 08, 2000, for a corrigendum was added to the regulation and published in the Official Journal. A mere technicality, it was, however, irrelevant to the economic and political issues at stake and discussed here. See *Official Journal of the European Communities*, L 120, 05/08/1999: 46.

² See *Official Journal of the European Communities*, L 115, 05/04/1999: 1.

³ ICAO = International Civil Aviation Organization. For its functions see also footnote 14.

⁴ See *Official Journal of the European Communities*, L 85, 03/28/2002: 40f.

⁵ See ICAO (2001).

destroying rent-seeking strategies by identifying actual and potential winners and losers. A brief outlook will wrap up the paper.

A Chronology of Events

On March 09, 1998, the Commission of the EU submitted to the Council a “Proposal for a Council Directive on the registration and use within the Community of certain types of civil subsonic jet aeroplanes which have been modified and recertified as meeting the standards of Volume I, Part II, Chapter 3 of Annex 16 of the Convention on International Civil Aviation, third edition (July 1993).”⁶ After successfully suggesting in its first reading of the matter, on September 16, 1998,⁷ that the Council transform the original proposal for a directive into a regulation,⁸ the European Parliament, on February 10, 1999⁹ finally adopted the legislation in its second reading; the Parliament also urged the Council to pass the act “definitively as soon as possible.”¹⁰

On April 29, 1999, the ‘hushkit regulation’ was indeed adopted by the Council. However, in the wake of House Resolution H.R. 661, passed by the US Congress on March 3, 1999, which proposed to retaliate by suspending landing rights for (only Chapter 2-compliant) Concorde in the USA,¹¹ the EU Council decided to delay by one year its entry into force, to prove its intention to settle the hushkit dispute with the US in the meantime. Although several other US resolutions were introduced and (mostly) adopted,¹² no progress was made. For this reason, on November 25, 1999, Omega Air Ltd, a Dublin-based company (with some US-subsidiaries in the hushkit industry) in the business of installing these mufflers on old Boeing 707 aircraft, filed a complaint against the ‘hushkit regulation’ with the High Court of Justice of England and Wales (a little later a second complaint was filed with the High Court of Ireland) to stop its enactment. In its challenge Omega stated five reasons why, in its view, then pending Council Regulation 925/1999 would infringe upon EU law as well as upon international trade and aviation law:

- The EU had not heeded its legal obligation to adequately state reasons for the necessity of the regulation;
- the proposed remedy – the ban of hushkitted aircraft and a minimum by-pass ratio for re-engined aircraft – would be out of proportion (and not conducive) to the regulation’s primary objective of reducing overall noise levels;

⁶ See *Official Journal of the European Communities*, C 118, 07/17/1998: 20f.

⁷ See *Official Journal of the European Communities*, C 313, 10/12/1998: 93f.

⁸ A directive only defines the EU’s objectives in the affected field, while leaving it to the discretion of the member-states by what means they intend to achieve them. By contrast, a regulation precisely defines both the objectives and the policy instruments the member-states have to apply.

⁹ The minutes of this session are available at <http://www3.europarl.eu.int/omk/omnsapir.so/pv1?PRG=CALEND&APP=PV1&LANGUE=EN&TPV=DEF&FILE=990210> (as of July 15, 2002).

¹⁰ *Ibid.*

¹¹ See <http://thomas.loc.gov/cgi-bin/bdquery/z?d106:HE00086:@@L&summ2=m&> for the full text of the resolution (as of July 15, 2002).

¹² For details see *Fischer* (2000).

- the regulation would violate the pertinent WTO rules on technical barriers to trade by relying upon technology/design standards instead of a performance standard;
- the regulation would discriminate against US manufacturers of engines and hushkits while unfairly favoring their European competitors; and
- the regulation would be in clear violation of the 1944 Chicago Convention.^{13, 14}

Both national courts found that key elements of the regulation might indeed be incompatible with EU law and pertinent ICAO rules; consequently, on December 21, 1999 and March 21, 2000, the complaints were referred to the European Court of Justice (ECJ) for a preliminary ruling on the validity of Article 2(2)¹⁵ of the ‘hushkit regulation’ with respect to Community law.

On March 14, 2000, the US government, after further rounds of intense negotiations with the EU and a history of almost three years of, from the US point of view, fruitless bilateral talks, decided to bring the case, under the rarely used Chicago Convention Article 84 provisions, before the ICAO Council for final settlement. It argued that

- the noise standards adopted by the EU would, if implemented, be in clear breach of its ICAO obligations;
- the hushkit regulation would discriminate against non-EU-registered aircraft and their operators; and, hence, that it
- would have a “disparate impact on US interests.”¹⁶

In June 2001, the ICAO Council, after years of controversy, finally adopted the Annex 16, Vol. I, Chapter 4 noise standards. They will become effective as of January 01, 2006, and will apply to all newly certificated and to all those Chapter 3 aeroplanes for which recertification to this new standard is requested.¹⁷ The EU had been widely perceived to have been more adamant that these tighter rules should be passed than the USA; some observers even conclude (without, however, being able to prove their case) that the EU’s ploy was to use its ‘hushkit regulation’ as a mere bargaining chip to prod the reluctant US government into eventually accepting Chapter 4.¹⁸ What is more, during its meeting from September 25-October 05, 2001, the 33rd ICAO Assembly agreed on the so-called ‘balanced approach’ to become its future approach to noise management. It comprises four principal elements – reduction measures at source (= air-

¹³ A good survey on the background of the complaint is given by *Michaels* (2000).

¹⁴ Even before the Second World War was over, fifty two states met in Chicago in 1944 to sign the ‘Convention on International Civil Aviation’ known subsequently as the Chicago Convention. It provided the regulatory and safety framework for the development of international air transport. The Convention also set up an intergovernmental agency, the International Civil Aviation Organisation (ICAO), based in Montréal, Canada, to provide the basis for the worldwide co-ordination of technical and operational standards and practices for key aviation issues. For further details see *Doganis* (1986: 25f).

¹⁵ See below at III.3.a.

