

TRANSPORTATION RESEARCH
CIRCULAR

Number E-C051

January 2003

Future Aviation Activities

12th International Workshop

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

Future Aviation Activities

12th International Workshop

Sponsored by

COMMITTEE ON AVIATION ECONOMICS AND FORECASTING (A1J02)
COMMITTEE ON LIGHT COMMERCIAL AND GENERAL AVIATION (A1J03)

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Foreword

The 12th International Workshop on Future Aviation Activities was conducted by the Transportation Research Board on September 18–20, 2002, at the National Academy of Sciences in Washington, D.C. This workshop, the most recent in a biennial series that was initiated in 1979, was carried out with support from the Federal Aviation Administration to provide input to public- and private-sector managers and decision makers on forecasting long-term trends and developments in commercial, business, and personal air transport. Focus was on the post-September 11 environment. Topics discussed include the domestic and international macroeconomic outlook; the structure and operating patterns of major and regional American air carriers; expected developments in international aviation, air cargo issues, aircraft, and engine manufacture; trends in business aviation, including fractional ownership; civil helicopter transport services; and the improving future for personally owned and operated light aircraft.

Nearly 150 participants, drawn from government, industry, academic institutions, and private consulting firms both here and abroad, took part in this 3-day meeting. Many came from the United States, in addition to substantial representation from Europe, Asia, Latin America, and foreign firms with offices in the United States.

The program consisted of three major segments: an opening plenary session with presentations on the broad outlook and strategic issues; nine concurrent discussion panels on sectoral trends and problems; and a concluding plenary session in which panel discussions were summarized.

TRB deeply appreciates the gift of time and the thoughtful contributions of the distinguished experts who attended the workshop. Special acknowledgment is due to the workshop cochairs—Mr. Gerald Bernstein of the Stanford Transportation Group and Professor Gerald S. McDougall, Dean of the Harrison College of Business at Southeast Missouri State University—for planning and organizing this endeavor and for overseeing preparation of this report.

Workshop participants represented a diverse set of views from throughout the aviation community. Given the broad range of perspectives, the observations and suggestions voiced at the workshop were varied and sometimes even at odds. Although some of the views reported here were widely held, they are not to be construed as consensus findings or recommendations of all the participants or of the members of the steering group.

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Introduction

The workshop opened with an introduction by Louise Mailett, Acting Assistant Administrator for the FAA's Office of Policy, Planning, and International Aviation. Robert Bowles, FAA's Manager of Statistics and Forecasts, then outlined the latest aviation trends, summarized the development of the FAA draft forecast, and charged the panels to examine and challenge all aspects of that draft forecast. Their welcome was followed by four distinguished plenary speakers. Douglas Runte, Executive Director of the Fixed Income Division of Morgan Stanley, provided insights into the market's financial view of the air transportation industry. Mary Rose Loney, President and Chief Executive Officer of the Loney Group, then summarized the issues and challenges involved in providing airport security, capacity and convenience. Rollie Vincent, Cessna Aircraft Corporation's Vice President for Strategic Planning and New Business Development, addressed a range of opportunities, efficiencies, and the changing environment for general aviation (GA). The final plenary speaker was Kevin Mitchell, Chairman of the Business Travel Coalition, who offered a unique perspective from the viewpoint of large corporate buyers of air transportation services.

By addressing the post-September 11 environment and issues facing major and regional airlines and the GA community, the plenary speakers provided thoughtful insights to the panel members who were then charged with looking into the future and comparing their outlook with that of the FAA. Each individual was assigned to one of nine panels. These panels addressed the following areas: domestic, regional, and international airlines; business aviation; light/personal GA; vertical flight; air cargo operations; airports; and fleets and manufacturers.

Introductory Presentations

WELCOME

Gerald W. Bernstein

Stanford Transportation Group

Welcome to the 12th International Workshop on Future Aviation Activities. This is conducted by the Transportation Research Board (TRB) on behalf of the FAA. I'm Gerald Bernstein, Chairman of the TRB's Committee on Aviation Economics and Forecasting (A1J02). In my spare time, I am Managing Director of Stanford Transportation Group, an aviation consultancy based in San Francisco. I am co-chairing this event with Gerry McDougall, who is Chairman of the TRB's Committee on Light Commercial and General Aviation (A1J03) and Dean of the College of Business at Southeast Missouri State University.

As many of you know, this workshop is rescheduled from September 12 of last year. I know from speaking with many of you that you spent 1 week in a city somewhere that was not part of your original itinerary in trying to get here. On behalf of the TRB and FAA, I want to thank you for your perseverance in returning to this event this year. Your willingness to participate is recognized and appreciated.

There aren't many formal opening remarks. Many of you who have attended in the past are aware that this is a workshop and not a conference. The people here are selected to provide background information. They have been chosen for expertise in a number of critical areas to the aviation community. But, this is essentially not a conference with time spent by us talking to you. This is really for you people in your panel sessions to be critiquing the numbers that the FAA is proposing as draft forecast numbers, to discuss industry issues, and to provide information that will be used and will become public next March when the FAA holds its forecasting conference. So, this is really a working session and, indeed, workshop is the correct name for this.

I'm not going to go through event by event. But, just by way of setting the overall schedule, this morning we have a number of formal speeches. For the breakout sessions during the afternoon, there will be a mix of discussion and formal presentations. Thursday is the real backbone of the conference—the working sessions. At the end of Thursday afternoon, the panel chairs meet to put together their draft presentations. On Friday morning, the closing plenary will provide everyone with an opportunity to hear from the other panels. The chairmen of the panels will be presenting to the plenary session the findings of their panel, so you get to hear what kinds of discussions or issues were covered by the other panels.

Before I start the formal introductions of the speakers, I would like to recognize a few people who have made this conference possible. We have about 150 attendees this year. That is about a 50% increase from the normal number. I think it speaks to both the diligence of the panel chairs, as well as perhaps for all of us in the industry who have a “need to know” to get together and say what's happening with people in our respective sectors.

I would like the panel chairs to be recognized for the work they have done: Anne Strauss-Weider for air cargo; Tulinda Larsen for regional aviation; Joe Schwieterman for domestic airlines; Rich Golaszewski and Charles Chambers for international airlines; Gerry McDougall for business aviation; Ron Swanda for general aviation (GA); Dave Lawrence for vertical flight;

Geoff Gosling for airports; and Derrick Maple for large transport. I want to thank you all very much for organizing this.

Finally, a workshop like this doesn't just happen. You don't get 150 participants together in a year's worth—and in our case, 2 years worth—of behind-the-scenes planning that is needed to make it happen. Chairpersons and chairs need to be identified and contacted. We need to be reminded about due dates. The budget needs to be established with the FAA. The invitations need to be sent out to more than 200 people. The return invitations need to be logged in. The panel chairs need to be reminded again about due dates. Meeting support and space needs to be arranged. Dinner arrangements need to be made. We need to be reminded again about due dates. So, there is quite a lot of work behind the scenes by TRB staff that goes on to make this happen. In particular, two staff people have been doing this over and above their regular jobs, and those would be Joe Breen and Nancy Doten. Thank you very much for organizing this session.

FAA WELCOME

Louise Maillett

Federal Aviation Administration

Thanks for that introduction. I'd like to welcome you. I'm the exception to the rest of this panel. I'm one of the people here who doesn't have any expertise. My function here is to say thank you for coming and to welcome you to this workshop. This is, as Jerry said, an extraordinarily important time for us in the aviation industry and specifically for us at the FAA in the area of forecasting.

Forecasting is something we have done for many years with your help. In fact, this is the 12th workshop that we have had. Some of you I recognize from previous workshops. We use the forecasting information we get from here and other sources for a lot of things in the FAA. It is an essential part of our planning and our activities at the FAA.

To just mention a few things, we use it for purposes of planning our budget and for planning our staffing in our capital expenditures. In fact, this is perfect timing because next week we are going to be going to the Office of Management and Budget (OMB) to talk about our forecasting and what do we really see, given all the uncertainty, as part of our budget discussions. So, I will be listening very carefully. I won't be here for much of today, but I do want to come back on Friday to hear the reports because what we hear from you will help to refine us in our discussions on those things such as budget and capital expenditures.

But, it is also something that we use in other parts of the agency for purposes of forecasting our trust fund revenues—now that our trust fund revenues to the agency are tied into what comes into the trust fund. It is of more interest than in the past. We also use the data when we do our cost-benefit analysis for rulemaking—something very important to many of you out there. It is very important for this type of forecasting. We also use it for purposes of calculating accident rates in our safety area. So, pretty much every part of the FAA uses the forecasts that we pulled together with your help. I'd like to think that not just the FAA uses those forecasts, but that you all find it of use in your endeavors as well, so that it is something that is mutually beneficial for us to have a forecast that is on target. I think we have a pretty good record when it comes to having a good, solid forecast. There are some events that nobody can foresee. Obviously, September 11 is one of those.

I do want to digress. As you know in the FAA, September 11 was a busy time, and, in fact, the 12th forecast conference went out the window very quickly, as you all know. One thing that I have to say a thank you for is that not many of you called. I've got to tell you that from September 12 onward, the number of calls I got from people who were stranded around the country saying "how do I get home"—I have to say that most of you did not call me and ask that question. So, I have a personal thank you to all of you because there were a lot of things going on, as you know, and we had more heads of state in the United States during that day than you can even imagine. Most of them were prime ministers that had to get home by a certain date, and all of them were on our phones trying to get a special exception for themselves. So, the fact that all of you did not call and say, "the workshop," I really appreciated it.

Coming back to today, I want to thank all of you for being here. We will use the information that you give us. We need to. We always have relied on you for two things: to help us in the methodology of forecasting and make sure we have the right methodology, and also to look for just basic common sense on what do you think is going to happen. That type of personal expertise and knowledge is always invaluable, but this year it's even more than normal. So, I think this will be a very useful workshop, and I think it does give us the opportunity to really have people sit around and talk about this rather than just being lectured. So, I'm glad its going to be very participative.

The other thing I would like to just recognize—in addition to thanking Jerry Bernstein and Gerry McDougall for their work here and to Joe [Breen] who is invaluable—is that every time we have a tough issue such as congestion, we always turn to Joe to help us weigh out the issues and get the right people in the audience. But, I'd also like to thank the folks who have come from overseas. The international component of our forecast is very important to us. Again this year, I think the methodology is always important, but the personal perspective—the personal expertise—is very helpful. I think having an international perspective really will help our conversations over the next couple of days.

Again, let me just thank you. I apologize that I've got to leave, but as Jerry [Bernstein] said, we have a new administrator, and I have a meeting with her. So, I think it is a wise decision, at least in the short term, but I will be back and I look forward to seeing you tonight and on Friday, as well. So, thank you very much for coming.

LATEST AVIATION OUTLOOK AND TRENDS

Robert Bowles

Federal Aviation Administration

I would like to second Louise in welcoming all of you to the 12th International Workshop on Future Aviation Activities, which we more commonly refer to as the forecast assumption workshop. This big crowd that we see here—the 150 people in attendance—makes us think that maybe we aren't the only people that don't know what is happening in the industry now. So, maybe we can start with that.

The FAA forecast cycle begins around the first week in October, so the timing of this conference couldn't be more perfect. Normally, we ask the workshop attendees to critique the forecasts that we developed and finalized last January and then publish in March for the forecast conference. However, things are moving so quickly within the industry that we wanted you to review our latest forecast—the ones we used to revise in June of this year. And, even those

forecasts may have been rendered obsolete now by the recent announcement by some of the major carriers.

What I would like to do this morning is briefly discuss the recent economic and traffic trends, as well as some of our revised assumptions and projections of aviation demand. I also would like to provide some direction to the individual panels on what my staff and I consider to be the important issues and/or trends impacting aviation demand for the next several years. It is on these issues that we seek your expert opinion and input.

Other than the acknowledgement of long recession in 2001 and somewhat stronger activity in 2002, there is very little difference in the economic projections that we used in either the March or June forecasts. The June OMB economic projections still call for approximately 3.2 percent annual growth in the U.S. Gross Domestic Product (GDP) over the forecast period. However, the recent corporate accounting scandals, combined with the floundering stock market, have led some economic forecast services to lower their short- to medium-term economic forecasts. DRI, which is the green line on the chart, now projects slower economic growth through 2007.

The decline in jet fuel prices presents one of the few bright spots for aviation in 2002. While the latest economic projections that we are using call for continued declines in real fuel prices over the forecast period, the recent trend appears to be upward.

The outlook for world economic growth has also changed very little from the economic projections we used in March. However, a recent announcement from DRI-WEFA entitled "Are We Heading for Global Stag-flation?" raises the possibility that Europe and Japan may both be headed for a double dip. In addition, the current economic problems in Argentina and Brazil show no signs of lessening.

The starting point in preparing the 2002 and 2003 commercial air carrier forecast was the 1-year schedules published by the Official Airline Guide, which we then adjusted for industry carrier input and analyst expertise. Traffic was then projected using assumptions as to load factor, average aircraft size and stage length. Last March, we projected that U.S. large carrier domestic capacity would recover gradually from the 20% cut-backs announced in September and October, with annual capacity levels recovering to pre-strike levels in 2003 to 2004. Although the recovery in 2002 is somewhat stronger than we projected in March, the recently announced restructuring and schedule cutbacks will result in significant schedule reductions this fall, and this could push the recovery period beyond 2003–2004.

Domestic air carrier traffic is also stronger than we projected last March, while international traffic will be about as predicted. Unfortunately, the stronger-than-expected gains still reflect a 10% decline in domestic traffic over 2001 levels, and more importantly appear to have been purchased at the expense of industry profits. Although air carrier traffic has shown improvement throughout the year, it now appears that the recovery has stalled and could, when combined with fall schedule reductions, weaken in the months ahead.

Passenger yield started to decline in early 2001 largely as a result of the U.S. economic recession, which brought about a dramatic shift in the passenger mix from business to leisure. Passenger yields have recovered somewhat from the depressed levels immediately following the events of September 11. However, uneconomic fare levels and a slower than expected return of the business travel have, given the current airline cost structure, left domestic passenger yields at historically low and uneconomic levels.

As a result, U.S. airlines have experienced large losses for five consecutive quarters and are expected to lose an additional \$7.0 billion in 2002. In addition, many Wall Street analysts are

predicting that losses will continue well into 2003, and some expect 2004 to be a break-even year at best.

The revised June forecasts have air carrier and domestic passenger demand returning to pre-September 11 levels by the end of 2003, with demand actually exceeding the March forecasts over the remainder of the forecast period. Given the events of the last several months, the June forecast could be somewhat optimistic, especially in the immediate short term.

Our latest forecasts of international passenger demand are basically unchanged from the projections we made in March. However, the sluggishness of international travel this past summer could also call these forecasts into question.

One of the major assumptions we made in preparing both the March and June forecasts was that the long-term relationship in our economic models had not changed and given similar rates of economic growth, demand over the long term should approximate previous long-term growth rates. That is, we assumed that the propensity to travel had not changed. However, signs are increasing that indicate that the industry could be undergoing fundamental structural changes. If true, this not only affects the timing of the recovery, but it also could significantly impact the long-term growth.

Not all sectors of the aviation community performed poorly in 2002. Regional commuter passenger demand appears, for the most part, to have weathered both the economic downturn as well as the events of September 11. This is due to the transfer of large numbers of routes from the larger code-sharing partners from mainline to regional jets (RJs). The revised June forecasts of regional demand in 2002 is 4% higher than the one we prepared last March. Given recently announced capacity cuts by several of the larger mainline carriers, we also may have understated passenger demand in 2003 and beyond. However, the scope clauses of the large carriers could be a major constraint to higher regional capacity and traffic growth. Nevertheless, we expect the demand for regional commuter traffic to continue to grow at rates somewhat higher than that of the larger carriers.

Air cargo freight demand was significantly impacted by the 2001 economic recession, but it appears to have recovered strongly in the business market and is on the brink of recovery in international markets. Based on the wide swings in the demand for air cargo services over the past several years, we expect the demand for air freight to continue to be driven largely by U.S. and world economic growth. However, in July, airmail ton miles are still running 50% below depressed 2001 levels. This large decline is due to a number of factors, including security restrictions on the transport of mail on passenger aircraft and the accelerated movement of electronic alternatives. While we expect the demand for airmail to reverse this downward trend, we do not see the demand for airmail returning to 2000 levels during the entire long-term forecast period.

The resurgence that we witnessed in demand for GA aircraft sales and services over the past 5 years took a double hit in 2001—first from the economic recession and then from the events of September 11. This included the establishment of a number of security restrictions on the operation of GA aircraft, some of which are still in effect today. While some industry statistics will show declines in 2002, the industry has proved that it is able to weather both economic downturns and unfavorable regulation actions—something it could have accomplished several years ago.

Based on the results through July, we expect GA activity at FAA-towered airports to be, at worst, flat in 2002, and up 2% to 3% in route centers. This is outperforming basically the commercial industry. Part of this recent resurgence can be traced to the increased interest shown

in fractional corporate and on-demand charter flying immediately following the events of September 11. The cutbacks in commercial airline schedules, combined with increased check-in and security clearance times at most major airports, has made some sectors of GA a viable alternative to commercial flights. The increased interest is confirmed by FAA flight data that show that business jet activity is up over 30% since September 11. While the personal sport flying continues to show some sluggishness, we expect the sector to turn around as soon as economic recovery gains strength.

