Aviation Rulemaking Cost Committee (ARCC)

Charter of the Aviation Rulemaking Cost Committee

ORDER

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

111(

9/1

SUBJ: AVIATION RULEMAKING COST COMMITTEE

1. PURPOSE. This order constitutes the charter for the Aviation Rulemaking Cost Committe designated and established pursuant to the Administrator's authority under 49 USC 106(p)(5).

2. DISTRIBUTION. This order is distributed to selected organizations in Washington Head the aircraft certification directorates.

3. BACKGROUND. The FAA's Office of Aviation Policy and Plans (APO) prepares econon evaluations (benefit/cost analyses) of most proposed FAA rules. To facilitate performing these and to foster uniformity, APO has developed a series of guidance documents for use in all econo evaluations performed by the agency. These FAA documents are titled "Economic Values for E Federal Aviation Administration Investment and Regulatory Programs" (Report FAA-APO- "Economic Analysis of Investment and Regulatory Decisions -- Revised Guide" (FAA-APO-98-

The FAA Management Advisory Council (MAC) completed a review of FAA's regulatory proce 2001, and recommended that standardized methods and costs be used in all regulatory economic the extent possible. The FAA agrees that increased use of standardized methods and cost data w beneficial. Accordingly, the agency is initiating steps to work with the aviation industry to devel methods and data.

4. OBJECTIVES AND SCOPE. The objective of the committee is to recommend new stand methodologies and cost assumptions that could be used in performing regulatory economic evalu including industry comment and update on those standardized methods and values that are alread by the FAA in the publications cited under Background above. As its initial objective, the comm prepare a specific set of cost items and quantify the specific values it recommends the FAA use i regulatory evaluations.

5. DUTIES.

a. Review the FAA's regulatory evaluation process and its current use of standardized committee will review the process by which the FAA performs economic assessments of propos amendments to the Federal Aviation Regulations. In particular, the committee will review Repo 98-8, "Economic Values for Evaluation of Federal Aviation Administration Investment and Regu Programs." This document contains a series of economic values currently used by the FAA in b analyses.

b. Develop a list of recommended standardized cost items. The committee will prepare a items used in FAA regulatory economic evaluations for which it is feasible and desirable to deve standardized values. The list should validate or revise items contained in report FAA-APO-98-8 propose additional items as appropriate. Examples of potential candidate cost items include fligh

compensation, the cost of removing an air carrier aircraft from revenue service for both large and businesses, and aircraft fuel consumption as a function of gross weight. The committee should a the list those items included in report FAA-APO-98-8 that can and should be updated.

c. Propose methods and/or data. No later than one year after its formation, the committee methodologies and data sources for the calculation of the items on the list developed in task b. E useful to the FAA in this task will be access to data that is normally not available through comm sources. The committee may need to develop methodologies that allow companies to provide co FAA in ways that will allow the protection of proprietary data from corporate rivals.

The committee will also propose approaches and/or methodologies that the FAA might use in re analyses when data is not available for cost or benefit elements that are nevertheless likely to be the analysis.

d. Estimate and review the value of cost items. As resources and time permit, the committ compile information on actual costs given in the recommended list of cost items using generally accepted accounting procedures and other appropriate economic analysis techniques. These will to the FAA for inclusion in a FAA standardized cost database.

In addition, the FAA may independently provide estimates for cost items on the list developed in committee will review the methods and data used in these calculations, and provide comment on of estimates and appropriate use of those cost items.

e. Final Report. No later than two years after its formation, the committee will prepare and FAA a final report of the work performed and recommendations made. For the data and method the committee, the report will show how each item was estimated. For items calculated by the F report will provide advice on the accuracy of the estimates and appropriate use of those items. Th also contain any recommendations the committee may have for calculating costs in the future for regulations based on the committee's own knowledge, experience, and insights gained in perf tasks.

6. ORGANIZATION AND ADMINISTRATION. The Assistant Administrator for Policy, International Aviation (Assistant Administrator) is the sponsor of the Aviation Rulemaking Cost and will appoint the Designated Federal Official for the committee. The Assistant Administrator responsible for providing administrative support for the committee.

The Assistant Administrator shall have the sole discretion to appoint members to the committee the Chair of the committee. The committee shall consist of individuals with expertise in costs, a and finances for major airlines, national airlines, cargo airlines, regional airlines, airports, aircraf manufacturers, aircraft maintenance, and general aviation entities and such other individuals a Assistant Administrator may deem appropriate.

Once designated, the Chair:

- Determines, in coordination with the other members of the committee, when a meeting is re where it will be held (minutes may or may not be taken at the election of the Chair);
- Arranges notification to all committee members of the time and place for any meeting;
- Formulates an agenda for each meeting and conducts the meeting; and
- Develops clear roles and responsibilities for committee members and designates members o subcommittees, as appropriate.

7. COMPENSATION. Non-Government representatives serve without Government compen bear all costs related to their participation on the committee.

8. ESTIMATED COST. The committee will be supported by technical, economic and admin support funded by the Assistant Administrator for Policy, Planning, and International Aviation. Estimated cost should be no more than the cost of one Federal employee, plus contract support a necessary.

9. PUBLIC PARTICIPATION. Interested persons or organizations desiring to attend a mee not members of the committee must request and receive approval in advance of the meeting from Administrator for Policy, Planning, and International Aviation or his/her delegate.

10. AVAILABILITY OF RECORDS. Subject to the conditions of the Freedom of Informatio U.S.C. Section 522, records, report, agendas, working papers, and other documents that are made to or prepared for or by the committee shall be available for public inspection and copying at the of Aviation Policy and Plans, 800 Independence Avenue, S.W., Washington, D.C. 20591. Fees s charged for information furnished to the public in accordance with the fee schedule publishe Title 49, Code of Federal Regulations.

11. PUBLIC INTEREST. The formation of the Aviation Rulemaking Cost Committee is dete in the public interest in connection with the performance of duties imposed on FAA by law.

12. EFFECTIVE DATE AND DURATION. The committee is effective November 1, 2002. committee shall remain in existence until October 31, 2004, unless sooner terminated or extende Administrator.

Monte R. Belger
Acting Administrator

September 28, 2004

Sharon Pinkerton, Assistant Administrator for Aviation Policy, Planning, and Environment
AEP-1
Federal Aviation Administration
800 Independence Ave, SW
Washington, DC 20591

Dear Ms. Pinkerton:

The Aviation Rulemaking Cost Committee (ARCC) was formed in September 2002 to improve the Federal Aviation Administration's (FAA) regulatory economic evaluations of the economic benefits and costs to the aviation industry, and the public, of proposed FAA rules. The tasks to accomplish this goal was mandated via special charter of the FAA Administrator and included 1) updating previously established standardized methodologies for estimating costs, 2) recommending new standardized methodologies of the aforementioned, 3) updating previously established standardized costs for various inputs used in regulatory evaluations, 4) recommending new standardized costs, and lastly, 5) voice any other recommendations or concerns that the ARCC deems relevant to the issue at hand.