¹⁶ *United States Department of State* (2000a: 17).

¹⁷ See *ICAO* (2002).

¹⁸ This view is held, amongst others, by *Fischer* (2000).

craft), land-use planning, noise abatement operational procedures and, as the last resort, (local) operating restrictions – and offers member-states a great deal more flexibility in the definition and enforcement of their national and local noise abatement policies than the traditional ICAO framework it will replace.

Immediately before the latter event, on September 20, 2001, Advocate General Alber at the ECJ had delivered his opinion in the Omega case. He considered Article 2(2)¹⁹ of the ‘hushkit regulation’ to be incompatible with EU law and hence invalid, arguing that the use of a design standard (the by-pass ratio) instead of specific noise limit amounted to a “manifest error of assessment” on the part of the EU’s legislative bodies with respect to their evaluation of the necessity of the regulation.²⁰ Since the Court, in its final judgments, sides with the Advocate General’s opinions in almost ninety per cent of the cases referred to it, the latter’s assessment significantly increased the pressure on the EU to back down (ironically, the Court, in its final ruling, delivered on March 12, 2002, exceptionally chose not to follow the Advocate General’s recommendation this time. Instead it held that the controversial Article 2(2) of the regulation was perfectly compatible with EU law!²¹ The ECJ’s decision, however, arrived much too late to have any tangible effect on the final political outcome of the ‘hushkit war’).

Facing the risk of an embarrassing defeat before the ECJ, the EU Council, at its 2374th meeting (October 15-16, 2001), decided to officially welcome the Montréal outcome, noting “that the resolution on environmental questions adopted by the ICAO Assembly opens up a prospect of replacing the “hushkits” Regulation in the near future.”²² By adding that “[w]ith this in view, the Council notes the intention of the Commission, to submit, as soon as possible, a proposal which, whilst complying with the new international provisions, will enable a framework to be established for the operational restrictions at the Community level, taking full advantage of the flexibility offered by the ICAO...”,²³ this face-saving wording effectively meant the suspension of the ‘hushkit regulation’ with immediate effect. Last not least the Council pledged “to give all the necessary priority to this proposal so that it can be adopted before April 2002”.²⁴ This deadline was met with the Council’s decision, taken during its 2420th meeting on March 25-26, 2002,²⁵ to adopt the new Directive 30/2002 “on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Community airports”,²⁶ the legally required consent by the European Parliament was

¹⁹ See below at III.3.a.

²⁰ The Advocate General’s Opinion on the Omega case (reference number: C 27/00) is available at <http://www.curia.eu.int/jurisp/cgi-bin/form.pl?lang=en&Submit=Submit&docrequire=alldocs&numaff=C%2C+27&datefs=&datefe=&nomusuel=&domaine=&mots=&resmax=100> (as of July 15, 2002).

²¹ For the ECJ’s final judgment see *ibid.* (as of July 15, 2001).

²² The minutes of this Council’s session are available at <http://ue.eu.int/newsroom/LoadDoc.asp?MAX=1&BID=87&DID=68525&LANG=1> (as of July 15, 2001).

²³ *Ibid.*

²⁴ *Ibid.*

²⁵ The Council’s decision can be found at <http://ue.eu.int/pressData/en/trans/70046.pdf> (as of July 15, 2001).

²⁶ See *Official Journal of the European Communities*, L 85, 03/28/2002: 40.

secured at its sitting on March 13, 2002.²⁷ A complementary directive “on the establishment of a Community framework for noise classification of civil subsonic aircraft for the purposes of calculating noise charges” is still going through the drafting process.²⁸

The 1999 ‘Hushkit Regulation’ at a Glance

Objective

The policy objective of Regulation 925/1999 was “to lay down rules to prevent deteriorations in the overall noise impact in the Community of recertificated civil subsonic jet aeroplanes while at the same time limiting other environmental damage” (Article 1). It was based upon two assumptions, elaborated at some length in the regulation’s reasons section:

- First, that the noise performance of hushkitted – as opposed to some re-engined – Chapter 2-aircraft is per se significantly worse than that of the more modern aircraft originally certificated to meet Chapter 3-standards;²⁹ and
- second, that “such modifications tend to worsen the gaseous emissions performance and fuel burn of earlier technology aero engines”.³⁰

Key Provisions

Essential Definitions

In Article 2(2), the recertificated civil subsonic jet aeroplanes targeted by the regulation are defined as any civil subsonic jet aeroplane “initially certificated to Chapter 2 or equivalent standards, or initially not noise-certificated which has been modified to meet Chapter 3 standards either directly through technical measures or indirectly through operational restrictions.” The scope of this so-called non-addition rule also includes aircraft which had originally been “dual-certificated to the standards of Chapter 3 by means of weight restrictions.” It is also important in this context to note that the ‘hush-kit regulation’ would have also applied to all those civil subsonic jet aeroplanes which “have been modified to meet Chapter 3 standards by being completely re-engined with engines having a by-pass ratio” below 3:1.

The term “operational restrictions” refers to both weight restrictions and “operational limitations within the control of the pilot or the operator, such as reduced flap setting” (Article 2(4)).

²⁷ The minutes are available at <http://www3.europarl.eu.int/omk/omnsapir.so/pv1?PRG=CALEND&APP=PV1&LANGUE=EN&TPV=DEF&FILE=020313> (as of July 15, 2002).

²⁸ For the Commission’s current draft version see *Official Journal of the European Communities*, C 103E, 04/30/2002: 221.

²⁹ See *Official Journal of the European Communities*, L 115, 05/04/1999: 1 at (5).

³⁰ *Ibid.*

Sanctions for Non-Compliance

First, all non-complying aircraft were barred from getting registered in any EU member-state after April 01, 1999 (Article 3(1)); given the aforementioned delay regarding the entry into force of Regulation 925/1999, this deadline was in effect extended until May 04, 2000. However, an grandfather-style exemption was granted to all those affected aircraft which were already on any member-state's register as of April 1, 1999, provided that they "have been registered in the Community ever since (Article 3(2)).