To provide some focus to the panels assembled at this workshop, my staff has prepared a list of questions regarding the issues and trends that they consider important in developing next year's forecasts. Before I get to some of these issues, I would like to propose two questions that I would like each of the panels to consider. First is the timing and strength of aviation's recovery from the events of September 11. Second is the question of whether we are witnessing the start of a long-term structural change to the commercial aviation industry. Your answer to this question will not only impact the long-term forecasts but could also impact the timing of the recovery.

First some questions for the commercial industry: Will business demand return, or has the profile of the business traveler changed significantly? Will pricing pressures continue, or will the recently announced capacity reductions allow carriers to hold the line on fares? What will be the impact of the U.S. airlines Chapter 11 and the announced scheduled reductions by the other major carriers? Is this an acceleration of the shift to more operations from mainline to RJs? What are the prospects of the approval of a European single-sky concept and what would the impact be on international demand and competition? What impact will the move toward fee per departure, this is versus prorated fares, have on the financial viability and future demand of the regional industry? Will the current air carrier restructuring result in the elimination of the pilot scope laws? What are the implications of the domestic code-sharing agreements between United and USAir, and Continental, Delta, and Northwest? What are the limits on the growth of the low-cost, low-fare carriers? How or can the industry constrain or lower their labor costs?

For the cargo panel: What are the impacts of the security directives on air freight or airmail demand? What will replace high tech as the next driver of cargo demand? What will be the impact of the U.S. Postal Service contract with FedEx on future growth? What are the impacts of competitive factors on future air cargo activity—and this includes the increased use of trucks by integrated carries—and intermodal competition and competition for facilities onsite at airports?

While most of the questions we raise for the air carriers and cargo panels also pertain to the fleet panel, there are some additional questions we need to relate to the fleet panel: What are the short- and long-term implications of the major fleet actions since September 11? Does American Airlines' hub restructuring at Chicago's O'Hare and Dallas/Fort Worth (DFW) change the mix of the aircraft required for this type of operation? Is there a saturation point for the number of RJs? Is there a U.S. market for a sonic cruiser and/or large wide-body aircraft—how many, what markets, when?

In addition to numerous questions regarding security issues, airport planners must continue to devise and implement plans to solve future capacity delay problems. Is peak-period pricing the solution for future delays? Is American Airlines' hub de-peaking a potential solution? What will be the impact of the projected rapid growth of the RJs?

The current FAA forecast for the GA fleet and hours flown relies very heavily on the growth rates that are developed during this workshop. Our questions to the GA panels are: Do all

sectors of GA respond to the same stimuli? This includes the business corporate versus pleasure sport flying. What are the drivers of the demand for these two sectors? How will the restrictions on foreign pilot training impact the future demand for GA products and services? Is the increased interest in fractional corporate on-demand charter a short- or a long-term phenomenon? What will be the impact of the eclipse aircraft on future activity and services?

When we started preparing our forecast last October, there were a lot of uncertainties and very little data to provide us with any answers. They say that ignorance was bliss, and maybe it was. But, to the credit of my staff, I think we provided aviation planners with a very credible set of forecasts, and for the most part, our forecasts for 2002 were right on. As we gear up for October, we find that we have a lot more data, but the questions and uncertainties have become more complex. This is where we need your assistance and expertise. Your answers to the questions that I have posed will go a long way in helping us develop a set of credible and accurate forecasts this fall. You have an important task ahead of you.

My staff and I will be available to you throughout this workshop to answer any questions you may have regarding our forecasts or the assumptions that underlie these forecasts. Again, my sincere thanks to all of you for taking time out of your very busy schedules to assist my staff in helping us develop the most accurate forecast that we can possibly do. Thank you.

THE MARKET VIEW

Douglas Runte

Morgan Stanley

It is a great pleasure to be here today at this conference in front of such a distinguished group of experts. Looking at the list of attendees, I actually see many of the sources for some of the research that I do on Wall Street.

A little bit of housekeeping—in this Wall Street environment, it is probably good to say that my firm, Morgan Stanley, is advising United Airlines in its application for a loan guarantee with the Air Transportation Stabilization Board. I wanted to disclose that up front. Also this week, we were an underwriter for a \$600 million debt issue for American Airlines. So, I am precluded somewhat on what I can say on each of those carriers in specific.

I also would like to mention that I'm a debt analyst, and debt analysts, in contrast to some of my equity counterparts, tend to be gloomier. Our bankers always say there is a dark cloud over my head. So, if Internet analysts on the equity side have a bright, sunny, smiley face, I've got a dark cloud above mine.

My 17 years of experience in the industry have all been on the financial side. I really defer to the people in this audience for so much of the other stuff that goes on in the industry. I have done airline debt, aircraft debt finance, and also airport finance. In summary, I'm a debt guy. Why have a debt guy here? I think normally it is tradition at these types of conferences to have an equity analyst—someone like a Sam Buttrick or my colleague, Kevin Murphys, in equity research. I think the reason I'm here is probably because they weren't available. But, I would like to think there is another reason.

It is the debt market that makes this industry work—which provides the financials to provide funds to build airports, to buy airplanes, to build maintenance hangars. As an example, since 1995, the corporate bond market has raised \$45 billion for the airline industry in the United States alone. That financed more than 1,200 new aircraft. So, when you see Continental's ads

about its new fleet, that money came from the corporate bond market. Add to that the municipal bond market, which finances many airport facilities—that is over \$15 billion of issuance since 1995. I believe that is a underestimate—it is probably closer to \$20 billion.

So, basically in the last 7 years, the debt market has provided \$60 billion to \$65 billion of funding for the airline industry. In contrast, the equity market, notwithstanding the well-deserved and well-publicized success of the JetBlue initial public offering (IPO), has raised less than \$4 billion. Internal cash generation adds somewhat to that, but still it is dwarfed by the debt market. I think that is also an example of a problem in the industry that I will talk about a little later.

I would really like to discuss three topics today: the state of the industry prior to September 11, the impact of September 11, and the market outlook from the perspective of an airline and aircraft debt financier. I'm really going to focus on the first and the last. The middle thing is pretty obvious.

It is easy to blame the industry's problems on September 11. I think it would also be wrong. September 11 brought many in the industry to their knees, but many were already stumbling well prior to September 11. All but three of the largest airlines reported losses in the first half of 2001—that is pre-September 11. Most had losses that at least prior to September 11—when losses really began to hit—we considered startling, if not horrific. Of course, after September 11, we wished for those days of rather modest losses in retrospect.

Why did that happen? Well, I think there is enough blame to go around and you will see why I'm a debt analyst. I'm going to be pretty candid and throw some stones and be a little bit self-deprecating. I think some of the blame goes to the airlines, some goes to airline labor groups, and also to my community, airline and aircraft financiers, and the debt market.

Starting with the airlines, I think in a buoyant revenue environment, there may have been a little loss of focus on necessary cost controls. This is largely a commodity industry and basic economics say that in commodity industries, cost control is critical. Most importantly, I think some failed to show the necessary tough love with their labor groups. One large carrier in Chicago in 2000 comes immediately to mind.

Let's segue right into labor in the interest of brevity. There was a great quote from a pilot leader at that Chicago-based airline in 2000, which I think did a wonderful job of summarizing some of the problems in this industry. The quote came from Captain "Mad Dog" Dubinsky, as he is fondly known. He said, "It's my job to squeeze the neck of the golden goose so hard it lays a golden egg but not so hard that I kill it." It came after the record-setting contract in 2000, which even then appeared unsustainable, and in retrospect brought on in part a whole litany of problems for the airline industry. Tough love is necessary. Airline unions have immense power in this industry. Pilots, in particular, can bring an airline to its knees and bankrupt even the strongest carrier in a period of months. It is an immense bargaining power and it needs to be used appropriately. I would say that the golden goose is probably in critical condition at a number of carriers. That critical condition, in some ways, may lead us in a strange way to some solutions for the industry's problems.

I also want to be clear about something else. This is still a "golden goose industry"; for many—from labor to aircraft financiers to lessors—it is a very profitable industry. There is a very great saying that no one has ever earned an adequate return on their airline industry. Well, that is really equity. Equity is an important component of things, but there are other stakeholders—labor in particular—that have enjoyed super-normal returns.

Now that I've thrown stones at management and labor, let's throw some stones at my community and myself—the aircraft financiers. The aircraft finance community really wrote the

checks that allowed the airlines to continue to grow airplanes and pay generous wages. The bond market allowed airlines to finance aircraft at rates that were exceptionally attractive, while at the same time buying back stock. In retrospect, perhaps some of that money could have been better applied to shoring up balance sheets. But where the debt market remained open and allowed you to finance an aircraft with an average coupon and interest rate of 7%, the idea was why use your own cash and instead turn to the debt market.

Perhaps the most egregious example is one of the carriers that was up there earlier, USAirways. Between 1998 and 2000, USAirways took \$2.0 billion of hard-earned money and used it to buy back stock. An airline exists for equity returns, but there also comes a point of fraudulent conveyance. Would USAirways have been in bankruptcy if that \$2.0 billion had been used to buy-down debt—to buy airplanes with cash instead of debt? I don't know. The problems at USAirways were pretty profound and maybe the carwash of bankruptcy was inevitable. I don't think so, but maybe it was. But, \$2.0 billion in an awful lot of money not to reinvest in your business.

So, what about September 11? We started to see recovery in the first quarter of the year. The bond market improved. The equity market improved. The market opened up to new capital. But, as was alluded to, recent results have been far less sanguine. The other thing about September 11 is just given the inherent economics of the airline industry and particularly some of the union contracts, revenue declines were matched with unit-cost increases. That is a frustration for a financial analyst to be looking at that diversion. But, that is, in fact, what happens. I guess the financial analyst in technical terms would call it a very bad thing.

In my market, the corporate bond market, the result of September 11 was swift. We saw corporate bond prices plunge from 100 or 95 cents on the dollar down to 50 cents on the dollar. Yields on airline debt approached levels that we normally associated with Third World countries in the midst of a coup. Debt of Delta Airlines—previously an investment-grade airline with a strong balance sheet that was doing relatively well from a debt balance sheet perspective—went from 90 cents on the dollar down to the 60s and 70s. United Airlines—I can say this because it is a fact—went from prices in the 80s down to prices as low as 7 cents on the dollar. Implied interest rate on something like that, which is between 50% and 75%, makes a long/short look pretty attractive.

It is interesting, though, that not all airline bonds traded to those levels. Airline bonds that were backed by physical assets—either airports, which we will hear about later, or aircraft, which are pieces of metal—actually held up relatively well, meaning interest rates of 15% instead of 25% to 35%. But, for good aircraft and good airports, the bond markets remained open, and relative yields were okay.

Finally, on a personal note, September 11 brought a professional change for me. I had previously been in investment-grade research covering the best bonds. I actually was transferred about September 14 into high-yield research, and I have also recently been given the cost center of distressed and restructuring. So, I seem to be straddling that as well.

Where do we go from here? The losses that we are seeing are simply unsustainable. These aren't the type of losses that Wall Street analysts have a history of just shrugging their shoulders at and saying it doesn't matter because they are one-time items or fleet restructuring charges that really don't matter because they are not cash. Everyone knew an F100 had a value closer to zero than \$10 million. It is not a big surprise when someone takes a write-off. These are actual cash losses of \$4 million to \$7 million a day, in part during seasons when airlines are supposed to be making money.

So, what do you do to fix things? I think a combination of things. Financial analysis is basically pretty simple. If you are having losses, you increase revenue, you reduce costs, or do a combination of both. I think the airline industry will need a lot of the former and will get help ultimately from some of the latter. But, it is interesting. I spent some time trolling airline employee websites, and when you look at it, it seems like the solution to the problem is really simple. All an airline really needs to do is rationalize its pricing structure, and instantaneously revenues will go up, all will be well, and employees will be okay. That would be nice to have that switch on your control panel where you just boost revenues up. Despite the most sophisticated financial analysis of the airlines, that switch has not yet appeared on the control panel and is largely outside of the control of the airlines. So, I think a large part of the problem is going to have to be solved on the cost side. Given that labor represents an increasing percentage of total expenses, between 45% to 50% of operating expenses in some cases—a number that has been climbing increasingly over the last 10 years—a lot of it is going to have to come from labor. As was pointed out by Mr. Siegel yesterday, in a speech that some of you may have heard at the International Aviation Club, the labor cost increases that were implemented over the last 4 to 5 years were maybe sustainable in a most robust revenue environment in 20 years, but it's not sustainable in anything approaching where we are now.

If an airline does not adjust its costs, the solution is fairly simple—Chapter 11 bankruptcy or the threat of a Chapter 11 bankruptcy. I think that brings us back to that wonderful golden goose statement, because few people have more to lose in an airline bankruptcy than labor unions, particularly pilots. Equity holders, of course, get wiped out. Unsecured creditors wind up getting zero. Secured credits actually wind up doing okay in the history of most airline bankruptcies.

So, I think there is an enormous incentive for the various stakeholders from aircraft lessors to labor groups to participate in restructuring. If they don't there is a section of the Bankruptcy Code which should be in the front mind of any stakeholder. It is Section 1113 and Section 1114. Section 1113 is a provision of the Code that was modified in the mid-1980s, after the first Continental Airlines bankruptcy. It does allow, after a series of steps, a bankruptcy court judge to impose new contracts on unions if it is in the interest of the trust estate, if it is presented fairly, and if management makes a good faith effort. I think in most cases, management is making a good faith effort to work with employees. As Mr. Siegel said yesterday, you do not argue with your spouse and you do not fight with your unions. It is a formula for happiness in life.

So, I think airlines will continue to work. It doesn't mean necessarily that pay cuts are inevitable. We all want to get paid more money. Getting paid more money is a good thing. But, it needs to be associated with productivity improvements. Pay people X amount per hour, but try to increase the hours—or at least the amount of work coming out of those hours. That is something that will be the job of both airline management and airline unions. I think with USAirways, although it did come as a result of a painful bankruptcy or the threat of a bankruptcy leading up to it, we see some signs of solutions.

Here is my final summary of the three areas that I was asked to address from a financial perspective: aircraft, airports, and airline debt. For aircraft manufacturers, the next couple of years are going to be exceptionally difficult. Boeing is already talking down its delivery numbers of 275 to 300 for next year. Other than low-cost carriers who are adding narrow-bodies, every airline that I have talked to is trying to postpone, defer, or cancel just about any new aircraft delivery that they can. Again, the low-cost carries, such as Southwest and JetBlue, are the clear

exception. For 2003, there are maybe 575 mainline deliveries in aggregate. For 2004, it looks like it will be less.

Interestingly, the financial market will restrain that growth. The financial market is willing to finance aircraft, but these days it is only willing to finance the best aircraft. That means new 737s and new A320s. If someone wants a start-up carrier with MD-80s coming out of the desert, good luck finding the financiers to finance that effort in any sort of scale.

With airports, I think the debt market remains open for critical facilities. For less desirable facilities, costs are becoming significantly higher. For airline special facility debt, which is pegged to a particular airline, yields again are reaching 15% to 20% on the tax-exempt basis. That is supposed to be a subsidy. As for keeping rates down, it actually hasn't quite worked out that way.

Finally, for the airlines themselves, as I said, investors are willing to provide money to the airline industry for airlines with well-thought-out prospects and business plans, like JetBlue, which was the most successful IPO of the year. Imagine that—an airline having the most successful IPO of the year. They also are willing to provide capital if it is secured by either aircraft or airports. On an unsecured basis, I have to say right now the debt market is closed at anything except usurious rates. That is, in some ways, a self-regulating mechanism. As financing costs go up, expansion ambitions decrease, fleet additions go down, and start-ups don't materialize. So, with that I will conclude and rejoin the panelists. Thank you.

AIRPORTS IN THE 21ST CENTURY: THE CHALLENGES OF SECURITY, CAPACITY, AND CONVENIENCE

Mary Rose Loney

The Loney Group

Good morning to everyone. Thank you very much, Jerry, for that introduction. I must say that having spent 23 of my 25 years in the aviation industry managing airports that I'm very relieved that I'm not an airport director these days. When I look at my colleagues and the challenges they are facing out in the industry, it is particular daunting, and I welcome the opportunity to spend the next 20 minutes or so talking to you about airports. I welcome the opportunity before the panelists to give you my take and my outlook on airports, as well as to offer to you some strategies that I think are going to be important over the next 2 to 10 years to address needs in the airport industry.

Speaking of strategies, I was really amused by a comment made by Notre Dame's football coach this past weekend, Tyrone Willingham. For those of you who aren't Notre Dame fans, he is in his first year of coaching for Notre Dame. He came into the season unranked and is now at 3-0, and he sees his team now ranked number 12 in the nation. When he was asked about strategies, he said, "You know, I don't have a 5-year plan." He said that after living in the Bay area among all the dot-coms, it changes so fast you can't afford to have a 5-year plan. It is just win today. That's the goal—win today. I think, in many respects, that strategy has been the one that faces both the air carriers and airports over the last year—just win today. But anyway, it is absolutely essential to have strategies, so I welcome the work of TRB in supporting FAA in its forecasting activities.

Since September 11, I think we have seen one of the major seat-changing events in our industry. There have been many—the onset of the jet age, the Airline Deregulation Act of 1978.

But I think the impact of the new security mandates on airports, coupled with the need to continue to pursue capacity initiatives in what is a very tough economy, will be a continuing, challenging era of environmental opposition to airport capacity growth. I think as we address those multiple challenges, certainly the effects on how we address them could have a profound impact on the future of airports.