Therefore, the ARCC's final product can be segregated into three sections: 1) economic data, 2) methodologies for determining costs, and 3) general recommendations. The data and methodology output will be published separately in hardcopy and will also be available on the FAA's website. The recommendations follow in this letter. It is our hope that this final product will be useful to the FAA as it reviews proposed rules in the future.

The ARCC utilized the services of GRA, Inc., a noted aviation consulting firm, to collect and process the economic data. GRA made use of publicly and privately available databases. The final product has been reviewed and accepted by the ARCC although it is relying on the FAA's Office of Aviation Policy and Plans (APO) to validate the soundness of the source data and the accuracy of GRA's work. The data has been assembled in a manner that allows for querying and aggregating in numerous ways. The committee suggests that only a limited number of copies of the data be printed in order to promote online use of the aforementioned website.

The methodology papers were drafted by GRA with significant input from the ARCC. Ideally, all of the costs of a rule would be determined and agreed upon before a rule is even considered. In reality, the costing of a rule is more art than science. Therefore, the methodology papers were envisioned to provide a framework when looking at various cost components.

Finally, throughout our meetings, a number of issues surfaced that ARCC felt should be formally raised. The issues do not deal directly with cost data, or the determination thereof, but rather the rulemaking process and use of said data. The ARCC's recommendations are listed below and in more detail in the attached issue papers.

Recommendations

1. ***Differentiate between passenger and cargo operations:*** FAA should formally recognize the major differences between passenger and cargo operations when providing cost-benefit analyses to decision makers, and reflect this distinction in "Economic Analysis of Investment and Regulatory Decisions" and associated economic values tables. See Issue Paper #1 below.

2. ***Recognize previously adopted safety enhancements:*** FAA should account for the "accumulation" of previously adopted safety enhancements in determining the benefit of future accident avoidance. See Issue Paper #2 below.

3. ***Account for fleet differences:*** FAA should account for the differences in fleet types when determining the benefit of future accident avoidance. See Issue Paper #2 below.

4. ***Account for past rulemaking actions:*** FAA should always account for past rulemaking actions in determining benefits of future accident avoidance. See Issue Paper #3 below.

5. ***Ten-year lookback:*** FAA should not look back more than 10 years in determining the benefits of future accident avoidance to partially account for the overall improvement in aviation safety. See Issue Paper #4 below.

6. ***Account for varying fleet types:*** FAA should account for the varying fleet types to avoid a disproportionate benefit analysis. For a Part 121 operational rule, separate analyses should be developed for the regional, narrowbody and widebody fleets when each fleet type has different risks of a potential future accident. See Issue Paper #5 below.

7. ***Publishing changes and comments:*** For vehicles such as such as Advisory Circulars, program guidance letters, competition plan requirements and other guidance related to AIP eligibility that affect airport management or would likely cause airport operators to incur costs, the FAA should circulate a draft for notice and comment to affected parties. Furthermore, more regular and predictable dissemination of informal decisional documents and opinion letters (like the one the FAA released on the treatment of Ground Transportation project eligibility for PFCs this year) would provide necessary guidance on how FAA will interpret existing rules. See Issue Paper #7 below.

8. ***AD costs:*** The FAA should require that estimates include actual estimated costs of maintenance that consider the opening and closing required to do the required work of an Air Directive (AD), down time that is associated with this work, and any additional reporting requirements that result from the AD. See Issue Paper #9 below.

9. ***AD cost-benefit analyses:*** FAA should conduct cost-benefit analyses of ADs. See Issue Paper #9 below.

10. ***Publishing changes and comments:*** For vehicles (e.g., Sponsor Assurances, PFC authority, AIP eligibility, Advisory Circulars, guidance letters, rates and charges policies, and competition plans) that may have a regulatory impact, the FAA should publish the proposed change using the Docket Management System, publish all comments to the proposed regulatory change, and prepare a brief disposition of those comments to be issued when the final version is made available in the docket. See Issue Paper # 10 below.

11. ***NPRM comments:*** When there are many NPRM comments for a cost-benefit analysis, the FAA should consider updating the regulatory analysis and publishing it in the docket for additional comment before finalizing the rule.

12. ***APO independence:*** The FAA should make APO more independent.

13. ***Ex-parte rules:*** APO should educate its analysis on *ex-parte* rules in order to get good feedback during the formulative stages of regulatory evaluations.

14. ***ARC and ARAC involvement:*** ARCs and ARAC activities should involve APO in order to get better data sooner.

15. ***Collaborative assessments:*** Cost-benefit assessment should be collaborative throughout the whole process.

16. ***ARCC:*** Reconvene the ARCC committee when there are cost-benefit issues that warrant it.

Sincerely,

David Swierenga
ARCC Chairperson

Current ARCC Members:
Tony Broderick, Consultant to Airbus
Eric Byer, National Air Transportation Association
Douglas Carr, National Business Aviation Association
James Draxler, Boeing
Troy Englert, Air Line Pilots Association, International
Felipe Eudes Ponte Fernandez, Embraer S.A.
Luis Gutierrez, Aircraft Owners and Pilots Association
Rob Hackman, Aircraft Owners and Pilots Association
Keith Hagy, Airline Pilots Association
Jens Hennig, General Aviation Manufacturers Association
Lisa Hodge, Delta Airlines, Inc.
David Lee, Air Transport Association
David Lotterer, Regional Airline Association
Stan Mackiewicz, National Air Transportation Association
Thomas McSweeny, Boeing
Margie Tower Smith, C.M., American Association of Airport Executives
Jeffrey Wallace, Gulfstream Aerospace Corporation
David Watson, Delta Airlines, Inc.

Enclosure

Issue Paper #1

Cost Benefit Analysis for Cargo Fleets

FAA cost-benefit analysis requires that full costs and benefits of FAA regulatory actions be considered and explained in proposals for rulemaking. In the past 30 years, there has been a marked change in the makeup of the US airline aircraft fleet. Today a substantial number (many hundreds) of aircraft operated under 14 CFR Parts 121 and 135 are all-cargo aircraft. Especially with regard to 14 CFR Part 121 operations, the benefits of regulatory actions affecting all cargo operations are very different from those that can be attached to passenger aircraft operations. It is clear in some cases, a regulatory action that provides a very good cost-benefit ratio for passenger aircraft does not provide a similar justification for its application to freighters.

The reason for this disparity is clear: The main objective of regulatory actions taken by FAA is to provide the highest economically practicable level of passenger safety. In all-cargo aircraft, that object is inapplicable. So, for example, when considering regulations that would protect against fuel tank explosions, or similar low-probability events, a catastrophic event affecting a wide body aircraft might involve the deaths of 250 people and an associated imputed benefit of avoiding such a catastrophe of some $750 million plus the hull value of some $25-50 million. Without passenger fatalities avoided, the cost avoidance for an identical freighter accident is a factor of 30 lower than this. In addition, the utilization of freighters is much lower than that of passenger aircraft, further exaggerating the difference in cost avoidance in the two accident scenarios.