Second, as of April 1, 2002, all recertificated civil subsonic jet aeroplanes as defined by the regulation and registered in third (i.e. non-EU-) countries would have been banned from operating at Community airfields. Only those (third-country) operators who were able to prove that their recertificated aircraft "were on the register of that third country on 1 April 1999 and prior to that date have been operated, between 1 April 1995 and 1 April 1999, into the territory of the Community" would have benefited from another set of grandfather rights (Article 3(3)).

Third, recertificated aircraft already on any member-state's register were also grandfathered provided they had been operated on Community territory before April 01, 1999 (Article 3(4)). Otherwise, the general ban, effective April 01, 2002, would have applied to them, too.

Exemptions

Aside from the aforementioned grandfather rules, member states were permitted to grant

- temporary exemptions for operations of recertificated aircraft of an "exceptional nature" such as emergencies; member-states were allowed to subject these special permits to additional restrictions as for "certain airports and/or certain specified periods of the day" (Article 4(1));
- exemptions of unlimited duration for recertificated aircraft operating exclusively outside EU territory (Article 4(2)); and
- exemptions for all those recertificated aircraft "leased to an operator which for that reason have been temporarily removed from the register of the Member State in which they were registered during the 6 month before 1 April 1999, provided that legal and economic ownership of the aircraft remains in the Member State" (Article 4(3)).

Finally, Regulation 925/1999 was in no part applicable in any of the EU's Overseas departments as defined in Article 299(2)³¹ of the Treaty Establishing the European Community, i.e. in the French overseas departments, the Azores, Madeira, and the Canary Islands.

³¹ Article 227(2) of the Maastricht Version of the Treaty Establishing the European Community which is still referred to in Regulation 925/1999 was replaced by Article 299(2) after the former was amended by the Treaty of Amsterdam.

Economic Analysis

Excursus: The US-EU Hushkit Controversy – Both Sides of the Story³²

The US Position

The US critique of Regulation 925/1999 was based on a mix of political, economic and legal issues.³³ First, it was argued, that the EU's 'maverick' approach would undermine the ICAO's internationally recognized role as the "sole generally accepted entity to develop global environmental standards on a multilateral basis".³⁴ This traditional approach to noise management was considered vital by the US for an economically viable global aviation industry as it was deemed indispensable by the US to prevent a transaction and compliance cost-enhancing fragmented regulatory environment.³⁵ It was also pointed out that the EU had been in breach Article 33 of the Chicago Convention which demands every member-state to acknowledge all airworthiness certificates issued by any other member-state (as long as all current ICAO standards are met by that country).³⁶

Second, the US contended that the 'hushkit regulation' was "inconsistent with the spirit and the letter of the Chicago Convention"³⁷ for being discriminatory against other ICAO member-states, and the US in particular, and for being in violation of the general requirement, laid down in the Chicago Convention and its Annexes, to adopt performance-based standards only. More specifically, the US argued that, while the affected 'hushkitted' and re-engined aircraft were in full compliance with current Chapter 3 standards,³⁸ – a fact also acknowledged by the European Parliament in its report on the (then) proposed regulation³⁹ – the 'hushkit regulation' would arbitrarily, illegally and unjustifiably discriminate recertificated aeroplanes against more modern aircraft that were originally certificated to meet Chapter 3.

Third, the US stated that the EU's regulation was "focused more on targeting US interests than on reducing noise",⁴⁰ citing as proof the European Parliament's assessment that "it is to be feared that after December 1999 hushkitted Chapter 2 aeroplanes will be

³² For a good survey of the controversy see *Jasper/Moxon* (2000).

³³ The key issues are discussed by *Norris* (2000).

³⁴ See Statement of John W. Douglass, President, & CEO Aerospace Industries Association of America, Inc., Before the Committee on Transportation & Infrastructure, Subcommittee on Aviation, U.S. House of Representatives, September 9, 1999, Washington DC (http://www.aia-aerospace.org/aianews/speeches/1999/tst_jwd9_9_99.html) (as of July 15, 2002).

³⁵ *Ibid.*

³⁶ *United States Congress. Committee on Transportation and Infrastructure. Subcommittee on Aviation* (1999).

³⁷ *United States Department of State* (2000b: 3).

³⁸ *Ibid.*

³⁹ In its July 21, 1998 report on the proposed 'hushkit regulation' the European Parliament admits that hushkitted aeroplanes do indeed satisfy Chapter 3 standards – albeit "only just" –, but astonishingly and without any further explanation or proof, draws the conclusion that they "are not therefore really comparable with 'proper' Chapter 3 aeroplanes." See *European Parliament. Committee on the Environment, Public Health and Consumer Protection (Rapporteur: Mr José Valverde López)* (1998: 7).

⁴⁰ *Ibid.*

transferred from the USA to the European Community's aeroplane registers. It is the danger of this that should be precluded with the directive/regulation here under discussion."⁴¹ Moreover, US representatives have repeatedly argued that only US-based hush-kit, engine and aircraft manufacturers would be affected, whereas the by-pass ratio mandated by Regulation 925/1999 of greater than 3:1 was custom-tailored so as to allow only competing European engine manufacturers to (just narrowly) meet it,⁴² thereby putting their US competitors at a significant disadvantage on the attractive re-engining market. Even worse, the US side argued, that, scientifically speaking, no direct correlation could be established between an engine's by-pass ratio and the aircraft's noise level.⁴³

Finally, the US complained about the distortions caused on the resale market, claiming that the regulation's effect here would be to favor owners of EU-registered recertificated aircraft over US (and other third country) owners (which operated, at that time a total fleet of some 1,850 aeroplanes already recertificated or eligible for Chapter 3-modification and, hence, recertification).⁴⁴ Even EU-based airlines would be punished by being no longer in the position to purchase the targeted aircraft from non-EU-suppliers.⁴⁵ They would, however, have been permitted to hushkit or re-engine, or to operate at Community airports hushkitted or re-engined aircraft even after the cut-off date fixed for third country operators – provided these aircraft had been registered and operated in any EU member-state according to the far more generous provisions of Article 3(4). By contrast, US-based airlines, in particular integrators like Fedex, DHL or UPS with important and growing intra-Community networks, would not have been able to redeploy recertificated aircraft from their US operations into the Community any more.