Now, today I would like to address not only the impacts of the current interim and longer-term new security measures at airports but other factors as well. In particular, this includes the current airline instability and restructuring, as well as other capacity constraints and those factors that are going to affect and shape our airports.

But, before I talk about those, I would like to just give a very brief, historical perspective on airports. With the majority of U.S. commercial airports, you can see that they are relatively a nominal part of the overall number of airports in the United States, but certainly they carry all of our air transportation needs on the commercial side. Interestingly, the majority of commercial air transportation occurs in an adversely small proportion of airports. You would think that with 90% of our scheduled service occurring at the top 70 airports, we should be able to get our arms around problems like security solutions and capacity initiatives. But, I think once you drill down into the ownership and the operation of airports and you look at the complexity of relationships there, you begin to appreciate those challenges.

The majority of these airports are locally owned by cities, counties, or some type of local governing authority such as an airport authority. They have based their activities on a business model that is largely user-fee-supported for meeting their operating and maintenance costs, as well as long-term borrowing as Doug mentioned in the tax-exempt municipal bond market to fund capital improvements. There is also heavy federal participation through programs such as the Airport Improvement Program administered by the FAA, as well as congressionally mandated programs such as the Passenger Facility Charge Program.

Now, unfortunately, what happened on September 11 is that business model has been upset. The loss of traffic volumes has affected income generated through landing fees. Concourses have been restricted to ticketed passengers only, which has had an impact on revenues generated from food and retail. Fortunately, airports generally have the ability to adjust their rates and charges in order to support their ongoing operations during periods of difficulty. But, nonetheless, it has still been a major upset for airports since September 11.

Airport capital development is also being affected by the events since last year. Traditionally, airport development has been largely shaped by the dominant carrier. You can see it evident in the hub airports across the country, whether it is Chicago or Denver or Dallas/Fort Worth. You also see it in the downtown airports that have been adopted by Southwest Airlines over the last 20 years or so. In fact, the 1980s and the 1990s were really a remarkable period for airport capital development, although the majority of those improvements were terminal buildings. Because of the amount of time it takes to construct airport improvements, the continuing environmental opposition, and, sadly, litigation that is usually tied to airport development, we only have seen five new airports built in the last 30 years. All of those projects generally required some kind of closure or restriction to the existing airport that it replaced.

I think even more critical for the future of our industry in terms of capacity is the difficulty in adding new airfield capacity. It is always a challenge for an airport director to balance airport capacity with terminal and land-side capacity so that you are able to accommodate all segments of the air transportation experience from arrival to the airport to departure on an airplane. Currently, the financial difficulties that Doug just spoke about are

indeed having an affect on the ability to continue airport capital development. Many projects are being either downsized or deferred. Some are actually being cancelled, and I'll speak more about that in a minute.

This raises a serious concern as overall airport capacity is still lagging behind long-term demand. Even though the capacity crisis at airports that we experienced in the summer of 2000—of which many airports and airlines have referred to as the “good old days”—has really eased because of the traffic declines. But, it certainly doesn't give us really too much breathing room to take any slack here. We still have to pay attention and manage these airport capacity needs once again because of the complexities and the long-term nature of airport capital development. I think particularly these security mandates, the health of the airline industry, and continued environmental issues are going to dominate the scenario.

I'd like to spend the next few minutes talking specifically about six major needs that I feel airports are facing, as well as depending on how those needs are addressed and what the outlook is going to be for our airports.

Let me start with security because that is the one that is definitely front and center at airports right now. There are four critical events that are associated with the new security mandates. The federal government is in the process of taking over control of the passenger screening checkpoints that previously were an airline responsibility. A new mandate beginning December 31 to screen all checked baggage with explosive detection equipment is the second big issue. Timing is really critical here. There is not a lot of believers out there that the deadline can be met by December 31 to screen all checked baggage. The equipment needed to fulfill that mandate is not going to be able to be procured and installed in time; also, personnel training will not meet that deadline. Right now, there is some very contentious discussions between airports and the Transportation Security Administration (TSA) regarding how to meet that mandate—whether it is through some type of interim security measures or interim security equipment installations. I think the big concern with airports is that I would be willing to accept an interim operation. By interim, I think we are talking about equipment that is being placed in terminal lobbies as a temporary measure until it can be installed in a fully integrated way in the baggage handling areas of airport terminal buildings which is where that equipment belongs in order for it to function most efficiently. The big fear with airport directors is that the TSA only will have adequate funding to support the interim solutions, which is no real interim solution when you consider these terminal building lobbies weren't designed or sized to handle the type of security screening measures that are now being forced into them. They are also concerned there will be inadequate resources left to fund the permanent solutions, which are going to be very, very costly. I think the last issue is the TSA's ability to get adequate numbers of staff in place to operate the machinery.

As these discussions and debates go on, there are certainly unanswered policy questions that also affect the number of personnel and the types of machines that are needed. So, it is a very complex and difficult situation right now. Of course, the bottom line is that we want to ensure that as these mega-investments in the billions of dollars are being spent at airports, there is going to be enough left over to continue to advance improved technology for the process.

The second major need at airports is for terminal redesign to occur. Security is certainly driving that as the number one factor. I've already talked about the need to ensure that our security practices occur in areas that make it most efficient. That is in the baggage handling areas. These long-term solutions are very costly and they are going to take time to implement due to the weight of the machines that require structural reinforcement of terminal building

floors. They need to be integrated into existing baggage conveyor systems that are the proprietary equipment of the airlines, so there are also leasing and contract issues that need to be addressed.

Just to give you an example, Atlanta's Hartsfield is looking at a permanent installation that will take 22 months to install, and its estimated cost is \$111 million. That is just one airport. This is an airport that is also in the process of designing a new international terminal building and is also just on the throes of constructing a fifth runway. So, it has other capital needs that it needs to face as well.

So, these terminal redesign initiatives that are being prompted by security are certainly eroding the planning scope of many airports that are facing other types of capacity challenges. Then, when you throw in the RJ factor—and Bob Bowles spoke about that earlier, and its impact on terminal design—some airports are looking at constructing dedicated terminals for RJ activity. So, trying to balance all of these needs, I think, is very crucial.

The third need is for airline restructuring. American Airlines has announced its rolling hub concept at both O'Hare and DFW where it is de-peaking its activity for more efficient utilization of ground personnel and aircraft. USAirways is looking at capacity reductions of approximately 300 flights. United Airlines is expected to reduce capacity somewhere in the range of 9%. Then, there is good old Southwest Airlines: Even the healthy carrier of the industry is retooling as well. They have just announced non-stop, coast-to-coast service with unrestricted fares of \$299 with a tagline that says, "Business travel is back." So, there has certainly been some restructuring, I think, of an unprecedented nature that is going to have an impact on airports.

We are already seeing it. United and American have announced to Chicago their intent to defer the World Gateway program, which was negotiated back in my tenure as the Commissioner of Aviation for O'Hare. It is a \$3.6 billion program calling for two new terminal buildings that are designed to provide more gates at O'Hare. If you remember in the late 1990s and in 2000, the lack of slots and gates at O'Hare was one of the big issues nationwide as a system capacity problem. Now, that project is being deferred. So, we need to pay attention to these kinds of impacts that we are seeing, I think, in the long term once again because once activity gets back to a level and gates are needed at an airport like O'Hare, it is not an overnight process to get those created.

The fourth need is systems integration. This is a really interesting challenge, I think, between both airports and airlines. There has been a heavy investment in both airport systems and airline systems at airports. But, they are largely disparate, they are fragmented, and they are not integrated. I think there is a terrific opportunity, particularly given new security measures and new security technology, to fully integrate all of these systems across all of the users for greater efficiency and cost savings. I think having a strategy to effectuate that integration, though, is going to be tough because the systems are proprietary, and many of them are scalable on their own right—so there is not a lot of incentive to integrate.

The fifth need is just generally airport capacity. As I mentioned, there was a lot more focus on these capacity projects in 2000 than there is today. I don't know if you remember the proposed streamline federal review and approval processes to narrow the time required to launch major airport expansion projects. Louise Mailett mentioned to me this morning that bill is actually on its way to President Bush, so that has been resurrected. But, I would argue, having been an airport director at the local level for over two decades, that I think the majority of the impacts to the scheduling and the timing for airport projects is created at the local level. Given

opposition from surrounding communities, oftentimes those result in negotiated compromises that impose restrictions on a project. By way of example, let's say that an airport proposes to build a new runway, and it is heavily opposed by the surrounding neighbors. As part of the protracted negotiation and perhaps litigation over that runway project, it is agreed that the runway will only be used in the daytime hours. Well, that then raises the issue of airline reluctance to invest in a project that has a limited return. I think overall, there needs to be top leadership management of how restrictions at the local level affect overall system capacity. Of course, as we have seen in the case of Chicago, federal intervention may certainly be necessary in some cases, as has been with the congressional activity to allow expansion at O'Hare to proceed.

Associated with airport capacity, there has been discussion about use of supplemental airports—i.e., creating new “greenfield” airports—I think those are going to be very difficult in the near term, and I think we will see a continued push to take advantage of existing infrastructure.

The final need is investment resources. We talked about the traditional way of managing airports. I think that airports have, over the last 15 years, done a much better job of weaning themselves from total reliance on airline income to support their operating costs. They have attracted some limited third-party development at their airports that are associated primarily with food and retail shops, parking facilities, and rental car campuses. I think there is probably some limited opportunities to increase third-party development. Most of those opportunities are probably going to be on the collateral land development side of airports. But again, we are going to be continuing to rely largely upon airline support.

So, that brings us to the precarious future. Once again, those needs as I've been talking about—security, airline stability, capacity, the environment—I would like to conclude by just briefly talking about my strategies or what I would like to offer to the panel for your consideration.

I think one of the dangers right now—with both installing temporary or interim security measures at airports and trying to negotiate the longer-term improvements—is that we will lose sight of the need to make the airport experience more predictable and more convenient for our passengers. If you remember back on November 19, 2001, when Congress passed the law to federalize airport security, the goal was to make it more uniform. Well, right now we are very far from meeting that goal. It is a challenge because as they say, if you visit one airport, you've visited one airport. They are very difficult in terms of size and structure. So, trying to orchestrate and implement a nationwide security plan for airports is going to take a continued, sustained effort by the federal government. Also, the need for technology to get us to that level of predictability and stability so that passengers will want to travel again at an airport is definitely tied to advanced technology.

I think we need, as a strategy, to very much stay focused on Secretary Mineta's 10-minute security queue goal. I think that is essential for the viability of air travel and for airports long term. These terminal building lobby redesign requirements that I spoke about earlier have to meet the convenience test—absolutely. Of course, addressing the needs of business travelers, I would like to see us be able to return to some of the very exciting initiatives that we were looking at back at the millennium for remote baggage check-in and ease of airport access for travelers—while continuing to stay focused on what improvements need to be implemented to ensure adequate capacity, as well as convenience.

Speaking of capacity initiatives, I think as a strategy we need to give greater recognition to the FAA's Operational Evolution Plan. That is its 10-year plan for adding new runways and new technologies and procedures. I think it is important that leadership at the top communicates the importance of these capacity initiatives during what seems like a period where capacity is the least of our worries.

I also believe that given the restructuring that the airlines are currently undergoing, we need to revisit the capacity benchmarks that were established for the 31 busiest airports. This is because I feel that with the de-peaking of the hubs and the continued phenomenon of regional jets, those benchmarks are going to be affected.

Finally, some of the other capacity initiatives that 2 years ago were being looked at, we are likely to see those resurrected again—perhaps not immediately. But we need to keep those on our plate for opportunities to meet demand in the long term.

Then again, I would emphasize that streamlining environmental processing—if it is only done at the federal level. I don't think it is going to get us to where we are going to need to go to ensure that airports have the ability to grow in the future.

I would end by saying that we certainly can't afford to allow the scales to tip in either direction between security and capacity. Those both need to be managed in a responsible way. Again, if we do achieve greater capacity at our airports, that is not going to be sufficient to meet demand alone. Our processing systems have to improve. This is going to require the continued collaboration and coordination among all of the critical players in the industry among airports, airlines, and the federal government.

So, thank you very much. I look forward at the conclusion of all of our presentations to have the opportunity to answer any questions or to engage in a dialogue on these issues.

GENERAL AVIATION ISSUES

Rollie A. Vincent

Cessna Aircraft Company

I think this is a very effective program today, and I look forward to the discussions. I think we have had some very good presentations, and I've already learned a lot. First of all, welcome to Washington. It is so nice to be back here, and I thank the FAA and TRB for having me. I would like to talk to you a little bit this morning about the GA perspective. It is basically a perspective from one person—myself sitting in the prairies of the Midwest, the heartland—but we think we have something to say and we are glad to be here today.

Three things in the program: I'm going to talk about issues and obstacles to growth. I've been asked to look at that, and also to look for the opportunities in this confusion that we see in the industry and also at the GA level. Then, I will talk about strategies for recovery—a very simple program.

Recession

Clearly the first issue that we all are facing is something that happened well before 9-11. I think we all saw this. The recession has hit us very hard. The General Aviation Manufacturers Association (GAMA) reported recently that the first half of shipments/deliveries of new aircraft was down very significantly year-over-year, reflecting some of the numbers we have seen—

whether it be in airline or airport enplanements, etc. U.S. export billing is down about 24% year-over-year. These are very similar to the numbers we heard about earlier from Bob.

But, of course, standing back from this whole thing in my econometrics training from the past tells me that what does go up comes down. I wonder if sometimes we have forgotten about the fact that this is a cyclical industry. It always was and always will be, I'm afraid.

We are seeing a demand dip, and I'll share with you our perspective on where this is going. We believe we are going to come out above historical levels for demand in the industry. There is instability in the business, no question. I think one of the things we have seen with our customers is the erosion of wealth—whether it be at the corporate level or the individual levels. Some of our customers, of course, are writing their own checks. Their personal purchasing power has been impacted. There is a theme, again, if you are looking for things to keep you up at night. Waning confidence is the one that bothers a lot of us—the confidence in investment and the confidence in the future—and we need to just break the cycle. I'll talk about that a little more in a minute.

We've seen for about 18 to 24 months what we call a net order rate reduction. By that, we mean that orders continue to come in, but then they balance off against the cancellations that we occasionally see from an airframe point of view. The net order rates have been down. Prices have softened, in particular, in the used aircraft market and with some inventory build-up.

Chart 1 basically just shares you with you some historical information and our view of the forecasts for business jets. Business jets make up the biggest piece of the GA puzzle from a revenue perspective. You see the roller coaster impact that we have to look forward to. I think that around 2004, we are going to see the recovery. We have about 40% of these shipments in



CHART 1 Aircraft or roller coaster? Business jet shipments (actual and forecast).

our production facilities, so we have a pretty good confidence about those numbers that you are looking at there. But the thing to note is this is a level of recovery well above historical patterns in this business. This is a good business. I think a lot of people have come to enjoy these benefits, and they are going to recognize that as we go forward.

The recovery, we believe, is going to be noticeable in 2004. We saw some suggestions of that last week at the big National Business Aviation Association (NBAA) convention in Orlando, which actually indicated some very good feelings of demand for the future. But it is going to be a couple years in front of us.

Business-Jet Demand Drivers

For those of you who do econometric-type forecasting, these are the things we use—and I think most of the industry looks at now—in GA. With corporate profitability with a 1-year lag, of course, you have to fill your bank account before you can spend it. That is usually what happens, although we heard some differences from Doug and others on that already this morning. A real change in GDP is something that we clearly have already seen. Bob talked about that, as well. The interest rate factor has been a positive feature, of course, plus exchange rates impacting international demand in particular.

Another thing to talk about—and this is something we have a lot more influence on—is our own investment strategies, whether it be at Cessna or the other airframers around this industry. We see a very encouraging level of investment in the future, and that is a choice—obviously driven by affordability and whether or not we can fund this internally. We are trying to do that ourselves internally.

The other factor—and again something we can all work on and help—is this alternative ownership structure, whether it be fractional, charter, or some other way. We are doing some innovative financing there to help stimulate demand there right now.

My training in statistics from years and years ago tells me that it is very difficult to forecast six variables, and I think anybody in the audience would share some of that—especially to decimal place accuracy. I remember being in a conference room like this in Ottawa, Canada, some years ago, and this Ph.D. in economics, who I admired and still do, got up and said something to the effect that economists are usually pretty happy if they can get the sign right in front of the variable. That scared me, and I did not go into that field of study for much longer.

General Aviation Image

In talking here about the issues and the obstacles in the industry, I believe general aviation has an image problem that we are continuing to try to address through GAMA, NBAA, and others, I think, very effectively. To summarize it in one line, what I'm hearing is that you guys are small; you guys are in the way; and maybe you don't always pay your fair share. I would like to say I would challenge that. I have worked on the airline side of this business, and I've worked on the GA side of the business. Look at some of the numbers: 31 million flight hours by GA just in the United States; 5,400 airports are being served; and 13 million gallons of fuel are being consumed, with taxes being paid on that. Globally, our estimates at Cessna suggest that GA is about a \$58 billion business every year. Those are U.S.—not Canadian—dollars.