It is no longer appropriate (and actually quite misleading) to lump together all 14 CFR 121 operations when considering the projected benefits of proposed rulemaking. Individual estimates should be made for all-cargo operations and those affecting passenger carrying fleets. This will facilitate reasoned discussion of the need to apply a regulatory requirement to each fleet independently.

RECOMMENDATION: FAA should formally recognize the major differences between passenger and cargo operations when providing cost-benefit analyses to decision makers, and reflect this distinction in "Economic Analysis of Investment and Regulatory Decisions" and associated economic values tables.

Issue Paper #2

Regulatory Evaluations

- Accounting for the "accumulation" of previously adopted safety enhancements in determining the benefit of future accident avoidance
- Accounting for the differences in fleet types when determining the benefit of future accident avoidance

The cost of avoiding a future accident is most often the primary benefit for operational rules mandating retrofit since the retrofit is usually justified by showing a reduced likelihood that a similar accident will occur in the future. However in determining the degree of benefit that a retrofit will provide, APO needs to account for previous rulemaking actions that also mitigate the likelihood that an accident similar to the accident that prompted the rulemaking action, will occur in the future.

Airworthiness Directives (AD's) are often issued to reduce the likelihood that a future similar accident will occur. AD's generally either mandate inspections and/or equipment retrofit. If the airplane accident has a causal link to equipment malfunction, an AD is issued affecting other aircraft fleet types of similar design. Past examples include the JT8D Burner Can "problem", the DC-10 hydraulic system "problem", and the B757 Thrust Reverser "problem". In such instances, subsequent operational rules and/or SFARs mandating OEM actions within specified deadlines were not issued. Within the past several years however, the FAA has not only issues corrective AD's to address specific equipment malfunction concerns but they have also issued operational and re-certification design rules. Examples include the Fuel Tank System Design Review, Cargo Fire Detection and Suppression, Aging Aircraft Maintenance Program and the forthcoming Aging Wiring NPRM. The later rulemaking actions are susceptible to a "double count", that is, counting the same fatalities twice as a benefit of avoiding a future accident unless the previous AD action is accounted for in determining future accident avoidance.

RECOMMENDATION: in determining the degree of benefit that a retrofit will provide, APO needs to account for previous rulemaking actions that also mitigate the likelihood that an accident similar to the accident that prompted the rulemaking action will occur in the future.

Issue Paper #3

Considerations for avoiding a "double count" of accident fatalities as a result of past regulatory actions

In determining whether a proposed operational rule provides additional benefit of future accident avoidance, the RegEval process needs to quantify the value of past FAA regulatory actions that also address accident causation. Generally past FAA regulatory actions are AD's. If specific ADs do not totally address the probability that a similar accident may not occur in the future, then operational rules may provide a positive safety benefit. First however the benefit provided by past ADs must be quantified. For example, in determining the benefit of the Fuel Tank System Design Review rule, there were numerous AD subsequently issued against the similar fleet types. What then is the probability that a similar accident (fuel tank explosion) may occur in an unrelated fleet type and in the fleet type modified by past AD action? An industry ARC quantified the relative risks of a future fuel tank explosion for airplanes with wing tanks, center tanks and center tanks with adjacent heat sources (air conditioning pack). Had APO conducted a similar analysis for the Fuel Tank System Design rule, FAA AFS may have proposed a completely different rule than what was ultimately adopted.

RECOMMENDATION: APO should always account for past rulemaking actions in determining benefits of future accident avoidance.

Issue Paper #4

Considerations for avoiding a "double count" of accident fatalities as a result of past regulatory actions that mitigate the probability of an accident in general

Within the last 10 years there has been a significant reduction in the number of fatal commercial aircraft accidents. In determining the benefit of operational and design review rulemaking based on future accident avoidance, the RegEval process should also account for the overall improvement in the aviation safety record. This may take the form of a safety improvement "factor" as a way of accounting for these progressive changes in determining whether a future accident may occur, or the accident analysis should not look back more than 10 years.

An analysis that looks back at an accident record during the last 10 years is generally reflective of the current fleet since new aircraft designs generally do not change within a relatively short time. A 20 year look back analysis will not accurately reflect the fleet accident rate however because of the significant differences in accident rates between the two periods.

RECOMMENDATION: APO should not look back more than 10 years in determining the benefits of future accident avoidance to partially account for the overall improvement in aviation safety.

Issue Paper #5

Considerations in addressing the likelihood that accident avoidance occurs in equal probability when various fleet types are affected

The RegEval process should also account for the safety risk differences among the various airplanes type affected by operational and design review rulemaking. In each instance, the RegEval's were developed to justify the expense placed upon the total industry as a result of a single accident that may be avoided in future operations. The RegEval process assumes that a single event will occur with equal probability in other airplane types in spite of their design differences.

A proposed operational rule will likely affect many different aircraft types. An analysis that accounts for each and every type of aircraft may be impractical. However an analysis that accounts for only one average aircraft when many aircraft types are affected, is too generalized and will likely result in a benefit analysis that for a significant number of airplane types, may be disproportionate.

Aircraft can generally be grouped according to payloads. For example if a Part 121 rule is proposed, a cost benefit analysis that distinguishes between 50, 150 and 300 passenger seat airplanes fairly typifies all the aircraft that are affected, i.e., the regional, narrow body and wide-body aircraft. If the analysis is based only on a 150 seat aircraft however, the benefits analysis will overstate the benefit for the 50 seat aircraft and understate the benefit for the 300 seat aircraft.

A good analysis to review and see a disproportionate benefit analysis is the Fuel Tank System Design Review rule (Amendment 121-282). The Benefit Analysis constructed an "average" air carrier flight with 130 passengers and a crew of 7 onboard and determined that avoidance of just one accident within the next 10 years would result in the saving of 137 lives. At least three accidents would have to be experienced by the regional fleet however to see a comparable benefit. After the rule was adopted an industry ARC on Fuel Tank System Design determined that the risks for potentially having a fuel tank explosion accident in the future differed between airplanes having center fuel tank with a nearby heat source, airplanes with center fuel tank having no nearby heat sources and airplanes with just wing tanks. Had the cost benefit analysis been determined based upon the location of fuel tanks and incorporation of AD's applicable to fuel tank system design, the applicability of the rule would have been considerably less than what was adopted.

Operational rules affecting many fleet types will likely have risks of a future accident occurring varying among the fleet types. Nonetheless that there is a risk that a similar accident could happen may exist in all fleet types. A cost benefit analysis that more accurately depicts these different risks among the multiple airplane types (based upon payload) should ultimately lead to rules that provide multiple compliance periods. AD's of course provide specific compliance periods for different fleet types, so why should it be unusual for an operational rule to provide multiple compliance periods? The FAA has been reluctant to do this in the past most likely

because of the "one level of safety" premise. However this premise is not applicable when the risks of a future accident are shown to vary among the various fleet types.