In sum, the total cost to US companies in terms of revenues foregone was estimated by the US government at around US-\$ 1-2 billion for current operators of recertificated aircraft plus another US-\$ 1 billion for hushkit and engine manufacturers (in terms of lost sales for hushkits, engines, and spare parts).⁴⁶

⁴¹ Ibid.: 8. – After December 31, 1999 – more than two years before the global deadline set by ICAO (i.e. April 01, 2002) and also heeded by the EU –, the US had banned all civil subsonic Chapter 2-certificated from the US airspace. See *Boeing* (2000).

⁴² A corresponding graph, which clearly demonstrates that some hushkitted aircraft are in fact less noisy than some older unmodified, yet formally Chapter 3-compliant types can be found on the internet as part of a hushkit dossier prepared and maintained by the *United States Mission to the European Union. Public Affairs Office* (2002), Brussels (<http://www.useu.be/GIF's/noisebpr.gif>) (as of July 15, 2002).

⁴³ See *ibid.*

⁴⁴ See the Prepared Statement of Ambassador David L. Aaron on Behalf of the U.S. Department of Commerce, U.S. Department of State, Federal Aviation Administration Before the U.S. House of Representatives. Committee of Transportation and Infrastructure. Subcommittee on Aviation (1999), September 9 (<http://www.house.gov/transportation/aviation/09-09-99/aaron.html>) (as of July 15, 2002).

⁴⁵ See *United States Congress. Committee on Transportation and Infrastructure. Subcommittee on Aviation* (1999).

⁴⁶ See *ibid.*

The EU's Position⁴⁷

As stated above, a crucial point made by the EU was the fear that, without the defensive measures adopted through Regulation 925/1999, given the US's early phase-out of Chapter 2-aircraft, their US-based owners and operators would try and redeploy these aircraft for operations inside the Community, thereby exposing an increasing number of people inside the Community to much higher noise levels than would be permitted under the new law. To support this view, the EU argued that these aircraft, while technically (only just) complying, were inherently noisier than 'true' Chapter 3-compliant aircraft, and that Chapter 3 noise regulations had never been meant to cover recertificated aeroplanes, too. What is more, the adoption of the 'hushkit regulation' as a defensive measure had, according to the EU, become urgent after the USA's departure from the internationally agreed upon ICAO Chapter 2 phase-out schedule. This deviation was not only cited as proof that the US, too, had in the past ignored international regulations for domestic environmental reasons as legitimate as those pursued by the EU through the 'hushkit regulation'⁴⁸ (the EU had closely observed the Chapter 2 phase-out schedule as set by the ICAO). The early Chapter 2 phase-out in the USA, had, according to the EU, created massive incentives for the affected US owners and operators to dump or most of their surplus aircraft, hushkitted, re-engined or not, in Europe where, in 1999, only roughly 30 such recertificated aircraft had been registered.⁴⁹

Finally, in an attempt to prove its purely environmental motivation, the EU cited as an historical precedent that the introduction of Chapter 2 noise regulations in Europe hit a British-made and (mostly) BA-operated aeroplane worst – the Hawker Siddeley Trident – which, as a result, was replaced by more modern, complying equipment of US provenance (BA opted to replace it with a large fleet of Boeing 757s).⁵⁰

Environmental Policy Aspects

Alternative Environmental Policy Instruments

Environmental policy instruments may be categorized as follows:⁵¹

- regulatory (command-and-control) measures such as standards, which, for the ensuing analysis will be further subdivided into input-oriented technology (or design) standards – as featuring in the EU's non-addition rule – and output-oriented performance standards (such as specified maximum noise levels; as these limits may also

⁴⁷ For a brief survey of the EU's position see *Moxon* (2000).

⁴⁸ See *United States Congress. Committee on Transportation and Infrastructure. Subcommittee on Aviation* (1999).

⁴⁹ See *ibid.*: 30. – According to the Airclaims CASE database, currently around 115 such aircraft are being operated by European airlines, while another 150 examples would have to be either hushkitted or re-engined or grounded in reaction of the April 1, 2002 phase-out of Chapter 2. See *Learmount* (2001: 39). – This increase, by the way, in our view primarily reflects the recent boom of Community-based low-cost carriers which, however, are fast replacing these aircraft with state-of-the-art types (mostly the most modern variants of the successful Boeing 737).

⁵⁰ See *Moxon* (2000: 30).

⁵¹ See *Button* (1993: 91f).

be met indirectly through mandatory, pre-defined operating procedures and restrictions, these will also be regarded as performance standards in this paper);

- market-based or market-oriented incentives such as pollution taxes and charges (to discourage polluting activities);
- market-creating instruments such as tradable permits; and
- others including land-use planning techniques.

Selection Criteria

To begin with, it is a well-established and fundamental principle of environmental economics that any (positive or negative) externality should, on efficiency grounds, be internalized as close to its source as possible. While in many real-world cases, it may not be feasible to enforce this first-best solution, e.g. because it is impossible or prohibitively costly to identify and track the polluter, especially if it is mobile, this particular problem does not thwart noise abatement efforts in commercial aviation. What is more, since the negative effects of noise pollution are negligible at cruising altitude, reduction efforts need to focus only on aircraft and engine design, operating procedures (on approach, take-off and on the ground) and land-use planning. In other words: Aircraft noise is first and foremost a local – point-source – environmental externality.