This is how we see the industry. We had looked at the industry about 10 years ago. Today, we have a forward forecast and by 10 years, what we try to do is look for opportunities and this is how the revenue splits out ([Chart 2](#)). Essentially new and used airplane sales only

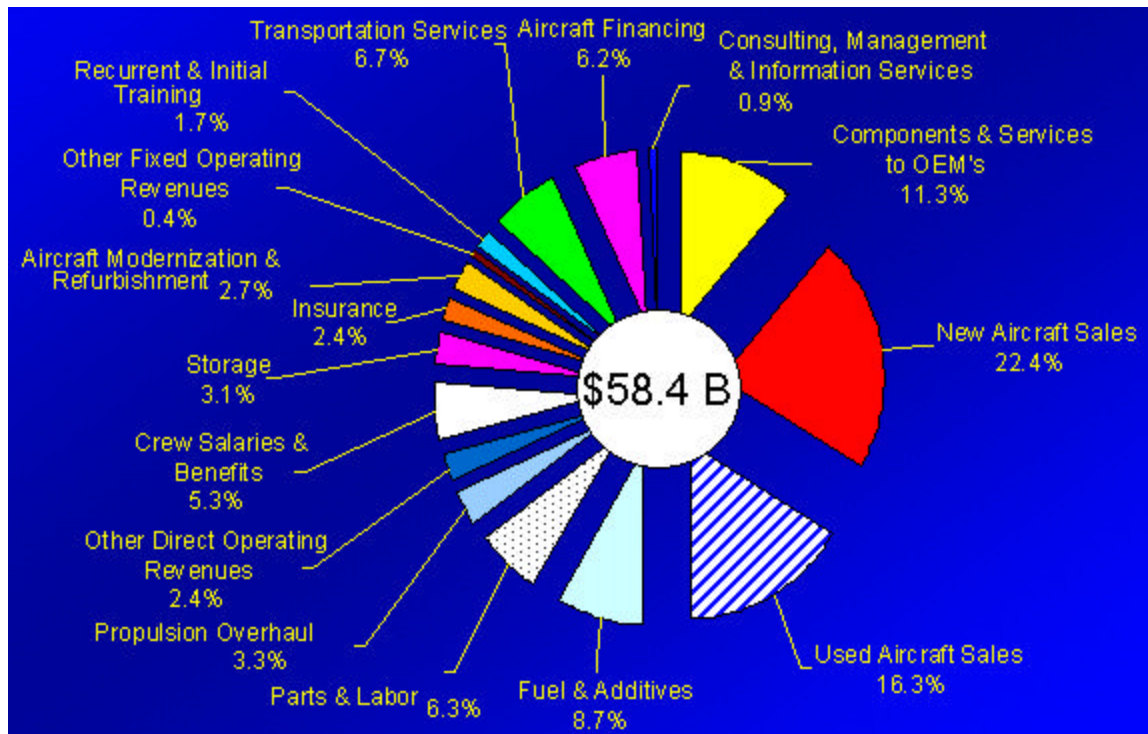


CHART 2 GA: 2001 worldwide industry revenues.

account for 38% to 39% of the revenues in this business. There is a whole bunch of ancillary services and activities around that which may be very interesting opportunities for growth.

Ed Bolen, the president of GAMA, spoke last week and talked about the image of GA: Who are we? What are we doing? At the NBAA Convention on September 10, he said, "There has been a sea change in the way business aircraft are viewed by shareholders." He added that "what we are seeing are companies safely and securely using their aircraft more than ever to enhance productivity and generate business in a down market." We saw some of the uptick of numbers in terms of usage—a 30% increase in business jet utilization since September 11. People stop me and they say, "September 11 must have been awful for your business." We're embarrassed to say that, "no, it has not been." It has caused people to look at alternatives to the airlines and we offer one of those.

The good news is that flight hours are up. Fractional demand is continuing. I spent a lot of time with our big customers, and these are basically airlines of business jets. They have a lot to learn from those of you in the airline industry. We have seen a lot of investment still going on in this business, and this is all very good news.

I'll talk a little more about image, and then move to another topic. But, here is a view from Wall Street—the J.P. Morgan people. Joseph Nadol III, with J.P. Morgan Securities, Inc., said that business jets—even though many companies that have accepted them—fall into the discretionary part of the capital budget for most companies. That is true for some companies. Others don't see it that way. But clearly, there is an image problem that the GA is addressing and needs to address here.

We talked about trust—the trust of corporations in this country, the trust we have in our financial and accounting systems. This is like bedrock that has been shaken lately. I don't think

we are through this. When we talk about us coming out of this in about 2 years or so, things like this are going to have to be resolved.

Again, there are issues about the use of private jet aircraft. If you pick up *The Wall Street Journal* or *USA Today*, you will see an article about how Tyco or GE or any of the other large corporations have abused, frankly, in my personal view, the privilege that their shareholders have given them for use of aircraft. This is not going to help our business, but I can assure you from where we stand, this is a very small portion of this business.

Obstacles

We have heard a little bit about the fear factor that just caused people to stop investing and stop spending. We are seeing some of that, but frankly not as much as you might expect. With the Iraqi situation, we don't know what that means. That is one of those shocks that none of us want to see. There are access limitations, user fees, etc. Nobody has really talked about insurance—that is an issue in our business, and I'm sure in the airline business. The pricing and affordability of insurance is scandalous. This is just an overview.

I'll talk now about opportunities and where we are going to go from here as an industry. Clearly, one thing I've learned in my experience is that when things get a little tough, it is time to focus on things that you are particularly good at. That is usually done through a self-assessment and things that your customers are going to value. One thing we have learned over the years at Cessna—and I'm sure competitors have felt this, as well—is that organic growth, as opposed to acquisitive growth, is probably a wise and profitable thing to be doing. It has certainly been our style.

We start with the customer. This is my favorite topic—talking with customers—because they are why we exist. What are they buying from us? If you're an airline person sitting in the audience, it is probably something very similar to this, as well. We offer something that is very personalized, though, and as the airlines do, we allow people to get face-to-face. This is our product. Whether we believe it or not, we maybe have a different way of generating that service, but is to make face-to-face happen.

What are the three things that customers are looking for, at least in our business? It is pretty straightforward: One, reliability; two, reliability; and three, reliability. If there is one thing that GA manufacturers and operators and users can learn from our airline friends is reliability. If there is one thing that we can share as an industry, it is how to improve the reliability. On-demand transportation is what we are all about.

We try to look at our customer segments, and this is something that a few in the audience do. But, it is maybe time to revisit this. What are the customers asking you for? We try to rank-order their needs and use these kinds of information to help us design products and services that meet their needs, whether they are a jet customer, a turboprop customer, or a piston customer (**Chart 3**). Reliability and quality—the value for the dollar that they are getting for the service that they are paying for or the product they are getting—are primary.

More specifically, if you look at the types of customers that we have—and I'm sure some of you have, as well, if they are a fractional type operator or if their demographic is such—they are going to have another specific level of need. Just boil it down a little bit deeper, and you usually find some ideas there for opportunities and strategies for the future.

The fractional market—we talked a little bit about this—is a business that is a wonderful business (**Chart 4**). Growing at a CAGR—a cumulative average growth rate of 48% over the last 5 years—we continue to see that growth. There has been softening at the very high end in the

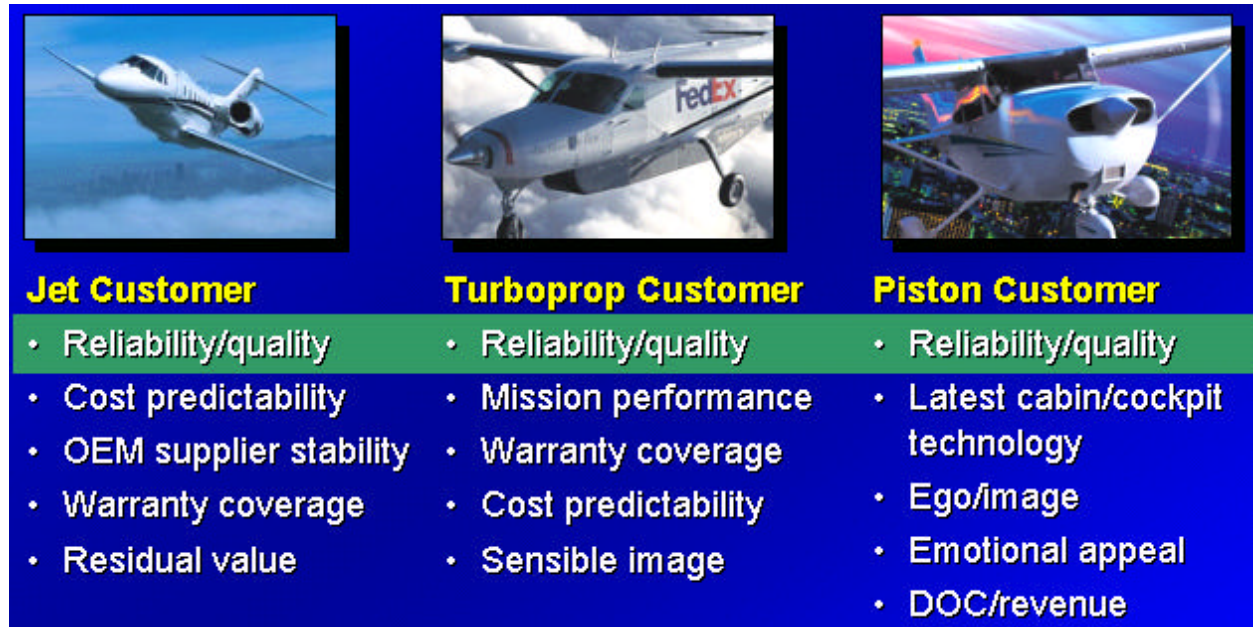


CHART 3 Customer segmentation: customers' needs ranking by segment.

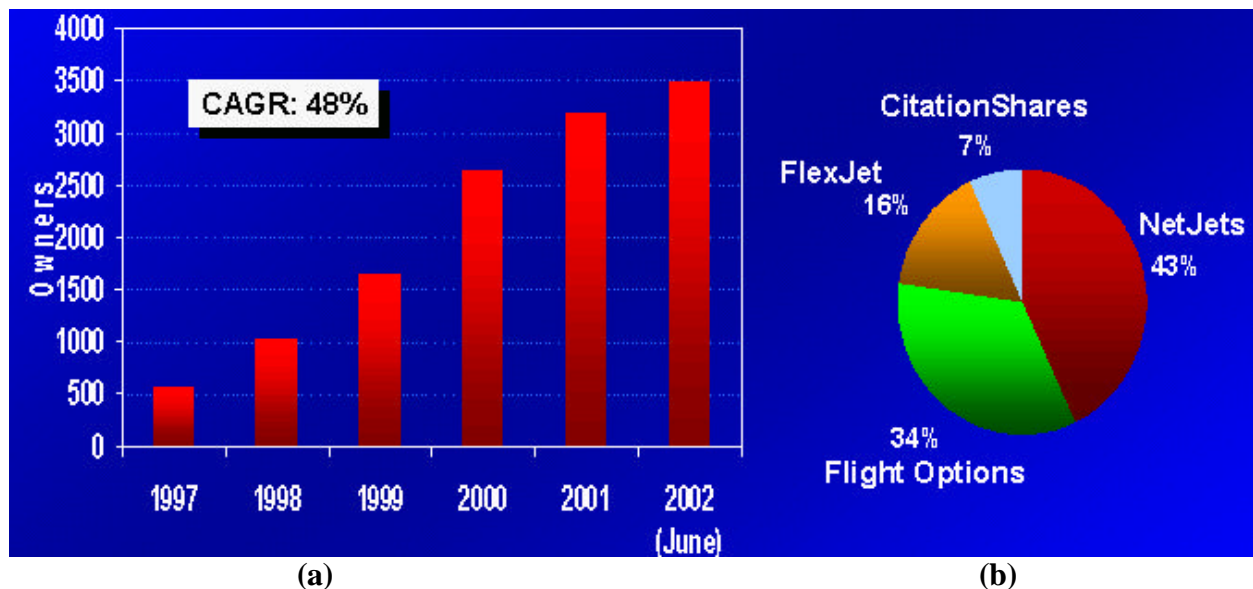


CHART 4 Fractional market: (a) growth in fractional owners, and (b) market share of fractional owners.

product ranges where we frankly are not participating right now, but that is where there is some softness. But, in general, this is a very good business, and I would hazard to say there is a lot more growth here.

Again, from a perspective of where opportunities are, it is always interesting to look at where you, as a company or an operator, stand relative to the competition and just see where value can be created. This is a price point chart showing essentially all of the various product offerings out there today—or soon available in business aviation in this case—and how we are

positioned against others. There are always opportunities out there (Chart 5). You have to find them.

Companies that are into product life cycle management (I think we all are), things that we come up with, great ideas we have, great products we have—they need to be refreshed. In our piece of the business, we see about a 7-year cycle for most of the products (Chart 6). After about 3 to 4 years or right after a product is introduced, if you are not working on the next one, you are probably missing something. This just shows you how we have tried to keep one of our products refreshed, and most of our competitors do this as well.

Just to close out here, I'll talk about a few strategies, particularly for the original equipment manufacturers (OEMs) in GA. Really, there are strategies that some of the OEMs, we believe, should or could be doing—certainly things we are trying to do ourselves. First, right-size: protecting the financial integrity of the business for the employees, the shareholders, the leadership, and the customers is number one and job one. If companies aren't doing this, shame on them. I think I would like to echo the comments made about United and other carriers. This is a key thing to keeping the business whole.

Achieving better operating efficiencies is another priority. Things there are commonality and looking at process improvement. Now is the time to do this kind of work. It takes a lot of time. I think this lull that we are in right now is actually going to allow us to make ourselves much better businesses—supporting customers that we have in bundling services for which previously they had to go all over the place looking for or frankly didn't know they needed.

We need to stimulate the market psychology. I think more than anything that could be the key to our future. This is a great country. This is a great business. This is a great industry. If you look forward, and you just look at where the demographics are, three-quarters of the people in this world live in Asia. Asia currently, for us, is about 1% of what we do. If you want to talk

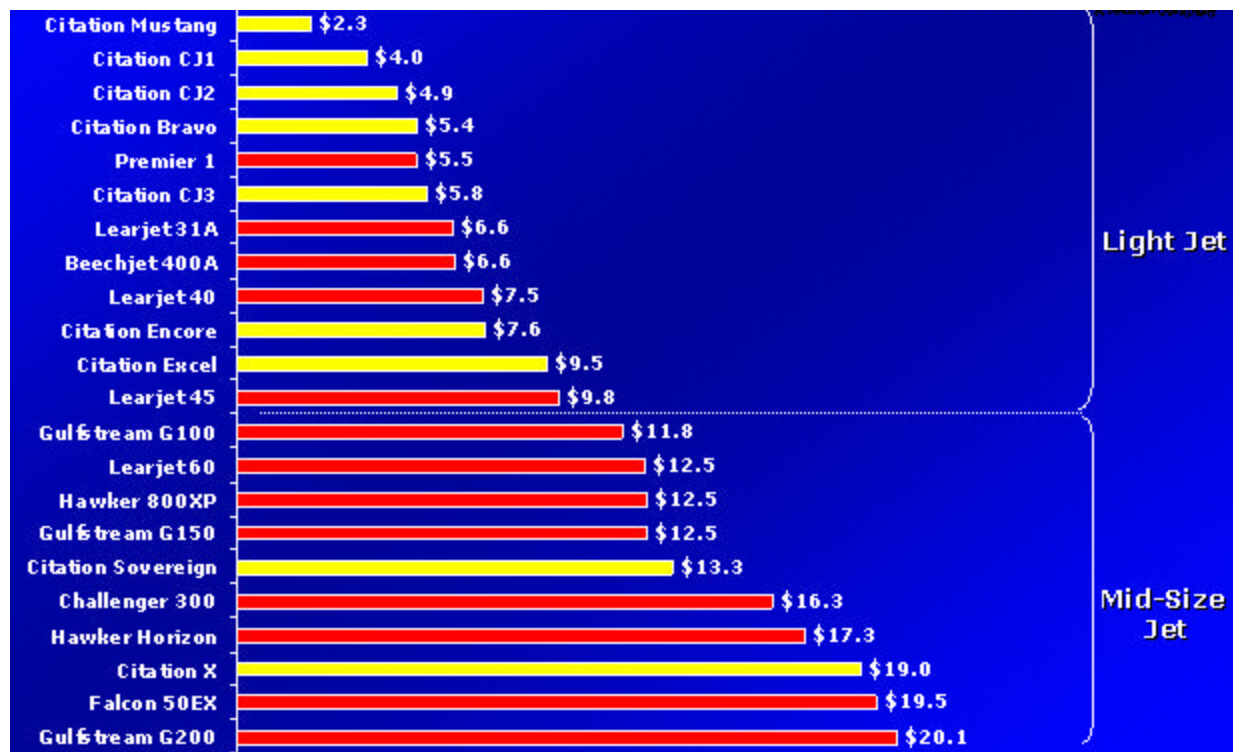


CHART 5 Price point management.