AFS adoption of rules that provide different compliance periods for different fleet types will obviously benefit industry but will benefit the FAA as well. The recent retrofit rule on enforced cockpit doors illustrated how difficult it was for FAA to certify design standards among the varying fleet types in order to meet one compliance deadline. Staggered compliance periods among the different fleet types will greatly ease the FAA's workload in approving different design standards.

RECOMMENDATION: APO should account for the varying fleet types to avoid a disproportionate benefit analysis. For a Part 121 operational rule, separate analyses should be developed for the regional, narrowbody and widebody fleets when each fleet type has different risks of a potential future accident.

Issue Paper #6

Cost Estimating – Airworthiness Directives

The FAA Airworthiness Directives Manual (FAA-AIR-M-8040.1, revised and updated August 2003, available at http://www.faa.gov/certification/aircraft/ad.htm) contains FAA policies concerning economic analyses that should be done when issuing Airworthiness Directives (AD's). The guidance presented is very straightforward and brief (less than one page), but does not always lead to a good estimate of the actual costs that will be incurred by the AD.

Specifically, the Manual should be revised to require that estimates include actual estimated costs of maintenance that consider the opening and closing required to do the required work, down time that is associated with this work, and any additional reporting requirements that result from the AD. These are "real" costs that are excluded by omission from the calculations suggested by the Handbook's guidance. To accomplish this end, paragraph 2a should be revised to refer to the appropriate sections of the APO "Economic Analysis of Investment and Regulatory Decisions" and "Economic Values for Evaluation of FAA Investment and Regulatory Decisions" guidance documents. In estimating AD costs there is no reason that AD's should follow cost estimating principles different from any other FAA organization, and these documents set forth FAA policies in that regard.

Paragraph 2e of the Handbook should also be revised to include reference to appropriate sections of those documents as well. The present language of the Handbook says "Calculations [for cost estimating] need not go beyond initial labor and parts costs. It is not necessary to include costs that operators may incur in individual maintenance scheduling of costs that operators might pass on to others." We find this difficult to agree with, since opening and closing costs are, by definition, "passed on to others." This section needs to be rewritten to provide emphasis that the guidance provided is intended to result in an honest estimate of all costs to the operators that will be incurred by compliance with the FAA actions required by the AD.

Airworthiness Directives are important documents, and the FAA requires that any operator of an aircraft demonstrate upon request that the aircraft they operate complies with all applicable airworthiness directives. This leads to the requirement that all operators maintain an easily accessible record keeping system to demonstrate airworthiness of their fleet of aircraft. Further, every time an airworthiness directive is issued, it requires that every operator of that aircraft type carefully review the document and its applicability to the fleet of aircraft they operate. This review and record keeping system is fundamental to safe operations, and represents not only an initial investment but also a recurring cost, each time an airworthiness directive is issued. FAA should make an attempt to estimate these costs, provide guidance in the appropriate handbooks, and reflect the costs in each AD that it publishes.

Paragraph 2b(2) of the Handbook should be rewritten to reflect a more reasoned explanation of why a "full cost-benefit analysis" of an AD is not normally required. The language now notes the following: "As a matter of law, in order to be airworthy, an aircraft must conform to its type design and be in a condition for safe operation. The type design is approved only after the FAA makes a determination that it complies with all applicable airworthiness requirements. In

adopting and maintaining those requirements, the FAA has already made the determination that they establish a level of safety that is cost beneficial. When the FAA makes a finding of an unsafe condition in an AD, it means that this cost-beneficial level of safety is no longer being achieved and that the required actions are necessary to restore that level of safety. Because this level of safety has already been determined to be cost beneficial and does not add an additional regulatory requirement, a full cost-benefit analysis for each AD would be redundant and unnecessary."

This discussion is misleading and should be revised. FAA has not, in general, made a determination that the level of safety achieved by FAA certification is "cost beneficial." The FAA certification requirements are the result of many decades of regulatory activity that only recently has been subject to cost-benefit analysis. Indeed, AD mandates are very prescriptive, and in general are not uniquely necessary to return the product to the level of safety contemplated upon approval of the type design. There are alternative means of accomplishing the same end, and FAA generally provides for such "alternative means of compliance." The reason that the FAA is not required to make a full cost-benefit analysis of each AD is that when OMB initially set forth procedures for clearing proposed rules over 10 years ago, FAA obtained a waiver of the requirement that such-cost-benefit analyses be provided for AD's. There is fundamentally no reason other than added workload that these cost-benefit analyses are not done.

RECOMMENDATIONS: The Airworthiness Directive Manual should be revised to require that estimates include actual estimated costs of maintenance that consider the opening and closing required to do the required work, down time that is associated with this work, and any additional reporting requirements that result from the AD.

Paragraphs 2a and 2 e should be revised to refer to the appropriate sections of the APO "Economic Analysis of Investment and Regulatory Decisions" and "Economic Values for Evaluation of FAA Investment and Regulatory Decisions" guidance documents, and paragraph 2e should be rewritten to provide emphasis that the guidance provided is intended to result in an honest estimate of all costs to the operators that will be incurred by compliance with the FAA actions required by the AD.

Paragraph 2b(2) of the Handbook should be rewritten to reflect a more reasoned explanation of why a "full cost-benefit analysis" of an AD is not normally required.

Issue Paper # 7

Regulation of airports is both extensive and complicated inside and outside the rulemaking process

This report examines the methodology by which costs are estimated by the FAA to determine the economic impact of rulemaking on users of the aviation system. Airports, as part of the aviation system, are broadly regulated by the FAA. While most of FAA's requirements are implemented through notice and comment rulemaking, airports are also subject to numerous advisory materials, guidelines and interpretative rulings which have a significant effect on the operational and financial management of airports. FAA interpretations of AIP eligibility and sponsor assurances, PFC authority, Advisory Circulars, guidance letters, rates and charges policies and more recently, competition plans, are some of the vehicles through which the DOT or FAA affect both the operational and financial management of an airport. As a matter of public policy, these agency actions should be more transparent so that the airports, as well as the tenants and customers of airports, can provide timely input and the FAA can have a greater appreciation of the issues involved and a better understanding of the implications of new requirements.

Sponsor Assurances, which are essentially the list of rules and requirements for an airport sponsor that accepts federal funding through the AIP program, are statutory in nature. These cover nearly every aspect of how an airport runs its operation from its use of airport revenues, to compatible land use, to the way it addresses competition from competing leaseholders (exclusive rights) on its property. Most troubling to airports, the sponsor assurances that an individual airport signs on to upon applying for federal funds to provide an important piece of the national aviation infrastructure are subject to changes in interpretation by the FAA over time. This may leave airport sponsors in the position of being responsible for complying with terms of an ever-changing contract over a period of twenty years or more.