This in turn raises the fiscal federalism issue as to whether noise abatement should, again on efficiency grounds, be a local, a national or an international responsibility. Two aspects are relevant in this context.⁵² As the economic costs of noise pollution vary significantly across jurisdictions – because of diverging preferences (including the willingness to accept higher or lower than ‘average’ emission and immission levels), income differentials, and, most important, vastly different marginal abatement as well as marginal damage costs⁵³ – there seems to be a wide scope for a highly decentralized approach. By contrast, the case for the spatial uniformity of standards rests upon the following two pillars:

- the ‘race-to-the-bottom’-hypothesis, i.e. the fear that otherwise the interjurisdictional competition would force locals to lower their standards to economically and environmentally suboptimal, unsustainable levels so as to attract more business; and
- the notion, that only globally harmonized standards would prevent a fragmentation of regulations – with enormously costly consequences for manufactures and airlines alike.

In our view, both arguments are ill-founded and irrelevant in the context of noise pollution in general and of the hushkit debate in particular. On the one hand this is due to

⁵² For a comprehensive discussion including a rigorous survey of the relevant literature see *Oates* (1999).

⁵³ Marginal damage costs may vary significantly due to differences in population density, meteorological, climatic, topographical and demographical conditions. Accordingly they may decrease over time, owing to advances in technology, innovative operating procedures, and intelligent land-use planning, or change in either direction in line with shifting population and settlement patterns. Differences in marginal abatement costs primarily result from the use of alternative production methods (including engine technology).

the fact that local residents, since the early days of commercial aviation, have (very successfully) demanded the imposition of ever stricter noise abatement policies around airports worldwide; in other words, there rather is plenty of empirical evidence of a steady ‘race-to-the-top’ in this area! The fragmentation argument, on the other hand, only holds water, and would only then pose serious economic problems as a result, if

- technology (design) and/or performance standards were, by a wide margin, the most efficient and effective environmental policy instrument available (an unfounded assumption, as we will demonstrate below); and
- if these standards were enforced by means of the country-of-destination principle (as opposed to the country-of-origin principle, i.e. mutual recognition);
- finally, it should be noted in this context, that international standardization may focus either on rather rigidly defined output criteria – as has traditionally been the case with ICAO noise standards (at least up to the recent adoption of the ‘balanced approach’) or on agreeing upon a common set of procedures and policy instruments with sufficient scope for fine-tuning at the local level (as explicitly allowed under ICAO’s new ‘balanced approach’).

Aside from satisfying the aforementioned more general principles, environmental policy instruments should be judged against the following criteria:⁵⁴

- Maximum economic and environmental efficiency: this means that the optimum level of pollution, where marginal abatement costs equal marginal damage costs, will be attained and the equimarginal principle will be satisfied;
- low information requirement for policy makers and enforcement agencies;
- high cost-effectiveness, including low transaction, administrative and enforcement costs;
- high adaptability (to changing technology, climatic conditions etc.);
- strong (dynamic) incentives for further improvement and innovation; and
- minimum impact on competition and international trade: to safeguard the welfare-enhancing effects of competitive domestic and cross-border markets, the least competition-restricting and/or trade-distorting policy instrument should be used by policymakers.

Ranking With Regard to Aircraft Noise Emissions

In this section we will perform an aptitude test of design standards, performance standards, pollution charges, tradable permits, and land-use planning to determine their respective usefulness for noise abatement purposes at airports. Although no single instrument of environmental policy scores equally well on all counts, as we will explain in this section, in our view noise-related user charges emerge as the clear winner, trailed, in that sequence, by tradable permits, and performance standards. Technology (design) standards come out last. To land-use planning, we attribute only a marginal, at best complementary role.

⁵⁴ See *Field* (1994: 181f); *Turner/Pearce/Bateman* (1994: 159f).

Noise-related charges

To begin with, noise-related charges excel as the, by far, least trade- and competition-restricting noise abatement approach. Based upon an objective criterion – emission or immission levels –, they do not constitute an entry barrier, but can be designed to adequately reflect the different damage costs caused by different aircraft types (and their operators); the equimarginal principle would then be satisfied as well. For this reason, they are also highly adaptable to changing conditions. In addition noise-related charges score high for the strong economic incentives they create for the affected polluters to seek ever further improvements in order to reduce their fiscal burden. What is more, since the technical and administrative infrastructure to measure noise levels and to impose sanctions for infringements against prescribed limits is already in place at all major and most minor airports, there would be no additional set-up and implementation costs. Finally, information requirements for policymakers are rather low.

Their only major drawback is the unclear relationship between the level of the charges and the total volume of noise emissions and, hence, overall noise pollution levels; in the end, the reduction effect depends on the price elasticity of demand, i.e. the (un)willingness of passenger and other airline customer to accept the, *ceteris paribus*, resulting higher price for airline services. Although for this reason the economic efficiency of noise-related charges may seem hard to predict, this disadvantage is on the one hand mitigated by airport congestion. On the other hand, the enormous (upward as well as downward) flexibility of charges⁵⁵ as opposed to all other instruments discussed here leaves policymakers with sufficient latitude to gradually approach the optimum local level of noise pollution in a trial-and-error process.

Finally, the argument that noise-related charges might arbitrarily (and inefficiently) be set too low for political and rent-seeking reasons, is insofar unconvincing as it must be considered a universal qualification, applying no less to all other environmental policy instruments and noise-abatement approaches discussed here.

Tradable permits

While being the favorite of environmental economists as a tool to tackle emission-related externalities, tradable permits must be considered a distant runner-up to noise-based charges in this context. First, since it is extremely likely that the introduction of emissions trading would be politically acceptable only if incumbents were grandfathered, it would spawn very similar trade-restricting and competition-distorting effects in favor of incumbents as caused by the command-and-control slot allocation procedures currently in use in most parts of the world. In other words, it would, at many major airports, create an additional infrastructure bottleneck on top of already existing (and worsening) capacity constraints. But even if authorities were willing and able to effectively prevent strategic hoarding of permits, incumbents may still resist this approach as it might also set a precedent as regards the feasibility and the effectiveness of a market for slots.⁵⁶ What is more, during the transition to a system of tradable permits, significant set-up costs would have to be incurred. In our view, these significant disadvantages

⁵⁵ Some years ago landing charges at Frankfurt Main International Airport, Germany, contain a noise-related component. Quite a few other airports all over the world are pursuing similar strategies. For details see *FRAPORT* (2001: 16f); *Morrel/Lu* (2000: 305f).