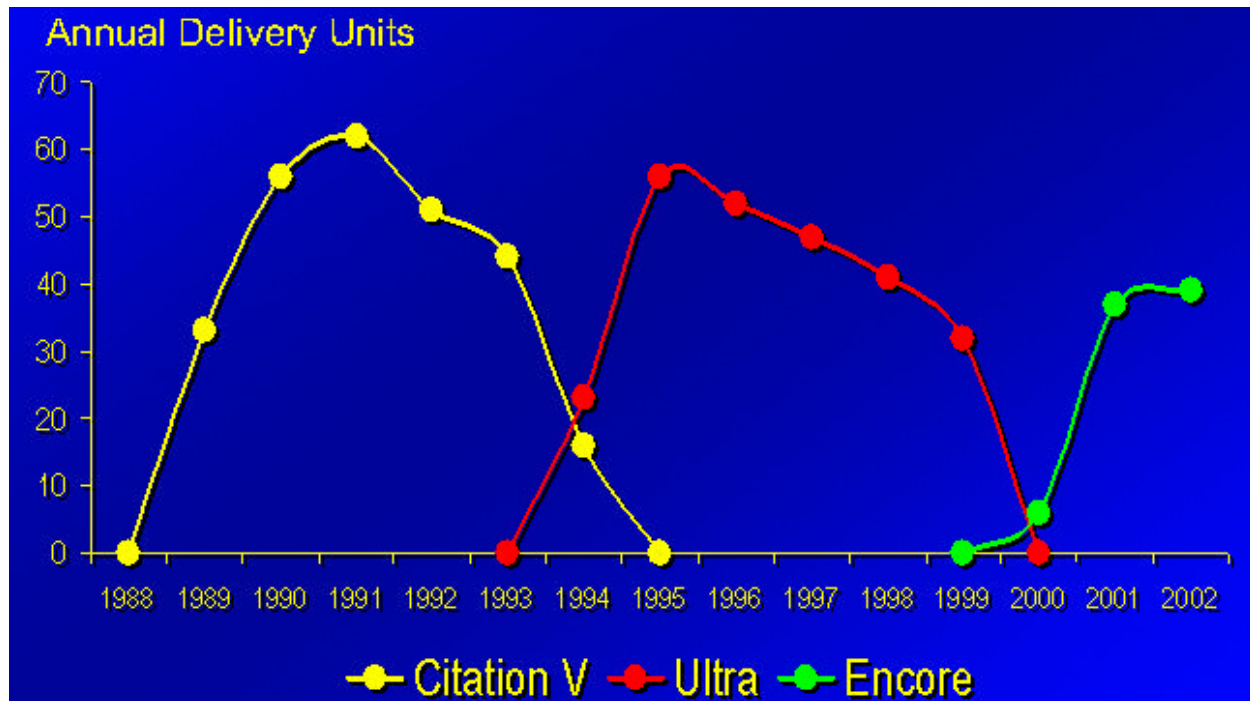


CHART 6 Life-cycle management.

about an opportunity, there is one waiting to happen. The psychology is a big part of it. We can get out of this and, in fact, we are already in the middle of getting out of it. Keeping our employees informed and engaged is another big piece of this. We don't want to lose their talents.

In GA, probably the biggest thing that has happened to us in the last 5 years or so has been the emergence of fractional ownership, which is just another way of operating and owning an aircraft. It is really bringing it to much more people who couldn't afford it. There is a real issue in this industry though. We have got to work together to get the operating efficiencies and profitability on the operating side where it needs to be. This is a lifeline. There is a need to move from management art to a science as this industry begins to see opportunities for scale economies. Others are starting to get to the point where, I think, NetJets is now the sixth biggest airline in the United States by fleet size. You probably haven't heard too much about them yet, but you will.

There is an opportunity for fractional companies to work more closely with the manufacturers on product and service design. Again, those are typically, 5-, 7-, or 8-year programs. I personally wonder if there is not something out there, and I'll go back to the Southwest Airlines example as a model of keep it simple and provide value for the dollar. I really wonder if there isn't another carrier coming that might look at that model.

At the industry level, we really appreciate the amazing efforts by GAMA, NBAA, and other of our industry associations to help spread the word on the need for airport capacity and airspace capacity—and frankly more and not less. In this wonderful country, if we can't find a way to pour a few miles of concrete every year, shame on us.

We need to promote investment. We need to promote aviation careers. There is a life blood of people leaving this industry, and I'm not going to be one of them. And, we need to avoid over-reactive legislation. The early signals coming out of TSA—I don't want to point any

fingers—are intimidating to say the least, and we have seen a sea change in terms of improvement of communications with TSA since the beginning.

In summary, the recovery is going to happen as we see it during 2004—2004 will be the low point. So, we are still looking at a couple of years out. We have a very strong confidence in that situation. It will occur as the economy rebounds, as investors start to come back, and frankly as we as an industry begin to see some new products that are currently in the pipeline and will be available for delivery.

Last week in Orlando, Florida, the GA and NBAA industries gathered and for the first time we got a first look at some new products and services that are coming. Investment frankly is coming from all the manufacturers, whether it be in new service facilities or brand new products to serve the customers as we go forward.

There is a market emerging, which I believe is going to be the next fractional kind of explosion. Some are calling it the air taxi. I would call it the personal jet phenomenon. We launched an airplane last week, and within 1 day we took 218 orders with deposits. There were people coming to us who had forgotten their checkbooks. I had never seen this before. One gentleman came up to our booth last week and said, “I forgot my checkbook.” Of course, being the good customer-oriented people we are, we said, “Well, no problem. We know you.” He says will you take a credit card? Of course, we said yes. We didn’t have one of those little credit card plates—somebody had to run out and get one. We ran the gentleman’s American Express card with a deposit on a new aircraft. While we were waiting for the phone response to come back and for them to say yes, there is money in the account, he looked around our booth and said, “Well, what’s that?” It was one of our new little personal jets. He said, I’ll take one of those too. So, we called back the credit card company. This gentleman had more money than I can count.

This is just to say there is a lot of goodness in the future. It is not very far away.

This is a long cycle business, and we are in a bit of a dip. Here at the National Academy of Sciences, in this gorgeous facility, I think it is appropriate to end on the point that a scientist by the name of Albert Einstein said “In the middle of difficulty lies opportunity.” This is a wonderful time to invest for the future. That is our view, and let’s go out and get it. Thank you.

A CONVERGENCE OF ISSUES: THE CUSTOMER’S PERSPECTIVE

Kevin P. Mitchell

Business Travel Coalition

Good morning. I would like to thank the TRB and the FAA for having me here today. This is quite an honor to share some comments with such a group. The problem I had in preparing for today is that most of you are probably expert at business travel. So what I thought I would do is give you the perspective not so much from the individual business travelers’ point of view but rather from the large corporate buyers of air transportation services. I’m going to share the information I have with you by way of summarizing how corporations have viewed the commercial airline system here in the United States over the last couple of years.

It is rarely pointed out that no mass transportation system in the history of mankind has been profitable over time. Is the U.S. commercial air transportation system predestined by this force of fate? Or, did 19th century German philosopher Arthur Schopenhauer have it right when he said, “What people commonly call fate is mostly their own stupidity.”

The Airline Deregulation Act of 1978 democratized commercial travel in the United States, providing citizens of ordinary means the opportunity to travel by air. The 30 million passengers that had access to low fares in 1978 grew to 150 million, or close to it, in the year 2000. Low fare airlines in the build-out of the hub-and-spoke system, among the major airlines, were the prime enablers of this revolution in air travel. However, deregulation has proven to be a bumpy ride. No matter how well air travel was democratized, many business travelers do not feel fairly treated by major airlines when their tickets are, at times, eight times more expensive than our leisure fares. The same hub and spoke system that provided low fares to leisure travelers evolved into an entanglement of so-called fortress hubs with super premium business airfares, especially in short-haul markets.

To be sure, macroeconomic and geopolitical forces influence airline industry financial results. In the early 1990s, we saw the airlines lose billions of dollars with the advent of the Persian Gulf War and the recession. Business travel levels back then plummeted as major corporations mandated across the board reductions in costs in response to falling profits. However, as in previous cyclical downturns, business travel snapped back as soon as economic recovery appeared on the horizon. The rebound in business travel in the early 1990s was supported by relatively low business airfares and a competitive imperative at most corporations to get their people back on the road and secure face-time with prospective customers. Some would argue also that with load factors in the 1960s and middle seats open, it was certainly a more pleasant experience then than it is today.

By the late 1990s, though, the efficacy of the U.S. commercial airline system was being questioned by corporate customers. Travel management had moved from the corporate backorders in the early 1990s, to a highly visible function that commanded the involvement of chief executive officers (CEOs) and chief financial officers (CFOs). These senior executives were growing increasingly frustrated and impatient with the commercial aviation system. Arbitrary direct and indirect airfare increases, surcharges, and forced contract amendments cast many major airlines as arrogantly indifferent to their best customers' needs and concerns. Moreover, as business airfares were rising, customer service levels were eroding, resulting in cause for passenger rights legislation.

If the Northwest Airlines' Detroit blizzard debacle in January 1999 was the Fort Sumter of the passenger rights war, then United earned that distinction with its pilot slow-down in the summer of 2000. Aviation system gridlock nearly destroyed business travelers' confidence that they could accomplish day trips. Increasingly, the aviation system looked more like an obstacle to conducting business than a facilitator of commercial activities.

The customer responded to all of this. With the recession all but confirmed at the end of 2000, senior management took action. However, the across-the-board mandates to reduce spending by X percent or X dollars that were evident in previous economic recessions were replaced with in-depth review processes. Invariably, teams comprised of staff from finance, information technology, travel, purchasing, and human resources were put together. They were formed at the direction of the CFOs that were on a mission. These teams were tasked in the first quarter of 2001 of understanding why and how companies travel, as well as examining technological alternatives to the commercial airline product, such as webcasting, web conferencing, and video conferencing. The notion that employees had to be on the road, physically meeting with customers to be productive, was challenged.

In April, 2001, when the Business Travelers Coalition (BTC) did a survey, 86% of large companies indicated that they planned to decrease airline spending an average of 28% in 2001.

Some 76% of survey participants indicated that the cuts represented strategic reforms to policy and business practices versus just near-term cost avoidance. When BTC published the survey results in June of last year, major airlines dismissed the findings and announced that the industry would generate \$1.5 billion in profit for the year. Six weeks later, that figure was revised to a loss of \$1.6 billion. By August, analysts were projecting losses of \$3.3 to \$3.4 billion. That is a bottom-line miss of nearly \$5 billion, and, of course, that is all before the tragic events of September 11.

Clearly, there are some other serious problems plaguing the major network airlines beyond frustrated corporate customers. Cost structures have become bloated with run-away labor contracts and over-expansion. Asset utilization levels, labor, and aircraft gates are too low. Ever-increasing business airfares only served, however, to off-escape these and other structural problems. Major airline denial of some of these problems is not a solution. Some major airlines believed that they pushed business airfares in the late 1990s too high and that they could induce demand by simple airfare adjustments. But, by 2001, that was too late. Airlines missed the strategic decisions corporations made in the spring of 2000 that no manipulation of airfares could reverse. Increased investments in video conferencing and expanded contract with low-fare carriers were the responses from the senior ranks of these corporations. Major airlines have largely refused to acknowledge that their policies have backfired, and that there is a backlash from customers whose loyalty was taken for granted—and indeed perhaps it was never really won.

To this day, airlines insist that external forces caused their problems. The Associated Press writes on September 13, 2002, about an industry association's comments on very bad August traffic: "The group attributed the drop-off to the nation's economic troubles and travelers' frustrations with airport security." I think that is less than the complete analysis.

Nonetheless, the situation is a perilous one. Many airline analysts now project the industry will lose more money in 2002 than in 2001. More than 18 months of data and analysis have demonstrated that business travel demand has virtually fallen off a cliff. There has been growing recognition that business travelers actually price elastic and that business airfare levels need to be reduced 25% to 30% to induce significant demand. As *Aviation Strategy* stated in its August issue, structural reforms will need to include major industrywide cuts in business airfares to levels that restore business traveler perceptions of value.

Importantly, airlines are decades behind other industries that switch from pricing products based on cost to costing products based upon what the customer is willing to pay. Price cuts in response to falling demand would seem like an obvious strategy, but just around Labor Day major airlines implemented what might be the largest price increase in the history of commercial aviation with their non-refundable ticket policy changes. Many industry observers were confounded by these policy changes. The Associated Press reported on J.P. Morgan analyst Jamie Baker's view of these changes to the business airfare models. It said, "Baker criticized the industry for imposing fees and restrictions on airfares at a time they desperately need to stimulate demand. Baker cited a complete lack of industry recovery and said he expects the nine largest carriers to lose \$6.8 billion this year, significantly worse than his previous estimate of \$5.4 billion."

Just as the major airlines missed the strategic nature of decisions by corporate customers in the spring of 2001 to permanently reduce the reliance on commercial aviation, they are missing it once again. Timing could not be more inopportune. This coming October, CEOs will be approving 2003 budgets. In response to the major airlines' indirect price increases, travel

managers will likely be making recommendations to cut travel further in 2003, to mandate low-fare carriers, or to make further investment in technological substitutes and further use of those substitutes.

I'd like to end with just a quick story. I was on the phone with a journalist from Syracuse a couple of weeks back who had to fly to Phoenix. It was \$1,800 from Syracuse. So, he went on the Internet, which was a big part of this story because the Internet is not only giving transparency to pricing but also to low-fare carrier offerings and alternative airports. He drove 2 hours to Buffalo and flew through Pittsburgh for \$268. I was out to dinner at an industry event with some airline executives, and I shared that story. They said to me, "Kevin, you just don't get it. You don't get it. Because as soon as that traveler understands the value of his time, he will be back. He'll be back." I responded that the airlines might get him back at \$368, \$468, or maybe even \$568, but the days of the \$1,800 are over. That is the real implication that is out there today from the business traveler community. Thank you very much.

QUESTIONS AND ANSWERS

Gerald Bernstein: Thanks, Kevin, for the sobering indeed customer perspective. A number of issues have been raised. There are microphones here for questions. I'm going to use a chair's prerogative to get the ball rolling here with a question to Doug and Kevin. I think Doug used the term "a commodity industry," and so to Doug or Kevin, do you think the airlines have really come to recognize the commodity industry nature of their business?

Answer: I would think there is evidence that the major carriers have come to understand that the enemy really in a sense is the low-fare carriers. There has been a denial over the years. They said they don't compete with Southwest. It is a different product, and they were a different market, a different customer. And, I think Leo Mullen a couple of months back made the statement that no, our threat isn't American, it is AirTran, it is Southwest. So, I think there is increasing understanding and acknowledgement that those low-fare carriers and the major carriers indeed share customers and markets. I think that is an important recognition.

Answer: I would agree. I think the business traveler consideration set has grown, where 10 to 15 years ago you would not have flown a low-cost carrier with their dumpy old DC-9s. Now, a lot of these start-up low-cost carriers are operating brand new 717s, as in the case of AirTran, or JetBlue with great service and new A320s, or National for that matter with fairly new 757s. So, I think the consideration set has grown. I don't think it is a pure commodity, but I think there are some distinctions—everything from the obvious like frequent flyer mileage to other things. But, it is becoming more like a pure commodity.

Question: In your presentation, you said you really didn't see the older airplanes from the 1970s or 1980s coming back out of the desert because of local financing availability. Don't the owners of those assets have some incentive to put them back to work?

Comment: Absolutely. Depending upon the initial financing source, an operating lessor has immense incentive to lower lease rates and try to get fundamentally good aircraft like MD-80s or 737 classics back up in the air at rents of \$50,000 to \$75,000 a month, depending upon the type

and vintage. But, anyone looking for a start-up carrier to suddenly find the money to do any sort of financing on their own, I think, will be mistaken. The other issue is that the manufacturers themselves have an incentive to offer financing for new aircraft. I read magazines such as *Flight* where you see headlines of Air Mongolia taking deliveries of new 737s. They are not supposed to be taking new 737s. There is a training wheel process here of old MD-80s to new 737s, and in some cases that intermediate step seems to be skipped in part because the manufacturers and the large leasing companies are offering new airplanes. So, older airplanes are going to have a problem. As for 737-200s—I think they're dead.

John Rodgers: John Rodgers with the FAA. I'm curious—normally airfares are really only a part of the trip cost for most people. There are rental cars, accommodations, and there may be amusements in the case of recreational travel. And, we have seen, I think, the real cost of air travel really fall over the decades. I'm wondering to what extent total trip costs are going to be a limiting factor on air travel—regardless of whether the airlines are able to get a handle on their own costs. I just address the question to the panel at large.

Mitchell: Clearly, as corporations budget, they are looking at total trip costs, and more savvy corporation employ other techniques to value the cost of people's time. When I was with Cigna Corporation, we did that routinely. We not only looked at the hotel, car, meal and other expenses, but we said we need as a company to make three times your salary and benefits. So, that was plugged into the cost of the trip. So a \$1,200 trip could easily go up to \$2,200. So, I think companies are looking at the total cost of business travel.

As I mentioned in my remarks, companies are looking at whether or not putting people back on the road is the most productive way and the most competitive way to sell product. Not in every case, but if we just envision salesperson A going out on a Sunday night, meeting for 2 days with perspective customers, and salesperson B going into the office on a Monday morning, immediately addressing customers with e-mail, rolling out a new product introduction by a Web casting, talking to customers over a Web conference call, doing a video conference with London. All this happens on day one, and is repeated on day two. The juxtaposed image is the person at the back of this long security line at an airport. So, people are asking who is more productive—the person who doesn't take four trips a month but takes one and who uses technology the other three weeks? That is becoming more and more of an issue.

Comment: We have seen a little bit of that in our element of the business, as well. The need for face-to-face transactions continues. There is no question. The interim in between the face-to-face is really what I think Kevin is talking about. The value of people's time is a critical element that helps businesses like ours survive, but people are looking very much at the total cost of the inconvenience of travel. It is a shame that it has become an inconvenience to travel.