Similarly, the authority to generate passenger facility charges—funds generated at the airport to be used at the airport, and to be used for specific projects pre-approved by the FAA comes with a myriad of statutory restrictions and eligibility requirements, implemented by complicated regulations and further interpreted through guidance and individual agency determinations.

The Rates and Charges Policy, which governs the fees an airport can charge to recover costs, is another example of a vehicle by which FAA and DOT affect the financial management of airports. DOT was charged by Congress with developing a Rates and Charges Policy in the Federal Aviation Administration Authorization Act of 1994, and after extensive notice and comment issued a Final Policy in June 1996.[1] However, the Final Policy was litigated and some provisions were vacated by the court. Despite the extensive comments provided by the aviation industry subsequent to that litigation, the FAA and the DOT have yet to issue a revised Final Policy consistent with the court's directive. The consequence is that the industry is left without clear guidance on key issues, and airports must seek a case-by-case verification from FAA that

[1] Department of Transportation, Office of the Secretary and Federal Aviation Administration, Final Policy Regarding Airport Rates and Charges, 61 Fed. Reg. 31994 (June 21, 1996); *vacated in part by* Air Transp. Assoc. of America v. Dep't of Transp., 119 F. 3d 38, *as amended by* 129 F. 3d 625 (D.C. Cir. 1997).

proposed changes in rates and charges will be considered to be in compliance with statutory mandates.

Although sponsor assurances are set forth in statutes, the FAA furthers compliance with the AIP grant conditions through a number of administrative means including Advisory Circulars (AC) and Program Guidance Letters (PGL). Through the Advisory Circular, the FAA headquarters advises its regional and airport district offices and certification inspectors and to a lesser extent the public on the official agency interpretation of FAA policies and regulations. Consistency with applicable ACs is not only a means of complying with sponsor assurances, but also is tied to future AIP grant eligibility and airport certification. Although Advisory Circulars are non-regulatory in nature, over time, Advisory Circulars have become less "advisory" and more mandatory. Problems may arise when different FAA Regions or Airports District Offices apply the ACs inconsistently.

The same is true of Program Guidance Letters, which are used by the FAA to provide interpretations of the statutory mandates of the AIP program. Program guidance letters will be used by local FAA personnel in making decisions for the eligibility of AIP funding. As a consequence, airport sponsors must be vigilant in dedicating sufficient resources to monitor the development of PGLs in order to ensure that their respective projects are deemed to be in compliance with FAA interpretations.

For example, in enacting AIR-21, the Congress imposed a requirement for eligibility to receive AIP funding or approval for PFC projects that certain large and medium hub airports would be required to submit a competition plan. The statute was vague as to the requirements for a competition plan. Rather, it was left to the FAA and the DOT to determine how this statutory requirement would be met. What resulted was the issuance of a 15-page PGL that detailed information on some 60 items, including detailed plans and sketches. The practical effect was that the affected airports expended significant resources to the compilation of information and materials, some of which were already in the possession of the agencies. According to an ACI-NA survey, it took some airports more than 200 hours and considerable cost to complete their competition plans. Moreover, some airports stated that it took the FAA nine months to review their competition plans, which in turn withheld the decision on AIP or PFC applications with little or no benefit to the traveling public. Ironically, it was only through an administrative exercise of the Office and Management and Budget, through the Paperwork Reduction Act, in which the airports community had any real opportunity to comment on the requirements contained in the FAA's program guidance letter.

For vehicles such as program guidance letters, advisory circulars, and other prospective agency interpretations which affect airport management, the FAA is encouraged to establish a more regular process of seeking comment and input from the regulated community prior to formalizing these types of guidance documents. This is not to suggest that each and every document should be subject to the same level of public notice and comment afforded a proposed regulation. However, as a matter of public policy, it is believed that seeking some level of information and feedback from those to be affected would provide more clarity and provide the

FAA with a better understanding of the costs associated with the imposition of new requirements.

In the same way, the FAA should examine its policy on publication of decisional documents, such as opinion letters and other interpretive materials that arise from informal adjudicatory proceedings to ensure a broader dissemination of these materials to the regulated community. While these documents are generally publicly available, it takes significant sleuthing through websites and requests to FAA offices to obtain copies of many of the materials, and parties not directly involved in the proceeding or discussion may be unaware of their existence. Consideration should be given to creating a web-based notification system in which subscribers could be informed about regular postings of this information.

Issue Paper #8

Aircraft Downtime Discussion

Premise—regulation causes aircraft to be taken out of service

- Maintenance/installation of equipment that can be accomplished with heavy check
- Maintenance/installation of equipment that must be accomplished prior to heavy check
- Airworthiness directive prohibits operation until action is taken

Basis—each carrier optimizes fleet size to produce required number of flight hours

- Means that, while there may be some slack, there is not a lot of extra aircraft time
- Airlines rotate fleets among stations so that they hit a maintenance base when needed
- Planned disruptions better accommodated than unplanned ones—the more lead time the more likely it is the carrier can minimize the cost of downtime
- Generally, the least cost solution would be to do the work when the aircraft is undergoing a major check (C or D)—how prevalent are progressive major checks where the check is broken into smaller work packages and done incrementally?
- The most expensive cost would be a grounding

Costs of Downtime

- At the high end—the carrier has to replace the aircraft in service without the ability to use its own crews—ACMI (aircraft, crew, maintenance and insurance lease) costs less avoidable costs of own crew—grounding?
- At the low end—the carrier can schedule the requirement within the window of existing scheduled maintenance checks—therefore no incremental costs
- Middle ground—carrier has to provide for additional aircraft hours by increasing fleet size
    - Requires changes that impact a large number of like aircraft—more difficult to cope with small fleet—may have to lease in if possible
    - If regulatory requirements are expected to recur for different reasons, then existing fleet has a margin for regulatory requirements—cost is real but not directly observed
    - If viewed as one time requirement then carrier handles in context of fleet plan by adjusting aircraft acquisition/retirement dates, or by adjusting leases, if possible

    - Implies that relevant cost is ownership or lease costs for total downtime caused by requirement
- Would a rule of thumb that said downtime cost is equal to the additional downtime required multiplied by the hourly ownership costs be a reasonable compromise for activities that can be scheduled into existing maintenance programs? This can be approximated by the hourly operating lease costs per block hour. (An option to get approximately the same result would be to divide the additional downtime by annual aircraft utilization and multiply by annual ownership costs.)
- The fact that an aircraft has to be "opened up" may result require the operator to perform additional maintenance. Required to fix airworthiness and other problems if discovered. While this would have to be done at a later date, there are two kinds of additional cost involved
    - Time value of money by performing work earlier than would otherwise be the case.
    - Performing maintenance in smaller work packages
- For regulations that require an unplanned (or unable to schedule as part of an existing maintenance activity) removal of an aircraft from service, would the costs of an ACMI aircraft replacement (less any avoidable costs) be the appropriate measure?

What else would be good to know?