⁵⁶ The US has very successfully introduced emissions trading for some gaseous emissions.

cannot be even not offset by tradable permits' above-average performance as to the criteria adaptability, economic efficiency including satisfaction of the equimarginal principle, incentives for improvement, and information requirements for policymakers, nor by the fact that the maximum allowable (local) level of noise pollution is unequivocally determined by the number of permits available.

Performance Standards and Technology (Design) Standards

Although having been discredited by economists as inefficient, environmental policy is still dominated by the regulatory, command-and-control approach using either performance or design standards to achieve environmental policy outcome. There are nonetheless some important differences between the two which we will elaborate on in this section.

To begin with, the disadvantages of *performance standards* – with ICAO's Chapter 2 and Chapter 3 noise standards as the single most important practical example in civil aviation –, however, are many and serious. First, while, in theory, an extremely flexible tool which may be custom-tailored to meet specific local requirements and preferences, this fragmentation is not an option under the aforementioned traditional ICAO rules. From an economic point of view, performance standards must, for several reasons, be considered a second- or even third-best solution to noise abatement. First and foremost, and as opposed to charges and permits, they effectively allow operators to pollute the environment at no cost at all as long as the standards are not exceeded; in other words, all damage costs are borne exclusively by the affected third parties, i.e. local residents. For this reason, the imposition of performance standards does not create any economic incentives to actively seek additional environmental improvements through innovative technologies or operating procedures either.

Even worse from an economist's perspective, uniform performance standards à la Chapter 2 and Chapter 3 increase the overall costs of noise abatement for their failure to satisfy the equimarginal principle, if marginal abatement costs differ amongst individual operators (which they do to a substantial degree, given the technological heterogeneity of their fleets, to name just one factor). To be more specific, this means that any politically mandated noise reduction goal, such as a 50% cut in average noise levels, will only be achieved at higher than necessary total costs to society – and at higher costs than would be incurred if any of the more efficient instruments discussed above were used instead.⁵⁷ Finally, performance standards are basically flawed for another important reason: Only the operators know their respective marginal abatement and compliance costs. This inherent and insurmountable informational asymmetry confers the operators an important strategic advantage vis-à-vis the regulatory body which is very likely to result in the mandatory standards being way too lax with respect to the local optima. These substantial disadvantages are partly offset, however, by – as least in the case of globally recognized uniform standards à la Chapter 2 and Chapter 3 – their small trade-distorting and competition-restricting effects.

While most of these characteristics also apply to *technology standards* (such as the non-addition and by-pass rules set by the EU in Regulation 925/1999), they are plagued by at least two more – and even more detrimental – flaws. Conceived as an all-or-nothing approach to noise reduction they leave the affected parties no room at all for manoeuvre

⁵⁷ See *Field* (1994: 214f) for a full discussion.

(if there is no mutual recognition of these standards across jurisdictions which is not the case in the hushkit context at issue here): either they are met or the affected airlines (or more precisely, their owners) are barred from operating their aircraft into and out of airports located in these jurisdictions. Effectively, this amounts to a tremendous restriction of competition both at the airline level and amongst competing engine and/or hush-kit manufacturers. Last not least, technology standards are far inferior to performance standards in one more crucial respect: more often than not there is no clear connection between the technology standard (an input!) and the stated environmental objective it was designed to meet (an environmental output!) as the controversy of the exact relationship (already discussed above) between by-pass ratios and noise levels clearly demonstrates.

Land-use Planning

The idea to pre-emptively reduce noise pollution around airports through sophisticated land-use planning, e.g. by disallowing development of neighboring residential areas is without doubt a very plausible and sensible one. Ideally, the noise ‘footprints’ of arriving and departing aircraft would then be largely felt within the airports’ own boundaries only, causing no (significant) externalities outside. However, this is at best a long-term solution to the problem. Even worse, it inevitably fails to deliver on its promise at most existing airports located in the densely populated metropolitan areas of Europe, Asia and the USA.

The following table briefly summarizes the main results of our analysis. For the arguments mentioned above however, land-use planning has not been ranked.

Table 1: Assessment of alternative environmental policy instruments

	Noise-related charges	Tradable permits	Standards		Land-use planning
			Performance	Technology (Design)	
Maximum economic and environmental efficiency	–	+	–	--	
Low information requirements	++	++	++	++	
High cost-effectiveness	+	--	–	–	
High adaptability	++	+	+	–	
Strong (dynamic) incentives	++	++	--	--	
Minimum impact on competition and international trade	++	–	+	--	

Assessment

If evaluated against this benchmark, it is perfectly obvious that the EU's 'hushkit regulation' must be severely criticized as an example of bad environmental policy at work, in particular for its economically unjustifiable reliance on inefficient design standards in the guise of a ban on the hushkit technology and a mandatory minimum by-pass ratio. As we will demonstrate in the following section, the picture become even gloomier, if the enormous potential for protectionist abuse inherent in Regulation 925/1999's strict provisions for non-complying third-country aircraft enters the equation.

For the sake of fairness, a word of caution, seem in order, however. Indeed, it cannot be seriously disputed that Regulation 925/1999 was an exemplary case study in how not to tackle the noise pollution problem in civil aviation, and, as a consequence, should have never, for all its deficiencies, been passed as a tool of environmental policy. Yet, it must not be overlooked in this context either – and this presents another major conclusion to be drawn from our analysis –, that the traditional and rather rigid ICAO approach to noise management, while clearly superior to the 'hushkit regulation', must be considered a second-best if not third-best solution to the problem of aircraft noise pollution itself. And if – a big if, admittedly –, as argued by some, the doomed 'hushkit regulation' was indeed conceived to be a mere bargaining chip, a clever ploy to induce the USA to give up its long-standing reluctance against the proposed stricter and yet more flexible Chapter 4 rules and the 'balanced approach', it nevertheless helped promote a worthy cause in the arena of international environmental policy.