Comment: If I could add one thing. There is a company with dual headquarters between Hartford and Philadelphia, and they implemented this new technology called TeleSuites. You sit across a table, and you are looking at people in a distant city. They are the same size as you. On the whole, this is fluid. The audio is studio quality. The travel by this company was cut by 65% year-to-date because of the ease of use. When you walk in these rooms, you extend your hand automatically to the other side. It is that life-like. I only bring this up because how many years away will it be that technology will be further improved where you are almost looking at a three-

dimensional person across the room where everything is there—except you can't smell the aftershave. If you have 100 of these facilities around the world, that is thousands of city-pair markets. You instantly have a digital airline that can compete for the commercial airline passenger on a global basis.

Jim Crites: Jim Crites with DFW International Airport. I have a question for Doug. With Sections 1113 and 1114 that you mentioned earlier, do you think air carriers as they go to restructure their costs will be more reluctant to write-off unsecured debt than they might have before the writing of Sections 1113 and 1114? What I mean by that is I see these air carriers with a lot of thick debt out there at airports and others. Once they get their costs in line, there are things they need to do. They are going to have to go out there and secure more debt. I would think they would be more reluctant to simply write off unsecured debt, given the size of it right now with some of the majors than they might have before. Meaning, as you mentioned, the threat of Chapter 11. Address your real issues, whether that be labor costs or what have you, and be more reluctant to upset those people who hold debt, whether it be secured or unsecured.

Runte: Yeah, the bankruptcy option is obviously a big game—a very dangerous game of chicken between the airline and its stakeholders. With unsecured debt, it is pretty binary. If you are out of bankruptcy, you're paid in full. If you go into bankruptcy, the history of recovery for airline unsecured debt in a bankruptcy—be it corporate bonds or tax-exempt municipal bonds issued by airports—ranges from 4 to 8 cents on the dollar. We actually haven't fully seen Section 1113 in operation. It came close with USAirways. The vote last night obviates the need for Sections 1113 and 1114, but it was clearly the threat of that imposition that got the union concessions and the contract approved. I'm not sure that answered your question.

Crites: Yeah, the thrust is simply that those sections as you pointed out provide for a greater willingness on both sides to avoid bankruptcy. So, given that, the debtors out there—as you mentioned there is a lot of debt out there—you are trying to protect your debtors' interests in you. A corollary consequence of those sections is that you are better securing your own secured debt, if you will, and reassuring people who might invest in those types of measures in the future once you restructure your costs.

Runte: The fiduciary responsibility of a board of directors of a company extends to the equity. At a certain point as you are approaching financial distress, that fiduciary responsibility actually expands to incorporate other stakeholders, including debt—both secured and unsecured. Once you fall into bankruptcy, you wind up with a rugby scrum of all of the creditors of various classes going for pieces of the corpse. That is what we are going to see with USAirways. I'm not sure I like that. Maybe I do; maybe I don't. I'm not privy to the creditors' committee. But, it will be very interesting.

M. Plumb: For Mary Rose. Mort Plumb, Director of Ted Stephens Anchorage International Airport. The preponderance of your comments on the six points dealt with the passenger side. I wonder if you might discuss the need and the probability of TSA going with a risk-assessment program and get some more balance and proportionality—not only with the passenger side. We are going toward the December 31 baggage side, but also the belly cargo, and then in a broader sense cargo in general at airports.

Loney: I think you've touched on some issues that are really the tip of the iceberg here. Right now, unfortunately, TSA is almost singularly focused on meeting the two major deadlines: the November 19 deadline for conversion of the checkpoints to federalized workers and the December 31 deadline for screening all checked baggage. So, other crucial initiatives—particularly in the area of cargo, perimeter security at airports—those have not been addressed yet. In an effort to balance those needs, I think that is really where the airport directors have been so effective in terms of voicing concerns about all the attention and primarily all the money that is being spent on just checkpoints and checked baggage functions where we need to preserve resources to address other vulnerabilities in the airport environment.

Now, I think the new wrench that has been throw into the pile here is the fact that TSA is scheduled to transfer over to a new Office of Homeland Security. What that will do to the priorities in aviation is anyone's guess at this point since that is going to be the merging of 19 different agencies, all with different cultures, their own different intelligence-gathering systems, and really their own different challenges in the area of protecting our nation. So, I guess in answer to your question, my hope is that the airports will continue their efforts with TSA to bring balance. I think TSA has been reluctant to take any steps affirmatively towards meeting those needs because they don't want to overstep the bounds of Congress. After all, Congress is the one that has mandated these security measures, and until Congress gives some relief, we are still marching towards this deadline—that being the most centric focus right now. But, I have a lot of faith in my colleagues out there in the industry that with respect to these issues—for cargo, for general aviation, for security, and how these mandates impact that component of our industry. I think they are going to continue to be very vocal with respect to these issues.

Bernstein: Thank you. I would like to finish with one round of applause for all the speakers here. In my previous experience at several of these workshops, this has certainly been one of the most articulate groups I've heard.

Summary

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INTRODUCTION

As in previous forecast workshops, the opening plenary session introduced workshop participants to a diverse set of complex conditions and interdependencies that influence the growth and development of our aviation world. Whether one speaks about commercial airline operations, cargo operations, business aviation, or personal flying, it is evident that economic, environmental, and regulatory influences have the potential for great good or great grief as we move into the next century. Since the last forecast workshop, security has moved abruptly to the forefront of issues facing all segments of aviation. Regardless of sector, macro-level factors are intertwined with competitive forces that encourage mergers, strategic alliances that cut across borders and people, and the development of new institutions to meet market realities. These responses are challenging traditional methods of doing business and governing such an important public good as our airway system. Clearly, the plenary speakers informed workshop participants that more than ever before, all segments of aviation are moving faster than public policy and our current ability to anticipate the future.

DOMESTIC AIRLINES

The Domestic Aviation Panel gathered at a time when critical drivers of airline profitability—especially business travel and yield—were at levels that many industry observers and corporate executives consider unsustainable. In addition to reviewing the FAA Forecast, the panelists evaluated issues that have risen greatly in significance since the previous gathering 3 years ago. These issues—the costs of heightened security, the “hassle factor,” burgeoning insurance costs, and federal policies to assist financially troubled airlines (e.g., loan guarantees)—have broad implications for an industry grappling with a sharp downturn in revenues.

Many panelists concur with the prevailing view that the airline industry’s financial crisis will accelerate the shift in market share from high-cost carriers to lower-cost providers. Recent trends have pushed the share of the revenue passenger miles (RPMs) accounted for by low-fare airlines from less than 15% a few years ago to more than 20% today. Many panelists believe that there are few constraints to prevent the low-fare sector from expanding its share to 30% of the market over the next 5 years. At the same time, upward pressure on costs (especially labor expense) at these airlines will likely lessen the difference in the cost per available seat miles between this sector and network carriers.

Most panelists expect the country’s largest airlines to make progress in their efforts to reduce labor costs and other operating expenses—despite the legacy of labor strife. Yet, this process will remain unpredictable and in some instances will be achievable only with an imminent threat of bankruptcy. Most panelists believe that large-scale cost reductions achieved by any one of the largest three airlines would gradually ripple through the industry. They do not

expect major consolidation to occur over the next several years, but they do anticipate that alliances and co-sharing arrangements will marginally increase in significance.

The fees levied on passengers to cover the rising costs of security and the rise in passenger facility charges have tended to offset much of the decline in average fares. Although the “hassle factor”—the burden placed on travelers due to longer dwell times at airports and more extensive security procedures—may be less significant than most experts anticipated a year ago, it will likely reduce RPM growth by several points, especially in short-haul markets.

The most notable change that network carriers will make, many panelists believe, will be a heavier reliance on smaller aircraft than suggested in previous forecasts. Such an adjustment would allow these carriers to maintain a high level of schedule frequency (and thus enhancing their value to business flyers) while allowing for incremental reductions in available seat miles (ASMs). Although they expect a slight rise in average aircraft size over the next decade (partially due to the replacement of F100s, B-727s, DC-9s, and other older jets with upgraded, larger models), they do not anticipate this aspect of industry supply to increase as fast as projected by the FAA. The recently announced decisions to ground larger aircraft, including MD-11s, 757s, and 767s, are evocative of the trend to reduce capacity by relying more heavily on aircraft with substantially fewer seats.

Many panel members anticipate that carriers will more aggressively manage their schedules to account for day-of-the-week and seasonal fluctuations in travel demand in the years ahead. There was less agreement on movement away from traditional hub-and-spoke schedules. Although “rolling hubs” can enhance equipment and manpower utilization, as well as lower facility costs, it increases travel times for passengers and can reduce connection opportunities.

The downturn in traffic and rise in security costs since the autumn of 2001 has raised concerns that resources and attention might be diverted away from efforts to improve air traffic control (ATC) systems. Many panelists warn that ATC limitations could constrain growth in the latter periods of the forecast.

The previous FAA forecast mirrored industry expectations about a sharp recovery of traffic during 2003; recently released data, however, suggest that this recovery will not be nearly as strong as anticipated. The panelists’ relative pessimism on this issue is due to a perceived weakness of business demand and to the demonstrated price elasticity of both pleasure and business travel. Most panelists believe that the FAA’s projections for 2004 and beyond are reasonable.

Due to the severely deteriorated financial condition of the industry and the uncertainties mentioned earlier, the panel also recognized the fallibility of any forecast that provides single-point estimates of industry performance. It may be necessary to prepare several different forecasts based on alternative scenarios.

INTERNATIONAL AIRLINES

The first major activity of the International Airlines Panel was a roundtable discussion of the recovery of the airline industry from the economic recession, as well as from the terrorists’ attacks of September 11. Of particular interest to the panel was when the airline industry would return to the traffic levels of 2000, along with yields that permitted profitable operation. Most panelists believed that the FAA forecasts were optimistic in this regard and that the recovery would take longer than is implicit in the FAA projections. Many felt that it could be 2004 or 2005 before some semblance of normality in terms of traffic and fares returned. Basically, demand is still weak, and carriers are pricing services to maintain volume. Although carriers are

trying to cut capacity, they have not been able to reduce costs as fast as they have been able to reduce capacity.

Many panelists also believed that any hostilities with Iraq would lengthen the time required for an airline recovery particularly for U.S. domestic traffic and for traffic on the North Atlantic. The effects on traffic volume and fares would be particularly pronounced for the North Atlantic market. In addition, any increase in tensions in the Middle East, which led to restrictions on the availability of petroleum supplies, would drive up jet fuel prices and thereby lengthen the recovery period for the airlines because they could not pass these costs forward to consumers without affecting traffic levels.

Panelists noted that the economic malaise was not limited to the United States. The Japanese economy, the economies of major countries in South America such as Argentina and Brazil, as well as many the economies of other countries in Central and South America, have all suffered from declines in the rates of growth. They also noted that airline traffic is driven, in large part, by the economy.

There is still substantial excess capacity that is limiting the ability of airlines to operate at profitable levels. Low yields in relation to costs are causing some carriers to exit markets in Latin America and the Pacific.

One panelist noted that many of the infrastructure concessions, which had been operating on commercial terms, have been severely impacted by traffic declines. These were generally high-fixed, low-variable cost operations. In these cases, revenues are extremely sensitive to aviation activity. As such, they are particularly harmed by reductions in traffic because revenues fall faster than costs. Infrastructure providers are now trying to shift some of the costs to the international long-haul traffic, believing that it is less price elastic and more able to pay.

Some participants believed that the financial distress in the industry should have given carriers an opportunity to fix issues related to poor fleet mix (carriers operating too many equipment types) and to exit markets that were of marginal profitability in the best of times. Load factors are high, but this has been achieved principally through fare stimulation. Unit revenues are still below unit costs for the network carriers. This level of performance cannot be sustained or more carriers will enter bankruptcy. As a result, break-even load factors are higher than today's actual load factors (which are themselves quite high).

Two of the largest international markets in Asia are Japan to the mainland United States, and Japan to Hawaii. These have suffered significant declines, which are a result of the poor economic conditions in Japan. Data on non-resident arrivals to the United States show that traffic from Japan was down almost 19% in 2001. Much of this decline is due to the weak Japanese economy. Other markets are more robust for travel within the region and to other parts of the world. Growth in travel to and from China has remained particularly strong.

With the two large economies in South America (Brazil and Argentina) in serious financial stress, this does not bode well for airline traffic within the Central American region. Argentina, Brazil and Mexico account for 76% of the region's gross domestic product. The United States is the region's main trading partner, and the United States is also experiencing slow economic growth.

U.S. transborder traffic accounts for about 25% of the Canadian market, while travel to the rest of the world accounts for another 15% with the remainder being traffic within Canada. Under U.S.–Canada open skies, the transborder market has been experiencing a compound annual growth rate of 7% to 8% per year. Overall, there has been a 17% traffic decline year over year in the January to July period.

The European Union (EU) is evaluating the merits of a Transatlantic Common Aviation Area; such a development would eliminate the remaining commercial restrictions related to airline business between the United States and the EU. While there has been much advancement made in deregulating international airline traffic flows via open skies agreements, substantial restrictions still remain. Examples of political impediments include organized labor in both Europe and the United States, the U.S. Department of Defense (as it wants to maintain a strong U.S. airline industry for use in national emergencies), and FAA regulatory oversight (which requires nationality of carriers for oversight under International Civil Aviation Organization principles).

There was extended discussion as to whether large alliances provide all the benefits claimed. Many accepted that there could be cost savings through common purchasing of fuel and aircraft. But, it was viewed that there are no economies of scale in airline service beyond some minimal level.

Airline alliances reflect several problems, including the fact their formation is used as a substitute for mergers, which may change if ownership restrictions change. They have been and will continue to be unstable with a constant reshuffling of the players, and they are characterized by bureaucratic models wherein no one is in charge and there are severe governance problems.

AIR CARGO

The panel discussion was divided into three parts: presentations of air cargo forecasts, identification and discussion of factors that can affect air cargo forecasts, and review of the FAA air cargo forecast within the framework of the factors and other air cargo forecasts.

Many panelists felt that the U.S. economy is not moving into a double-dip recession but remains extremely vulnerable to a large number of potential “shocks.” Assuming no shocks occur, the U.S. economy should show recovery by 2004. The world economy, however, is currently in a recession. The economic situations in Europe, Japan, and Latin America range from weak to outright recession. The “other Asia”—or countries other than Japan—shows the most promise. Nevertheless, the world economy appears to be moving in general towards recovery.

Air cargo, similar to maritime cargo, is projected to grow faster than the economy. This growth is primarily driven by the steady increase in international trade. However, many panelists strongly concurred that the outlook for air cargo must be adjusted by a series of factors.

Panelists identified three categories of factors that could affect air cargo forecasts: factors that could dampen air cargo, factors that could strengthen air cargo, and factors that have an uncertain impact on air cargo.

The factors that could dampen the demand for air cargo were of the most concern to panelists. Seven factors that could dampen air cargo were discussed. Truck substitution for domestic air cargo has a profound impact on the industry and the forecasts; truck substitution can alter the level and type of demand for cargo facilities on or adjacent to airports, as well as airside access requirements. (A related concern is a data problem when shipments tagged with air waybills actually move by truck.) Ocean-borne cargo movement can be a substitute for international air cargo when delivery times are less critical. New security measures may dampen air cargo demand in the short-term as the system adjusts to the new regulations; if the security measures are considered particularly difficult to international carriers, then some shipments may be rerouted to airports in Canada and Mexico and shipped by truck into the United States.

The increase in electronic document use and distribution is anticipated to continue to grow and reduce the demand for mail movements. Unlike passenger movements, cargo moves in one direction; yield and profit requirements dictate that cargo tonnage be available in both directions in order to keep a route active.

Overcapacity is a problem, particularly in the current post-September 11 environment. This has led to rate reductions in order to fill space resulting in adverse impacts on yield and profitability. Finally, cargo operations must meet company yield and profitability requirements or they will be discontinued. Recent business closures and mergers in the industry illustrate this requirement.

Several factors were identified and discussed that could strengthen air cargo demand. Continued federal efforts to create “open skies” would be beneficial. The use of these secondary airports has allowed air cargo to continue to grow despite constraints at primary airports. The use of “round robin routes” in order to balance cargo movements has helped provide the improved yields and profitability.

The factors that could affect air cargo—but in a way that could not be readily identified by the panelists—also were noted. These include the overall condition of the aviation industry, such as reductions in routes, increases in passengers per aircraft, resizing of aircraft, financial conditions of the airlines, and the role of new cargo aircraft. Many cargo aircraft are older and will be replaced either from the existing stock of aircraft “parked in the desert” or by some new aircraft purchases such as the cargo version of the Airbus Industries A380.

Development of standalone cargo airports and the reuse of military bases for air cargo also was discussed. Unless the location is acceptable to cargo carriers, the most panelists felt that this type of development remained unrealistic.

As for the FAA forecast, many panelists felt that the underlying economic forecast needs to be modified to reflect current conditions. Accordingly, they felt that the FAA air cargo forecasts should grow at a lower rate. Many participants also felt that the mail forecast should be adjusted downward to reflect the increased substitution of electronic document movement and the shift to cargo classification through the FedEx contract. Panelists also suggested that the aircraft forecast be reviewed and adjusted downward—given the reduced demand for narrow body cargo aircraft and reduced demand for new aircraft in light of the current availability of mothballed recent aircraft models. Many panelists suggested that FAA note that air cargo statistics may reflect the upper limit because of the air waybill/truck substitution issue. Some further opined that research on the percentage of air cargo moving by truck be undertaken to clarify the forecast.