- What is minimum amount of slack in existing maintenance schedules, if any
- Do carriers build in an allowance in fleet plan for aircraft out of service due to regulatory requirements?
- What amount of advanced notice for a requirement that requires removal of an aircraft from service minimizes impacts on carrier costs?
    - Days
    - Weeks
    - Months
    - Years
    - How is this related to the length of additional downtime required?
- Major check cycles—is rolling check becoming the norm?
- How often does an aircraft overnight at maintenance base?
- Can increased flying of remaining fleet make up the loss of aircraft due to downtime?
    - What minimum fleet size is needed to do this (if possible)?
    - How flexible is schedule?
- How do corporate and private aviation handle this

- Corporate flight departments would have to lease in—depending on aircraft available and length of time needed, they will:
  - lease the aircraft without a crew if same type
  - lease the aircraft with crew if needed for only a short time
  - train their crews on the type if needed for a longer time
- There have been a number of articles on GA engine AD's that effectively grounded the aircraft—the costs here are either the cost of a temporary replacement or the lost value of an activity (we'll do some digging on what was assumed in the reg eval for the AD)

Strawman Proposal

1. Does compliance time allow the work to be fit into a scheduled letter check?
   a. If yes, see 2 to 4 below
   b. If no, see 5 below
2. If yes, does implementation add to out of service time?
   a. If yes, add downtime costs using the monthly lease rate for the aircraft converted to an hourly basis (this is the minimum—see revenue loss below)
   b. If no, no downtime costs, just incremental cost of performing work
3. Costs of performing work
   a. Labor, materials and overhead—"shop rate"
   b. Costs to open and close aircraft unless the area would have been opened concurrently with the other work being performed (e.g. aircraft in D check and panels for AD would have been opened as part of the D check)
   c. Value of maintenance work brought forward (if any)—time value of money or cost of having smaller work packages—any way to get a standard value or rule of thumb on percent of work brought forward in relation to AD compliance cost? One interpretation is that these should not be counted as a cost to rule being analyzed because they relate to an existing regulatory requirement, and carriers are required to comply by law.
4. Value of downtime (out of service) costs
   a. Hourly cost of operating lease, or
   b. Lost revenue for time out of service less the avoidable costs of producing the revenue—this assumes that the airline loses the production of the flight hour. However, it is likely that the passenger will still travel on another flight, either by that carrier or another carrier. Thus this assumption should be examined critically.
5. If compliance cannot be accomplished at the same time as a letter check

a. Cost to open and close the aircraft

b. Downtime valued either as lease cost or foregone net revenue

c. Cost of performing required work

d. Cost of bringing maintenance forward as time value of money and smaller work packages

Example of Strawman Costs B-737-800/900

- Monthly operating lease rate: $250,000 (approx)
- Number of aircraft reported in Form 41: 267
- Block hours per day: 9.6
- Flight hours per day: 8.1
- Lease cost per block hour: $868
- RPMs per day: 408,340
- ASMs per day: 564,319
- Average stage length: 1,034 miles
- Cost per ASM: 3.8 cents
- Costs per block hour: $2,214
  1. Crew: $746
  2. Fuel/oil: $595
  3. Rentals: $328
  4. Depreciation: $202
  5. Insurance: $16
  6. Taxes $35
  7. Direct maintenance: $139
  8. Maintenance burden: $139
  9. Other: $14
     - Revenue per day at 11.3 cents average yield: $46,142
     - Revenue per block hour: $4,807
     - Avoidable costs per block hour:
       1. crew avoidable: $734 (less crew, fuel and direct maintenance)
       2. crew not avoidable: $1480 (less fuel and direct maintenance)
       3. other airline costs, not included in aircraft operating, may be avoidable if it is assumed that the flight does not take place.

- Net impact per hour is either the hourly lease cost ($868) or the flight revenue less avoidable costs, which ranges from about $3,300 to $4,100 per block hour, if one assumes that the flight hour is lost. However, in the latter case, the traffic may still be carried on another flight. In addition, to the extent that the passengers did not travel, there would be other avoidable costs that are not aircraft related. This could reduce the estimated impact considerably.

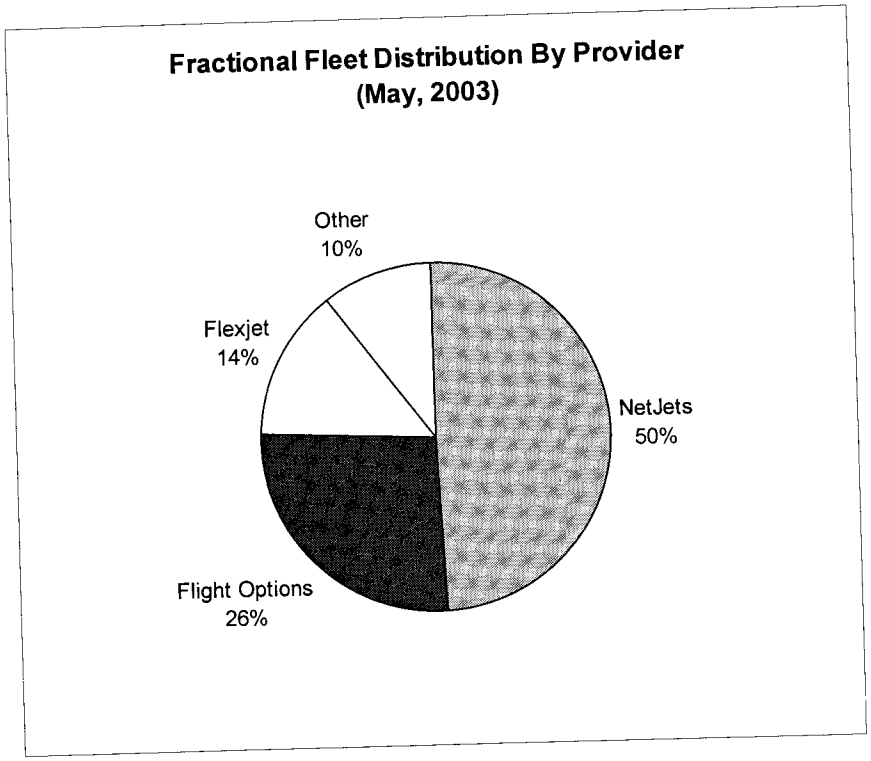
Alternate to Strawman

- Market value of aircraft: $30,000,000
- Carrying cost at 7%: $2.1 million
- Hourly carrying cost at 3,000 hours utilization: $700
- Implication is that this is close to hourly lease cost

Issue Paper #9

Fractional Aircraft Ownership
(Source: UBS Investment Research: June Business Jet Monthly)

- 3 providers dominate the fractional market with more than 90% market share:
  - Flexjet (15% market share)
  - Flight Options (32% market share)
  - NetJets Inc (46%market share)
- Total number of fractional shares was 5,985 at the end if May, 2003 (about 15% higher than year-ago levels)
- However, the number of shares sold (64 in May) is decreasing: "One a year-over-year basis, fractional share sales were down 60% in May (47% on a three-month rolling average basis) as monthly sales remain far below the peak of approximately 200 shares sold in December 2001" (UBS 39)
- The total number of fractionally owned aircraft continues to grow: in May, 2003 the total fleet size was 797:



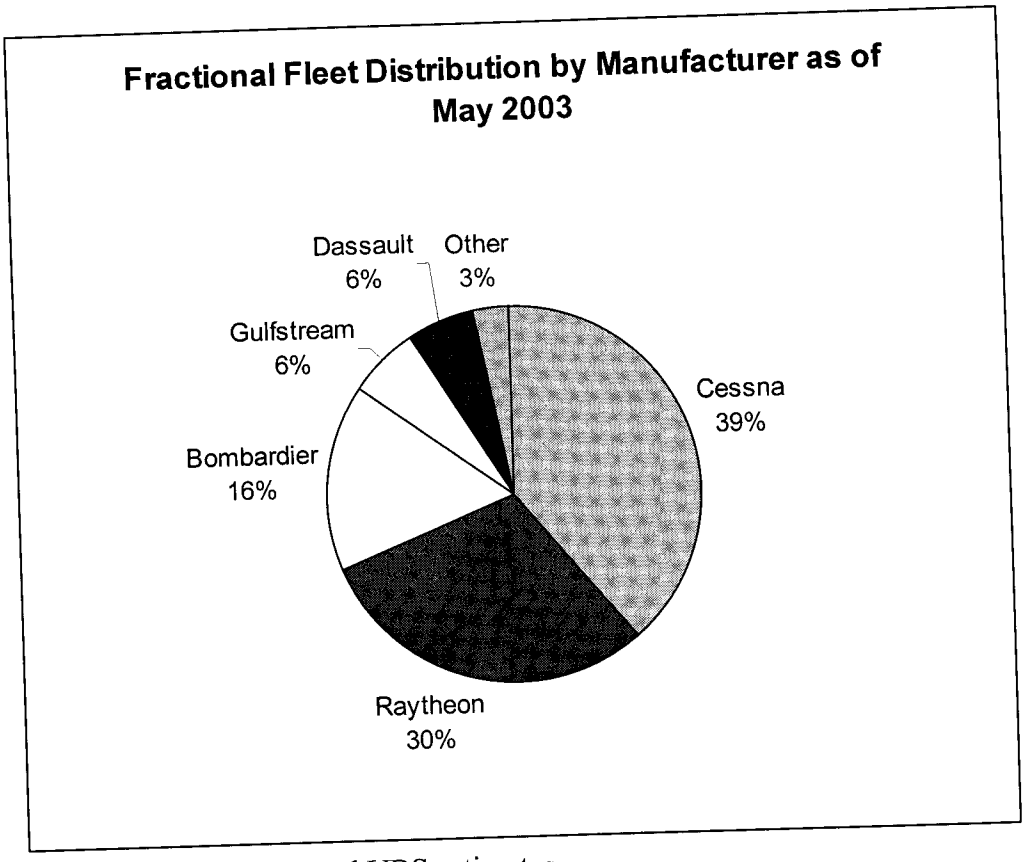
Source: AvData Inc. and UBS estimates
Date: May 2003

Fractional Fleet-Average Age by Provider		
Fractional Provider	No. Aircraft	Average Age
NetJets	392	4.8
Flight Options	210	9.7
Flexjet	113	4.4
CitationShares Sales	35	2.8
PlaneSense	9	3.7
AirSprint	8	3.9
Executive AirShares	4	4.5
Jet Linx Aviation	4	18.8
Skyline Aviation Services	3	1.8
Summit Jets	3	8.5
Jet One	3	20.8
FlightOne	2	19
Skyshare	2	24.5
Aviation One	2	24.5
Executive Aviation Group	2	19
Fractionair	1	22.5
Seven Bar	1	22.5
Jet-Share Canada	1	2.5
The Company Jet	1	1.5
West Coast Charters	1	22.5
Total	797	6.3

Note: NetJets' total aircraft count excludes jets in its aircraft management and charter businesses
Source: AvData Inc. and UBS estimates
Date: May, 2003

- While the fractional fleet continues to grow, the number of aircraft purchased in May remains near a four-year low

- Jets manufactured by Bombardier, Cessna, Dassault, Gulfstream, and Raytheon comprise almost the entire fractional fleet:



Source: AvData Inc. and UBS estimates
Date: May 2003

Top 10 models in Fractional Fleet as of May 2003:

1. Beechjet 400A
2. Citation V Ultra
3. Hawker 800XP
4. Citation V Excel
5. Citation X
6. Learjet 60
7. Gulfstream IV-SP
8. Falcon 2000
9. Learjet 45
10. Hawker 1000

Issue Paper #10

Seat Removal and Spill

Background

Seat removal, loss of seat use and spill are closely related topics. In addition there is the more general case of losing the ability to fill a seat due to regulatory requirements that affect payload range, seating capacities and so forth. These concepts share economic properties that make it worthwhile to treat them together.

Definitions

- Seat removal—seats that must be physically removed from an aircraft or not installed because of a regulatory requirement.
- Loss of seat use—a seat that cannot be filled because of a regulatory requirement. This can occur under two circumstances:
    - The seat is lost for specific flights because of aircraft performance limitations or other regulatory requirements.
    - The seat cannot be used on any flight—this likely reverts to seat removal at some point because there are costs to maintain and refurbish the seat. These could be avoided if the seat were removed.
- Spill—the inability to accommodate passengers on their desired flight because of a lack of capacity. The same carrier can carry these passengers on another flight; the passenger can move to a competitor's flight or not make the trip at all. Spill is controlled via yield management, and the objective is to spill those passengers who pay the least. Boeing has a spill model that has been adapted for use by many airlines.

Problem Statement

In many cases the flight would have departed without every seat filled so there may be no revenue loss associated with losing a seat. The frequency at which all seats are sold is likely to be a function of load factors, time of day, day of week, market type and seasonal considerations among others.

Valuing the actual loss of a passenger should consider that yield management has the objective of retaining the highest fare passengers and, if spill occurs, it is the passengers who paid the least who are not accommodated.

The ability to manage spill precisely depends, in part, on how far in advance the seat loss occurs. In the case of seat removal, the reduced number of seats becomes the available inventory for sale.

Carriers manage seat inventory over time, opening and closing discount seat availability to reflect the demand for the specific flight and to maximize revenues. Carriers often sell more seats than are available because of no shows. The payment of denied boarding compensation limits how oversold a carrier will allow a flight to get. (Flights are also likely to have a unique history regarding no shows).

A carrier would prefer to spill passengers onto its own flights rather than turn the passenger over to another airline. In determining societal impacts, revenue transfers among carriers should not be considered.

Not much has been for general aviation seat losses, although loss of seat is likely to have more disruption with fewer seats and fewer schedule choices.