Trade Policy Aspects

It has often been argued that free trade prevents countries from successfully pursuing legitimate domestic environmental policy goals. Many countries have therefore pressed for legal exemptions from their obligations under international trade laws,⁵⁸ in particular from the GATT/WTO rules. While a full (theoretical and empirical) discussion of this field is way beyond the scope of this paper,⁵⁹ we will assess now the GATT/WTO-conformity of the proposed 'hushkit regulation'.

The Relevant WTO Principles and Rules

Non-discrimination is by far the single most important WTO principle.⁶⁰ There are two dimensions to it: most-favored nation (MFN) treatment and national treatment. The former requires any WTO member-state to extend trade concessions it has granted any other member to all remaining members as well (some exceptions apply, in particular for developing countries for which preferential treatment is in order). To put it bluntly, no country is, under the MFN-principle allowed to discriminate amongst its WTO-trading partners. The complementary national treatment obligation requires WTO-signatories to treat foreign suppliers (of like goods) no less favorably than their local competitors on the domestic market. In other words, every member-state is free to pursue its own environmental policy goals. It only has to make sure that it does not use any policy

⁵⁸ A comprehensive survey of all relevant legal issues can be found in *Robb/Bethlehem* (2001).

⁵⁹ See *Dean* (2001); *Zaelke/Orbuch/Housman* (1993).

⁶⁰ For details see *Senti* (2000); *Trebilcock/Howe* (1999).

instruments that would violate the non-discrimination principle. For example, a country may, for domestic environmental policy reasons, ban imports only if it also imposes a total ban on the production and/or consumption of like (i.e. import-competing) home-made products.⁶¹

What is more, in extreme cases, but “[s]ubject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination where the same conditions prevail, or a disguised restriction on international trade” a general exemption from said member-states normal treaty obligations may be granted under Article XX(b) of the GATT if “necessary to protect human, animal or plant life or health.”⁶² Over time, based on pertinent case law, it has become a generally accepted practice that a member-state may only legally adopt protectionist measures under Article XX(b) if it can demonstrate that no alternative policy instrument “which it could reasonably be expected to employ and which is not inconsistent with other GATT provisions is available to it.” More precisely, “a contracting party is bound to use, among the measures reasonably available to it, that which will entail the least degree of inconsistency with other GATT provisions”,⁶³ i.e. the least trade-restricting or trade-distorting (environmental) policy instrument.

This fundamental requirement is repeated in and confirmed by two other GATT agreements of crucial importance to the international trade in civil aircraft: The Agreement on Technical Barriers to Trade,⁶⁴ an integral part of the GATT framework, and the plurilateral Agreement on Trade in Civil Aircraft,⁶⁵ which as of now has 26 signatories.

Assessment

As our economic analysis of the ‘hushkit regulation’ has demonstrated, the EU did not select the least trade-distorting policy instrument reasonably available to it. Quite to the contrary, Regulation 925/1999 not only exclusively relied on trade sanctions to discourage non-compliance. What is more, its provisions favored EU-based operations of recertificated aircraft over non-EU-residents, a clear breach of the national treatment requirement laid down in GATT/WTO rules. It must be concluded then that the ‘hushkit regulation’ would not have passed muster before a WTO panel, had the USA or any other affected third-country-WTO-member initiated dispute settlement proceedings in that matter. Finally, as for its trade effects, it must not be forgotten that the ‘hushkit regulation’ would have almost triggered a full-scale transatlantic trade war, with dire consequences for companies in other sectors of the economy, way beyond the aviation community itself.

⁶¹ See *Knorr* (1997: 58ff).

⁶² The full text of the GATT can be found at http://www.wto.org/english/docs_e/legal_e/gatt47.pdf (as of July 15, 2002).

⁶³ As stated in the Panel Report of November 7, 1989, on US Section 337 of the Tariff Act of 1930, in: *GATT* (1990: 345 ff.).

⁶⁴ The full text of this agreement is available at http://www.wto.org/english/docs_e/legal_e/17-tbt.pdf (as of July 15, 2002).

⁶⁵ The full text of this agreement is available at http://www.wto.org/english/docs_e/legal_e/air-79.pdf (as of July 15, 2002).

Rent-seeking Aspects

The strong opposition of the US government to Regulation 925/1999 was, as we pointed out above, strongly motivated by the fear that the US aviation industry would have had to bear the brunt of the economic costs associated with its implementation and enforcement. In this final section of our paper, we will discuss the impact, positive or negative, the ‘hushkit regulation’ had, or rather would have likely had, on the key players on the affected markets, i.e. on

- the operators of recertificated aircraft;
- the manufacturers of hushkits and engines; and
- Airbus and Boeing.

Operators of Recertificated Aircraft

Actual and potential operators of recertificated include passenger as well as cargo carriers (including integrators like Fedex, DHL, and UPS) from EU- and non-EU-countries. At this level, the ‘hushkit’ regulation might have inflicted economic damage on the affected third-country operators via two channels: directly through operating restrictions (including outright bans) and indirectly by lowering resale values.

Since US carriers have never used recertificated aircraft for passenger revenue services anywhere on the Transatlantic market, and, owing to their strategic alliances with major European carriers, have also surrendered all but a few 5th freedom services – where these aircraft were sometimes employed – to their Community-based partners, Regulation 925/1999 clearly is irrelevant for their European operations. What is more, the recertificated aircraft in the fleets of many air cargo carriers and integrators would, in our view, have for the most part benefited from the regulation’s grandfather rules. A different picture, however, emerges with regard to many third world airlines, which, for lack of capital, continue to have to operate non-complying aircraft into the Community frequently. The ‘hushkit regulation’ would have forced them to try and obtain a legal exemption or to discontinue their service. It would in particular have negatively affected quite a few passenger and cargo carriers from the EU’s neighboring regions North Africa, the Middle East including Turkey, and Central and Eastern Europe.