AIRPORTS AND INFRASTRUCTURE

The Airports and Infrastructure Panel discussed the FAA forecast projections of commercial passenger enplanements and total aircraft operations, suggested possible changes in the anticipated growth rates, and commented on factors that could affect future growth rates of enplanements or operations.

The panel addressed a list of issues affecting future activity levels. These included the effect of airport security and related issues on demand for air travel; the effect of changing airline economics, such as increased use of regional jets (RJs), changes in airport costs, and the rise of secondary hubs; general aviation (GA) issues, such as greater use of business jets and funding for reliever airports; and air travel valuation, including changes in the cost and convenience of air travel compared to other modes and the increasing role of low-cost carriers.

Panel members were particularly concerned about the first two issues. There was a strong feeling that the “hassle factor” is causing many people to seek alternative modes or travel substitutes, particularly for short-haul trips. The extreme delays that were experienced in the first few months after September 2001 have largely disappeared, but delays can still be a problem at peak times. Concern was expressed about what will happen in December 2002 if the full implementation of checked baggage screening takes place as scheduled. The point was made that senior airline and aviation leaders felt strongly that something had to change to reassure travelers that security had been improved in order to encourage people to start flying again.

The discussion then addressed the effects of the introduction of larger numbers of RJ aircraft into the fleet. It was suggested that RJ service tends to be designed to serve the premium passenger. They are also being increasingly used to provide feed to airline hubs from a greater distance than can be served by turboprop aircraft. RJs cost more per seat-mile to operate than larger aircraft, yet they allow airlines to test changes in service in a market more readily than with larger equipment.

Although there are some technology opportunities to increase capacity, it has been estimated that the technologies contained in the FAA Operational Evolution Plan will only give between about 1% and 8% increase in capacity. In contrast, there are about 15 new runways that are expected to come on line over the next 5 years, which will add about 1% per annum to the capacity of the large hubs. Of course, this increase is concentrated at particular airports. It was noted that these estimates imply that the uncertainty of the future growth in demand is a critical issue, since the increase in capacity is fairly close to the projected increase in demand.

In the near term, it was observed that general aviation activity is likely to be affected by two separate issues. The first is the changes in factors influencing the amount of flight training that takes place. The second is the continuing growth of business jet use—in particular growth in fractional ownership programs. In the longer term, if the Small Aircraft Transportation System lives up to the expectations of some of its proponents, this program could generate a large amount of GA operations, with a significant impact on the ATC system.

Panelists identified five significant factors that are likely to affect demand in a positive way and five that could affect demand in a negative way. The significant positive factors are Internet-based ticket purchasing systems, growth of low-cost airlines, airline bankruptcy, airline restructuring, and recovery of the economy. The growth of Internet-based ticketing provides a way for travelers to readily compare fares offered by different carriers. The effect has been to reduce average fares and allow low-cost carriers much greater market visibility. As the low-cost carriers add frequency on existing routes and start new service, they will stimulate new air travel, as well as divert passengers from higher-cost carriers. Bankruptcy and airline restructuring will allow higher-cost carriers to reduce their cost structure and provide new opportunities to reduce fares to compete with the low-cost carriers, which will stimulate additional air travel. Economic recovery will generate increased business travel, as well as provide a climate in which people are more likely to spend money on personal travel.

The significant negative factors include security procedures that significantly increase travel time or disrupt the air travel experience, increased deployment of RJs and business jets using the same airports and airspace as air carrier operations, costs of security measures and other user fees, and any future terrorist act involving aviation, and a war against Iraq. Concern exists that the introduction of 100% baggage screening planned for the end of this year would generate significant delays to air passengers, just as the passenger screening process is becoming less of a disruptive factor in the travel experience. This could result in a further shift of short haul

trips to alternative modes. The reduction in average aircraft size from the deployment of more RJs by the airlines and the shift of premium business travel to corporate aircraft will lead to greater delays, affecting both the travel time and cost of airline service. Recovery of the cost of enhanced security measures and related infrastructure expansion through user fees included in the ticket price will increase the cost of air travel. These fees can be a significant fraction of the price of cheaper tickets or short haul trips. Another terrorist attack involving aviation is not only likely to increase public hesitation to take air trips but is likely to result in a demand for even tighter—and more expensive—security measures. Finally, the commencement of hostilities against Iraq will further depress the demand for international air travel, and is likely to result in an increase in the price of oil, which in turn could force airlines to raise fares and further reduce service.

The panel members discussed the preliminary forecast growth rates for commercial passenger demand and aircraft operations that had been developed by the FAA. Many panelists were of the opinion that the FAA projections for the growth of domestic enplanements by large air carriers were too high for the period until 2005. They anticipated only a modest growth of 1.5% in 2003 over 2002, with a stronger recovery of 3.8% growth in 2004 and 2005. Many also felt that growth after 2006 might be slightly higher than the FAA had projected. Similarly, they felt that the growth in international passengers to and from the United States in 2003 would be lower than projected by the FAA. The panel members saw no reason to suggest changing the FAA growth projections for international passengers for the years from 2004 to 2010. Nor did they see any reason to change the FAA projections for the growth in regional/commuter enplanements for the period 2003 to 2006. They did feel that growth would remain somewhat stronger than projected by the FAA for the period from 2007–2010.

Consistent with the revised growth rates for passenger enplanements, many panelists felt that the FAA projection for the growth in air carrier operations for aircraft with 60 seats or more in 2003 was too high. They anticipated that air carrier operations would grow by about 3.5% per year for the period from 2004–2010. On the other hand, many of the participants felt that the FAA projection for regional/commuter aircraft operations for aircraft with less than 60 seats for the period 2003–2005 were too low. They saw no reason to change the FAA projection for 2006, but felt that the growth in regional/commuter aircraft operations would be slightly higher than the FAA projections for the period 2007–2010.

Most felt that the FAA projections for the growth in GA operations were too high, and anticipated a growth of only 1.5% in 2003, declining thereafter. In addition, many panelists strongly suggest that the FAA take steps to explicitly address the inherent uncertainty in any projection of the future by adopting a scenario-based forecasting process or one that generates confidence bands around the forecast values. This would be more realistic and would allow the users of the forecasts to more easily develop contingency plans for what they would do if aviation activity grows faster or slower than projected.

FLEETS AND MANUFACTURERS

Prior to the Fleets and Manufacturers Panel meeting, the participants submitted their forecasts to the co-chairs for comparison and production of a summary set of results. In addition, qualitative issues of importance to forecasting in the short and medium term were identified and prioritized prior to the meeting. Additional points were raised and discussed during the presentation of the results in the panel meeting.

The combined forecast of the panel was that worldwide passenger traffic would grow by 4.6% per annum over the next 20 years. The views of the panelists ranged from 3.9% to 5.3% per annum. In terms of regional growth, the forecasts were: North America, 3.7%; Europe, 4.5%; Asia/Pacific, 6.3%; and rest of world, 5.3%. Freight traffic is forecast to rise by an average of 7% per annum over the next 20 years.

Cumulative deliveries of commercial passenger jets with more than 75 seats are projected to reach 16,216 aircraft over the next 20 years, with 5,979 retirements, resulting in a net fleet increase of 10,237 aircraft, and reaching a fleet of 22,158 by the year 2021. The addition of the jet freighter fleet (for aircraft of equivalent size to the >75 seat category) increases the total (passenger + freighter) fleet size to 25,300 aircraft versus 13,900 today. The panelist's view for aircraft deliveries showed that average aircraft size would continue to grow—particularly from the demand for larger regional aircraft and size growth in longer-range large aircraft driven particularly by Asian carrier demand.

Many qualitative issues were raised that will impact the demand for commercial aircraft. The key issues include industry growth, aircraft retirements, and airline industry changes. In regards to industry growth, much attention was given to the severity of the cycle and whether the industry will plateau or begin to grow in the short term. U.S. economic stability/growth was seen to be a major driver, and airline profitability and yield management/pricing policies were agreed to have major influences on industry growth. Corporate travel policies/budgets and security costs were seen as inhibiting industry growth. On the specific issue of revenue passenger kilometers (RPK) growth in 2003, it was felt that the observation maybe optimistic—the forecasts excluded the impact of any additional demand shocks such as an Iraq conflict. Steady state RPK growth was forecast to return for all world regions by 2006, with traffic growth in the Asia/Pacific region seems to outpace growth in other regions over the 20-year period.

In regard to aircraft retirements, short-term issues included early retirement caused by technology obsolescence, environmental legislation, higher oil prices, and aircraft price versus productivity trends. In the medium term, parked aircraft returning to service was seen as a significant issue impacting upon new aircraft production.

Finally, the issue of airline changes addressed the globalization of airline operations and alliances/code-sharing effects. The impact of increased security measures was discussed, along with its impact upon the attractiveness of air travel versus ground based alternatives. Enhanced ticketing distribution channels—for example, via the Internet—and the increasing market share of low-cost operators are significant factors influencing the near term shape of the airline industry. Load factors are forecast to increase at a steady pace throughout the period. New routes and route frequency are seen to continue to develop, although infrastructure issues are a potential constraint to aircraft operations. In the medium term, potential changes to scope clauses could change the model of domestic airline operations. Further traffic constraints could be caused by limits of the advanced traffic management system.

Specific comments on the FAA draft forecast include the following. Growth in the fleet of U.S. large passenger jet aircraft was believed to be too high. Most panelists forecast lower traffic growth and higher aircraft productivity. They also projected the fleet by the year 2010 would be around 300 aircraft lower than the FAA figure, with the difference mostly in narrow-body aircraft. The FAA forecast for the fleet of U.S. large cargo jet aircraft was considered to be a little high, as most of the panel believed that there will be a move to larger aircraft with greater utilization.

U.S. RJ fleet growth was considered too high, with many panelists forecasting a long-term growth of 7.5% per annum compared to the FAA figure of 12%. This results in some 600 aircraft less in the fleet by 2010. The U.S. regional/commuter passenger fleet also was seen to be too high. In general, the panelists assumed a lower traffic forecast, with more turboprops being retired and a move to larger RJs resulting from potential scope clause changes. The reduction in the turboprop fleet was assumed to be more than offset, by a smaller number of RJs, exhibiting much increased speed and utilization.

REGIONAL AIRLINES

The regional airline panelists were relatively optimistic about regional airline activity over the FAA's forecast period. Between 2001 and 2010, the regional fleet is expected to grow at an average annual rate of 4%. This growth path will produce a fleet that approaches 3,500 aircraft by the end of the forecast period, compared with the 2,000 aircraft at the end of 2002. ASMs are expected to grow at an average annual rate of 10%. If this kind of growth is realized, ASMs will exceed 113 million by 2010, 121% higher than the 51 billion observed realized in 2002. Load factors are predicted to increase at an average annual rate of 1% over the forecast period, while RPMs are expected to increase at an average annual rate 15%. Stage lengths and enplanements are predicted to grow an average annual rate of 13.9% and 10%, respectively.

What accounts for these overall healthy growth rates? The regional airline panelists identified a number of factors that will affect the path of the regional airline industry over the FAA's forecast period, including: (1) labor/scope clauses; (2) the need to keep regional aviation separate from commercial aviation; (3) an increasing level of international activity; (4) legislative and regulatory issues in the area of congestion, security, taxes, rural service, and ATC funding; (5) industry restructuring as the number of domestic regional airlines continues to decline; (6) regional airline costs, especially labor costs; (7) increasing point-to-point service as hubs are fragmented; and (8) changes in fleet structure as turboprop aircraft continue to be retired and larger RJs are introduced into the regional fleet. In particular, most panelists believed that growth in enplanements and trip length will be driven by mainline restructuring; that growth in RPMs will be driven by the introduction of larger RJs and longer stage lengths and that growth in load factors and seat-size will be driven by the increasing presence of jets in the regional fleet. Changes in scope clauses are critical to the development of the most cost-effective, customer-focused regional fleet.

BUSINESS AVIATION

Using a conceptual framework that links shipments of new business turbine aircraft, fleet growth, and fleet hours and operations, most business aviation panelists concluded that the outlook for business aviation (turbine-powered, fixed-wing, GA aircraft) remains favorable for the FAA's forecast period despite some market sluggishness over 2002–2004. The turbojet segment of business aviation is expected to show continued strength, especially over the second half of the FAA's forecast period. The active fleet is expected to grow at an average annual rate of 4%, with total hours flown averaging 4.7% annual growth. The turboprop segment will show growth also, albeit at a lower average annual rate of 2.1%. Total turboprop hours will show little, if any growth, because of the overall aging of the turboprop fleet. While shipments of new business turbine aircraft will soften over the 2002–2004 period, annual shipments of new business turbine aircraft should number approximately 900 units a year over the second half of the decade (700 business jet units and 200 business turboprop units). By 2010, the U.S. business aviation fleet is

expected to exceed 17,400 aircraft and total turbine fleet hours are expected to exceed 7 million hours a year.

Business aviation operations will show commensurate growth, increasing 30% by 2010. Research and development by original equipment manufacturers (OEMs), engine manufacturers, and avionics suppliers will continue to press against the FAA's ability to certify aircraft in a timely manner as new product introductions in the middle of the forecast period fuel growth in deliveries, fleet size, and operations. It should be noted that annual shipments of new business turbine aircraft, fleet size, fleet hours, and business fleet operations will be dramatically higher than predicted if a small, relatively inexpensive, twin-engine business jet, such as the Eclipse and Adams aircraft now under development, is successfully introduced during the middle years of the forecast period. Most panelists feel that there is a greater than 50% chance that the technical challenges associated with such product development will be met.

This overall positive assessment of the future of business aviation assumes that a number of conditions prevail over the decade. First: (1) the U.S. economy will continue on a modest growth path; (2) that policy makers (e.g., Transportation Security Agency) will avoid overly restrictive homeland security measures; (3) that the FAA will not impose punitive landing fees on GA or initiate regulations that restrict access to airports and airspace by business turbine aircraft or impose overly severe avionics and environmental requirements on business turbine aircraft; (4) that international political tensions will be contained and that major military conflicts in the Middle East will be avoided; (5) that OEMs, engine manufacturers, and avionics suppliers will continue the research and development necessary to develop new business turbine products that bring greater value to the market place; and (6) improved fleet management and continued growth in the fractional sector will increase business turbine operations, as will new technologies that improve speed and range and expand mission capabilities.

VERTICAL FLIGHT

The immediate outlook for the vertical flight segment is affected by a number of factors including: (1) the lack of investment in rotorcraft research in the United States that pushes new product development to Europe; (2) increased demand for light and intermediate helicopters in emergency medical services and other public service applications related to homeland security; (3) a movement away from single-engine helicopters; (4) the absence of significant competition from other transportation modes such as high-speed rail and Unmanned Aerial Vehicles; (4) the maturity of current technology and the absence of significantly advanced rotorcraft on the horizon; (5) continued strength in off-shore oil exploration and production; and (6) regulatory constraints on noise and emissions.

Within the context defined by these conditions the vertical flight panelists generally expect the turbine rotorcraft fleet to grow at an average annual rate of 0.5% over the forecast period 2003–2010. By 2010, the turbine rotorcraft fleet is expected to exceed 4,500 aircraft. The piston rotorcraft fleet is expected to grow at an average annual rate of 1% and should exceed 2,800 aircraft by 2010. Total turbine hours are expected to grow at an average annual rate of 1% over the FAA's forecast period. This growth will yield in excess of 1.7 million total turbine fleet hours by 2010. Piston fleet hours are expected to grow at an average annual rate of 1.4% over this same period. With this growth pattern, total piston hours should approach 540,000 hours by 2010. Necessarily with fleet hours growing faster than fleet size, rotorcraft utilization (hours per aircraft) will increase over the forecast period.

Most vertical flight panelists continue to believe that the FAA understates the number of active helicopters—but recognize that the most widely used industry source for information on the active fleet probably overstates actual fleet size. The panel members will continue to work with the FAA to reconcile the differences in the data since these differences affect critical measures such as accident rates, which, in turn, affect insurance costs.

LIGHT AND PERSONAL GENERAL AVIATION

Conditions in the light and personal flying segment of GA are expected to stabilize over the FAA's forecast period because of changes taking place in regard to certification that will reduce the cost of personal flying and the introduction of new, more affordable products that are easier to fly. By 2010, the student pilot population is expected to approach 102,700 individuals, reflecting the impact of new product development, the introduction of sport pilot certification, and the continued promotion of personal flying by the industry. Also, innovations in sharing the cost of aircraft ownership are likely to increase the student pilot population.

The size of the single-engine fleet is expected to show modest growth for the forecast period and should exceed 150,000 aircraft by 2010, reflecting the encouragement of sport flying. The fleet of multi-engine piston aircraft, however, will show little, if any, growth over the forecast period. Single-engine activity is expected to reach 18.4 million hours by the end of the forecast period. The multi-engine piston fleet is expected to generate 2.9 million hours per year over second half of the forecast period, down slightly from the 3.0 million hours flown currently.

Discussion Panel Reports

Prior to this workshop, the FAA circulated a questionnaire to all invited participants. The questionnaire listed the preliminary and assumed values and growth rates for each sector of civil aviation to be incorporated in the forthcoming FAA aviation forecast scheduled for release in March 2003. The Transportation Research Board workshop panelists were asked to review these figures during their deliberations and, where possible, to offer alternatives and comments for each recommended change. The results from most panels are presented in Appendix A. Not every panel responded directly to the questionnaire. However, their assessments and rationales are presented in their individual panel reports.