Prior Research

FAA has commissioned a few papers that looked at valuing seat removal. These have incorporated concepts of spill. These studies have considered the episodic loss of a seat due to performance requirements. The studies were based on interviews of carriers, Boeing and others in the yield management business. Two types of cost estimates were prepared for the loss of a seat:

- Aggregate—maximum cost to remove one seat is no more than $16,000 per year
- Diversion to non-peak—passengers spill to another flight and cost is negligible at $2,000 to $4,000 per seat
- The above numbers are based on assumed revenues and demand elasticities

There is paper by Li and Oum[2] that relates observed load factor (OLF) to the nominal load factor (NLF--how many passengers wanted to fly), the capacity of the aircraft (C), coefficient of variation in demand (CV), the spilled passengers (SP), and the assumed form of the distribution of demand. It identifies a fundamental relationship between load factors, capacity and spill:

$$OLF = NLF - SP/C$$

The paper has a matrix that, for various values of CV, the assumed distribution of demand (normal, logistic, log-normal and gamma) and the observed load factor, provides the corresponding NLF. Two things are apparent:

- The CV has a big effect on the relationship between NLF and OLF—the more variability in demand the lower the OLF needed to produce the same NLF; for example the NLF exceeds one at an OLF of 0.7 when the CV is 0.8, while the NLF exceeds one at an OLF of about 0.95 when the CV is 0.2.
- The distribution type matters more for higher values of CV

[2] Michael Z. F. Li and Tae Hoon Oum, "Airline Spill Analysis—Beyond the Normal Demand" ***European Journal of Operational Research***, 125 (2000) 205-215

Potential Approaches

Obtain ARCC input on existing literature and contact points within airlines and carriers for more substantive discussions.

Examine Juba rule of thumb—lose seat 50% of the time at $80 incremental revenue.

- Assume 3500 hrs per year
- Two hour segment
- 50% of time lose seat
- 875 seats lost
- $80 one way revenue
- Annual revenue loss of $70,000 per seat
- Need to net out costs

Examine implications of treating a permanent seat loss as an ASM cost increase based on change in seats

- Concept is that loss of seat changes capacity for that fleet of aircraft and it cycles through decision-making, overbooking policies, and yield management
- What costs are relevant? Direct, total, total less costs attributable to passenger, etc.
- A loss of one seat on a 100 seat aircraft is about a 1% change in costs
- Using an ASM aircraft cost for a 737-800 of $.038 and 564,319 ASMs per day, the annual cost of a seat is about $78,000
- Is a load factor adjustment appropriate?
- Aircraft are not perfectly divisible in seats so there always is some compromise between ideal aircraft for a specific flight and the size of aircraft in the fleet.

Examine the implications of using the Li and Oum generic matrix (below) to determine the number of potentially spilled passengers

- Works for any seat size aircraft
- OLF should be obtainable from T-100; the calculation of CV requires more discrete data on load factors (if guidance on CV approximations could be obtained from airlines, our estimates of spill would be significantly more precise); OLF should be available on a segment basis from T-100 but this will be an average value of carrier, aircraft type and segment flown. The key is whether there is more variability within a carrier's flights in an O-D market at a specific time of day with a specific aircraft type. This can be an issue to raise with airline ARCC members. (As noted below, Boeing has an estimate of CV.)

Table 1

A paper by Swan[3] provides some information on values for the CV, which he calls the K-cyclic factor. These are illustrated below:

Table 2: Typical K-cyclic Values

Case	Day	Month	Season	Year
Flight Leg	0.00	0.30	0.32	0.36
Aircraft Increment	0.18	0.35	0.37	0.40
Fleet	0.32	0.44	0.45	0.48

The question at hand is determining the passengers lost for a reduction in one available seat on a flight. This is a function of the observed load factor for the flight. We can calculate the number of spilled passengers (SP) as a function of capacity (C), the nominal load factor (NLF) and the observed load factor (OLF) by the following:

$$OLF = NLF-SP/C$$
$$SP=(NLF-OLF)*C$$

If we assume a CV of 0.5, a normal distribution, a 150 seat aircraft, and an observed load factor of 0.801, then the NLF is 1.0. In turn this implies a total spill of (1 - 0.801) * 150, or about 30 passengers. If we assume a one-seat change in capacity, then the change in spill is approximately 0.2 passengers. Given, an assumed CV of 0.2, 0.5 and 0.8, the table below reports the change in spill for a one-seat change in capacity. The number of spilled passengers per seat increases as the coefficient of variation in demand increases and as the observed load factor increases.

[3]Dr. William M. Swan, **Spill Modeling for Airlines**, Boeing Commercial Airplane Company (2001)

Table 3

Spilled passengers (assuming a one-seat change in capacity)

	CV=0.2				CV=0.5				CV=0.8			
NLF	A	B	C	D	A	B	C	D	A	B	C	D
0.667	0.001	0.001	0.002	0.001	0.028	0.028	0.041	0.039	0.087	0.082	0.098	0.104
0.733	0.002	0.003	0.004	0.003	0.050	0.048	0.061	0.060	0.124	0.117	0.126	0.137
0.800	0.008	0.009	0.011	0.010	0.079	0.075	0.086	0.087	0.168	0.159	0.159	0.174
0.867	0.022	0.021	0.026	0.025	0.115	0.108	0.116	0.119	0.215	0.204	0.195	0.215
0.933	0.046	0.043	0.047	0.047	0.154	0.147	0.149	0.155	0.265	0.253	0.233	0.257
1.000	0.080	0.076	0.079	0.080	0.199	0.191	0.187	0.195	0.319	0.306	0.275	0.303
1.067	0.123	0.120	0.119	0.121	0.248	0.239	0.228	0.239	0.375	0.361	0.319	0.351
1.133	0.172	0.170	0.167	0.169	0.299	0.290	0.272	0.285	0.432	0.417	0.364	0.399
1.200	0.227	0.226	0.221	0.223	0.353	0.344	0.320	0.335	0.491	0.476	0.412	0.450
1.267	0.286	0.286	0.280	0.282	0.408	0.401	0.371	0.387	0.552	0.537	0.462	0.503
1.333	0.346	0.347	0.340	0.342	0.465	0.458	0.422	0.439	0.612	0.597	0.512	0.556
1.400	0.410	0.411	0.404	0.406	0.524	0.517	0.477	0.495	0.675	0.660	0.565	0.611

A=Normal; B=Logistic; C=Log-normal; D=Gamma.

For typical values of observed load factors the Li and Oum model suggests that about one-third of a passenger is lost for each seat removed. This is somewhat less than Juba estimates. However, using these lost revenue values produces an estimate that may overstate the impact because there are incremental costs avoided if a passenger does not fly and the passenger may be accommodated on another flight. In the latter case, there would be some loss of utility because the passenger is traveling at other than the desired time. Additional data from carriers on the ability to rebook spilled passengers on other flights are needed as well as estimates of the net loss if a passenger decides not to fly.