As for the ‘hushkit regulation’s’ impact on resale values, we find no significant negative effect on US operators either. This primarily owes to the fact that all major EU-based passenger carriers have no tradition of operating hushkitted aeroplanes (the only exemptions to this rule being some smaller charter airlines and a few of the recent low-cost upstarts). By contrast, US carriers have primarily upgraded large numbers of Chapter 2 aircraft to Chapter 3-standards, in spite of the much higher direct operating costs and costs per seat miles as compared to more modern types, to meet the booming demand on their domestic routes in the 1990s. Therefore, in our view, the European market is not nearly as promising for the resale of these aircraft as hoped for by US and feared by EU politicians and lobbyists alike (suffice it to say, with the questionable benefit of hindsight, that the extremely difficult economic situation facing the major US carriers since the late 1990ies and, of course, the tragic events of 9/11 with their disastrous consequences on air travel demand in the US have reduced the resale value of these planes to near zero levels – not the EU’s ‘hushkit regulation’). Finally, even US integrators –

have begun to replace, also on their pan-European networks, their fleets of smaller hushkitted aircraft, typically Boeing 727s, with much larger (and more modern) and fully Chapter 3-compliant aircraft like converted Boeing 757 and Airbus A300 aircraft.⁶⁶

Hushkit Producers and Engine Manufacturers

Given the huge demand for hushkitted aircraft in the US carriers it should come as no surprise that all major producers of hushkits – such as Burbank Aeronautical, Duganair, Technologies, Goodrich, and Fedex Aviation Services – are located there, too.⁶⁷ Obviously then, the EU's non-addition rule would have imposed on them some costs in terms of lost business from affected European customers and non-EU-carriers operating in the Community – most likely for the benefit of those European engine manufacturers whose products amazingly (only just⁶⁸) comply with the arbitrarily set mandatory minimum by-pass ratio of 3:1. This is because Regulation 925/1999 would have induced at least some third-country owners of hushkitted, yet non-complying aircraft to have these aircraft re-engined accordingly for the reasons stated above.

It would be wrong, however, to conclude that the 'hushkit regulation' would have been equally damaging for all US enginemakers. While definitely true in the case of Pratt & Whitney, which, given its huge installed base of low by-pass engines – of the JTD-8 and JTD-9-series – on most first- and second generation jet aircraft, would have been indeed dealt a certain blow to its very profitable spare parts and replacement engine businesses, most of its (few) US competitors would not have been affected at all. This is particularly true of General Electric, a relative latecomer to the business, whose offerings all meet and mostly exceed Chapter 3 and even Chapter 4 limits. What is more, GE and its EU-based counterpart Snecma have formed the very successful joint venture CFM International, by a wide margin the market leader in the Chapter 3-complying narrow-body category (the aircraft in this category will finally replace all older types affected by the 'hushkit regulation'). Even Pratt & Whitney, however, would have very likely gained indirectly by means of its involvement in the competing International Aero Engines (IAE) consortium, a multinational venture with UK-based Rolls-Royce, German MTU and Japanese Aero Engines Corp. (which itself is a consortium of three Japanese aerospace companies).

Airbus vs. Boeing?

Finally, and contrary to what some American commentators and lobbyists seem to believe, Airbus would have reaped few benefits owing to the 'hushkit regulation' at the expense of Boeing. By contrast, both manufacturers could have reasonably expected to profit, in terms of increased sales of brand-new replacement aircraft and/or higher average revenues, from any (forced) reduction in the number of older aircraft – regardless of the economic, legal or political cause. In our view, due to its much bigger in-

⁶⁶ Currently, neither Boeing nor Airbus offer dedicated freighter versions of their highly successful B737- and A320-families.

⁶⁷ For a recent survey of the hushkit market see *Kingsley-Jones* (2001).

⁶⁸ See above at footnote 42 for details.

stalled base of actually and potentially affected aircraft as compared to latecomer Airbus, Boeing would have even had relatively more reason to support the legislation than its European competitor. What is more, both companies have, up to this date, always expressed their concern over the increasing fragmentation of local and national noise abatement policies.

Assessment

The preceding analysis demonstrates that the real distributional effects of the (late) ‘hushkit regulation’ would have been far more complex and much less clear-cut than previously stated – especially on the US side of the Atlantic Ocean. Nevertheless it is fair to conclude that regulation 925/1999 would have produced five clear winners – the EU-based engine-makers, GE, the multinational engine consortia, the Boeing Company and Airbus Industries – and three losers – airlines from developing countries, the US hushkit industry, and Pratt & Whitney –, with both winners and losers remarkably evenly represented in the US and the EU, however.

Outlook

“In the longer term, the key question is what will happen once airline fleets are mostly Chapter 3? Since noise levels near airports are determined not only by the fleet mix serving the airport, but also by the number of aircraft movements, will the anticipated future growth in aircraft movements mean that noise will start to increase again?”⁶⁹ Against this background, the importance of ever more effective noise management techniques for the future health of the industry can hardly be overstated. In Europe alone, more than 15 percent of the population feel seriously disturbed by aircraft noise already, although average noise levels have fallen dramatically in recent years. More flexible decentralized, and above all, more efficient approaches to noise management are therefore urgently needed. The EU’s decision, of March 26, 2002, to replace its notorious and ill-designed ‘hushkit regulation’ with a new Directive which strongly reflects the fundamental principles of the ICAO’s new ‘balanced approach’ may be an important step in the right direction. Whether the resulting paradigm change will prevent future clashes remains doubtful, however, not least because the international aviation community, for lack of practical experience with the new ICAO rules, will sail in uncharted waters as regards the intricacies of their application to solve real-world noise problems for some time to come.

Meanwhile, the EU has moved on to wage ‘noise war II’ – this time in another self-declared self-defense action against the few remaining Chapter 2-aircraft from Russia, Belarus and some other former Soviet Republics which, for many of these countries’ carriers, are still indispensable on their vital international routes to and from the Community.⁷⁰ Russia, after fruitless talks with the EU, has already decided to take retaliatory action, by curbing bilateral traffic rights for some EU-carriers. To be continued...!

⁶⁹ See ICAO (2000).

⁷⁰ See Flight International (2002) for details.

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