International Airlines

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INTRODUCTION

The International Panel met as part of the domestic and regional airlines panel on September 18. On September 19, it met in its own session and discussed a number of topics as described below. The major purpose of this panel was to examine FAA's international aviation activity forecasts. For FAA purposes, the international market consists of travel to and from the United States to

other regions of the world, as well as transborder traffic between the United States, Canada, and Mexico.

The first major activity undertaken by the panel was a roundtable discussion of the recovery of the airline industry from the economic recession as well as from the terrorists' attacks of September 11. Of particular interest to the panel was when the airline industry would return to the traffic levels of 2000 along with yields that permitted profitable operation. Most panelists believed that the FAA forecasts were optimistic in this regard and that the recovery would take longer than is implicit in the FAA projections. The general feeling was that it could be 2004 or 2005 before some semblance of normality in terms of traffic and fares returned. Basically, demand is still weak, and carriers are pricing services to maintain volume. Although carriers are trying to cut capacity, they have not been able to reduce costs as fast as they have been able to reduce capacity. Most panelists believed that any hostilities with Iraq would lengthen the time required for an airline recovery particularly for U.S. domestic traffic and for traffic on the North Atlantic. The effects on traffic volume and fares would be particularly pronounced for the North Atlantic market. In addition, any increase in tensions in the Middle East, which would lead to restrictions on the availability of petroleum supplies, would drive up jet fuel prices and thereby lengthen the recovery period for the airlines because they could not pass these costs forward to consumers without affecting traffic levels. Relatively low fuel prices have been one of the bright spots over the past year.

The panelists noted that the economic malaise was not limited to the United States. The Japanese economy, the economies of major countries in South America such as Argentina and Brazil, as well as many the economies of other countries in Central and South America have all suffered from declines in the rates of growth. The panelists noted that airline traffic is driven, in large part, by the economy. Economic slowdowns, wherever they occur, result in reduced airline traffic.

The panelists also noted that there are some bright spots for airlines in the world such as in the Asia-Pacific market where the failure of Ansett has allowed Qantas, Air New Zealand, and Virgin Blue to achieve profitable operations. Singapore Airlines is also achieving profits with its costs under control.

Within the United States, there have been a number of airline bankruptcies with other carriers in financial distress. A major outbreak of hostilities or another terrorist act could push more U.S. carriers over the edge into bankruptcy. Within Europe, the failure of Swissair and Sabena was noted with the new Swiss Airlines operating at about one-third Swissair's prior capacity levels.

Within the United States, the new security requirements of the Transportation Security Administration (TSA) are imposing both costs and frustration on airlines and air travelers. There were some suggestions by panelists that this might cause a shift of high-yield traffic to business aircraft. In addition, many carriers are ceding short-haul traffic to low-cost carriers in the United States, Europe, and elsewhere. The large network carriers realize that they cannot produce these services at costs competitive with the niche low-cost carriers. The question was raised as to whether the large carriers might ally with these niche carriers and shift short-haul flying to them. However, panelists also noted that these low-cost carriers tend to serve other airports and tend not to interline traffic. As such, they are serving point-to-point leisure and business travelers within Europe, within selected regions of the United States, and elsewhere. A shift of more large carrier traffic to their regional partners is a more likely outcome.

EXCESS CAPACITY

There is still substantial excess capacity, which is limiting the ability of airlines to operate at profitable levels. One carrier sees the revenue recovery being delayed at least to 2004 and being dependent, in part, on creating some of the large combinations of airline code share alliances that are on the table today such as USAirways–United, Delta–Northwest–Continental, and so forth. Low yields in relation to costs are causing some carriers to exit markets in Latin America and the Pacific.

Many panelists also believed that the impacts of the downturn were much more dramatic in shifting traffic away from the old-line trunk carriers on short-haul business and leisure routes. Some of this traffic is being shifted to low-cost carriers, while other traffic is moving to the automobile or to other modes. Many of the panelists also believed that the fate of individual carriers depended, in part, on how quickly they were able to react and reduce capacity and staffing in face of the decline in demand.

INFRASTRUCTURE ISSUES

One panelist noted that many of the infrastructure concessions, which had been operating on commercial terms, have been severely impacted by traffic declines. These were generally high-fixed, low-variable cost operations. In this case, revenues are extremely sensitive to aviation activity. As such, they are particularly harmed by reductions in traffic because revenues fall faster than costs. When awarded, the concessionaires promised large payments to the government that has only exacerbated the problem. Infrastructure providers are now trying to shift some of the costs to the international long-haul traffic, believing that it is less price elastic and more able to pay.

FAA's infrastructure, while funded by indirect aviation taxes, will be affected in the future because of the reduction in funds flowing into the Airport and Airway Trust Fund because of the fall off in traffic. Trust Fund inflows are running about 20% below projections, according to one of the FAA panelists.

REGULATORY ISSUES

It was noted that when carriers encounter financial distress, safety oversight must be increased. This increased oversight also is required to make sure that security regulations are being complied with. A number of states are requiring an expanded audit to show that carriers meet International Civil Aviation Organization (ICAO) safety and security standards before they are permitted to operate or allowed to increase operations to certain countries.

There was a brief discussion about using regional bodies for oversight in the safety and security arena, especially in the developing regions of the world with small aviation sectors. In addition, there has also been support for major country carriers overseeing the safety of their code share partners involved in flying to and from the United States.

LOAD FACTORS AND AIRCRAFT SIZE

Some participants believed that the financial distress in the industry should have given carriers an opportunity to fix issues related to poor fleet mix (carriers operating too many equipment types) and to exit markets that were of marginal profitability in the best of times. Many of the network carriers are trying to retrench around a profitable core operation emphasizing service to and from the hub markets that they dominate. Load factors are high, but this has been achieved principally through fare stimulation. Unit revenues are still below unit costs for the network

carriers. This level of performance cannot be sustained, or more carriers will enter bankruptcy. As a result, break-even load factors are higher than today's actual load factors, which are already quite high.

REGIONAL REPORTS

Three panelists prepared reports discussing the traffic situation both to and from the United States and within their specific regions of the world.

Asia

Stanley Kuppusamy, Senior Vice President for Government Affairs of Singapore Airlines, made a presentation on the Asia Pacific market and traffic flows in that region to and from the United States. Overall, passengers [(in terms of revenue passenger kilometers (RPKs))] are down by 7.9% in July 2002 versus July 2001. However, the distribution varies by the region of the reporting carrier:

- Europe: -11.5%;
- North America: -8.4%; and
- Asia: +2.6%.

Kuppusamy noted that two of the largest international markets in Asia are Japan to the mainland United States and Japan to Hawaii. These have suffered significant declines, which are a result of the poor economic conditions in Japan. Data on non-resident arrivals to the United States show that traffic from Japan was down almost 19% in 2001. Much of this decline is due to the weak Japanese economy. Other markets are more robust for travel within the region and to other parts of the world. Growth in travel to and from China has remained particularly strong.

Kuppusamy reported that International Air Transport Association (IATA) forecasts show that growth in the trans-Pacific markets is expected to recover in the coming years:

- 2002: -5.7%;
- 2003: +7.5%;
- 2004: +4.5%; and
- 2005: +4.0%.

Latin America

Federico Bloch, Chief Executive Officer of TACA Airlines, made a presentation on the Latin America airline market. He noted that the slowdown in the U.S. economy has impacted Central America. With the two large economies in South America (Brazil and Argentina) in serious financial stress, this does not bode well for airline traffic within the Central American region. Argentina, Brazil, and Mexico account for 76% of the region's gross domestic product. The United States is the region's main trading partner and is also experiencing slow economic growth.

While passenger traffic to the United States is down by 12.1%, the percentage declines in intra-Latin America and Latin America to Europe traffic were larger in 2001. However, Latin America-North America is by far the largest market in terms of passengers. Bloch presented data noting that much of the decline in this region has been in traffic to and from the United States.

However, he noted that Latin American traffic is very dependent on economic conditions. Bloch stated that even modest economic growth will stimulate healthy traffic growth.

U.S.–Canada Transborder Market

Robert Duclos of Transport Canada made a presentation on the U.S.–Canada transborder market. He noted that travel to the United States accounts for about 25% of the Canadian market, while travel to the rest of the world accounts for another 15% with the remainder being traffic within Canada. Under U.S.–Canada open skies, the transborder market has been experiencing a compound annual growth rate of 7% to 8% per year. However, year over year, there was a 22% decline in January 2002 versus January 2001. This decline had fallen to 18% in April 2002 over April 2001 and finally to 10% in July 2002 over July 2001. Overall, there has been a 17% traffic decline year over year in the January to July period. He noted that the fall-off is not as great in the Western Canada–U.S. market in comparison to the Eastern Canada–U.S. market, which has been affected proportionally more.

Using data on arrivals to Canada, the composition of the market was roughly 60% Canadians and 40% U.S. citizens. Both markets have grown in 2000. However, in 2001 and 2002, the number of Canadian arrivals returning to Canada has fallen by 13% and 24%, respectively. Part of the travel decline to the United States by Canadians can be attributed to the unfavorable exchange rate between Canada and the United States.

MARKET STRUCTURE

Two panelists were asked to make presentations on issues concerning market structures for international airline operations and how they might affect traffic levels both within the United States and other regions of the world, as well as between the United States and other regions of the world.

Transatlantic Common Aviation Area

Dorothy Robyn of the Brattle Group discussed the Transatlantic Common Aviation Area (TCAA) that her firm is studying for the European Commission. The TCAA would eliminate the remaining commercial restrictions related to airline business between the United States and the European Union (EU). In essence, nationality clauses and bilateral agreements between countries, foreign ownership laws, and other restrictions mean that trade in airline services are still restricted between the United States and Europe, notwithstanding the “open skies” agreements between the United States and many European countries.

While there has been much advancement made in deregulating international airline traffic flows via open skies agreements, substantial restrictions still remain. For example, under the European single aviation market, any EU carrier can establish a carrier in another European state and can commence services on routes not connected to its own state. However, these carriers lack “nationality” for service to non-EU countries. For example, if a British carrier wanted to operate services between Italy and the United States, it cannot do so under current bilateral arrangements. This is also an impediment to mergers between EU and U.S. carriers which might provide additional technical efficiency or economies of scope and density in the market.

The current international market and the prevalence of large alliances have led to the reductions in the amount of interlining between carriers. The Brattle Group has been commissioned by the EU to examine the economic bases for opposition to the TCAA and to provide mechanisms to respond to them. The political impediments include the following:

- Organized labor both in Europe and the United States.
- The U.S. Department of Defense (DOD), because it wants to maintain a strong U.S. airline industry for use in national emergencies.
- FAA regulatory oversight that requires nationality of carriers for oversight under ICAO principles.

Labor's opposition to the TCAA is rooted in the fear that carriers will be able to use low-cost labor from other countries either in practice, or by threatening that they will, to restrict the opportunities for U.S. workers. The DOD's concern is principally related to the Civil Reserve Air Fleet program, which they rely upon to provide airlift in times of emergency. They believe that the program appears to be "free" in a budgetary sense and that foreign carriers or foreign controlled carriers may make less budget sense. They are also concerned that foreign carriers may be less willing to commit aircraft to this program. However, if foreign carriers were allowed to establish U.S. carriers with all the rights and obligations of nationality, the DOD concerns may be taken care of. Finally, current regulatory oversight models look to the national authority for safety oversight, although some multilateral safety bodies are being formed such as the one for the EU.

Airline Alliances

Barry Humphreys, Director of External Affairs and Route Development with Virgin Atlantic Airlines, gave a short presentation on airline alliances. His carrier has a skeptical view of the mega-alliances, although it has tactical code-share alliances with a number of carriers. Virgin Atlantic believes that there have never been enough tangible benefits that it could attain from entering into one of the large alliances. Virgin believes that airline alliances reflect the following:

- They are formed as a substitute for merger, but this may change if ownership restrictions change.
- Airline alliances have been and will continue to be unstable with a constant reshuffling of the players.
- Alliances are characterized by bureaucratic models where no one is in charge, and there are severe governance problems.

As a result, Virgin believes that large alliances do not provide all the benefits claimed. He does accept that there could be cost savings through common purchasing of fuel and aircraft, but it is generally accepted that there are no economies of scale in airline service beyond some minimal level.

Humphreys also stated that the consumer benefits which are claimed for alliances do not necessarily require an alliance as a prerequisite. He cites the following:

- Common frequent flyer programs,
- Common use of airport lounges,
- Better scheduled connections, and
- Code-sharing.

He said that all these can be done without an alliance. Virgin does not believe that antitrust immunity, which is granted to alliances, is in the consumers' interests.

PANEL DISCUSSION

The panel then went into a discussion of the proposed alliances among the existing “mega-alliances.” Paul Mifsud of KLM noted that his carrier is now looking to ally itself with one of the three large European carriers: British Airways, Air France, or Lufthansa. They are investigating this because KLM believes that only these three large carriers will end up leading successful alliances in Europe. KLM also believes that there will be three large alliances in the United States centered around American, Delta, and United, respectively. It was noted that United has proposed a code-sharing alliance with USAirways, and Delta is speaking to Continental and Northwest about a similar alliance. This leaves American and a few small carriers on the sidelines, but they, too, are likely having discussions about expanding the scope of their own alliances.

The question was raised whether the three large alliances would provide sufficient competition in domestic and international airline markets. Issues also were raised about the increased market power of such airlines actually allowing carriers to return to profitability. Such alliances might also provide a means for some discipline on the excess capacity available in the market place today.

Another subject discussed with interest was whether low-cost carriers would come to serve the role of the feeders or collectors for these large mega-alliances. It was believed that this would be done via the regional airline partners of the network carriers because the independent low-cost carriers generally do not operate into the same airports or with the same business model as the large network carriers. It does make sense for the large network carriers to outsource some of their flying to lower cost providers, but this will likely be to their partner regional airlines.

Finally, there was some discussion of point-to-point transportation via business aircraft as a potential substitute for high-yield business travelers. It was agreed that these trends were too early to assess at this time, although if the hassle factor continues, they may play a larger role in the market in the future.

Domestic Airlines

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INTRODUCTION

The Domestic Aviation Panel gathered at a time when critical drivers of airline profitability—especially business travel and yield—were at levels many industry observers and corporate executives considered unsustainable. Consisting of representatives from four consulting companies, two universities, three airlines, one airport, several federal agencies, and the Air Transport Association, the panel had access to 12 months of data on industry performance released subsequent to the events of September 11.

In addition to reviewing the FAA Forecast, the panel evaluated issues that have risen greatly in significance since the previous gathering 3 years ago. These issues—the costs of heightened security, the “hassle factor,” burgeoning insurance costs, and federal policies to assist financially troubled airlines (e.g., loan guarantees)—have broad implications for an industry grappling with a sharp downturn in revenues.

Due to the severely deteriorated financial condition of the industry and the uncertainties mentioned above, the panelists also recognized the fallibility of any forecast that provides single-point estimates of industry performance. As the full implications of the domestic aviation

sector's problems become evident, the panelists saw an essential need to monitor and revise forecasts frequently, taking into account issues that are difficult to assess through purely quantitative means.

EVOLVING STRUCTURE OF DOMESTIC AVIATION

Most participants agreed with the prevailing view that the airline industry's financial crisis will accelerate the shift in market share from high-cost carriers to low-cost providers. Recent trends have pushed the share of the revenue passenger miles (RPMs) accounted for by low-fare airlines from less than 15% a few years ago to more than 20% today. Nevertheless, as major airlines respond to the competitive pressures to lower unit costs, there is a general sense that the shift in market share to this low-fare sector will remain an incremental process. Most panelists expect the country's largest airlines, especially American, Delta, and United, to make progress in their efforts to reduce labor costs and other operating expenses, despite the legacy of labor strife.

The process by which major carriers will reduce labor costs will remain unpredictable and in some instances (i.e., United's recent difficulties) be achievable only with an imminent threat of bankruptcy. Panelists consider the experience of USAirways as illustrative of the process by which carriers would achieve significant labor-cost reductions. Most panelists feel, however, that large-scale cost reductions achieved by any one of the largest three airlines would gradually ripple through the industry.

The most notable change that network carriers will make, most panelists believe, will be a heavier reliance on smaller aircraft than suggested in previous forecasts. Such an adjustment would allow these carriers to maintain a high level of schedule frequency (and thus enhancing their value to business flyers) while allowing for incremental reductions in available seat miles (ASMs). Although most expect a slight rise in average aircraft size over the next decade (partially due to the replacement of F100s, B-727s, DC-9s, and other older jets with upgraded, larger models), panelists do not anticipate this aspect of industry supply to increase as fast as projected by the FAA. The panel believes that changes in the composition of fleets will be a very important contributor to the industry's recovery.

Technological advances and labor agreements have nullified many of the advantages of larger aircraft; these factors also are accelerating the shift toward more flexible types of equipment. On the basis of cost per available seat miles (CASMs), certain small-plane models can now be operated at costs comparable to larger planes. The recently announced decisions to ground larger aircraft, including MD-11s, 757s, and 767s, are evocative of the trend to reduce capacity by relying more heavily on aircraft with substantially fewer seats.

Continental and Delta (with its ComAir partner) have been particularly successful in using small aircraft to better match capacity with business demand, a process facilitated by their extensive reliance on regional jets (RJs) for short-haul, medium-distance, and—increasingly—long-haul business-oriented routes. This shift is also an important part of USAirway's turnaround strategy. The panelists anticipate the "scope cause" issues restricting the ability of several others carriers to deploy RJs—a major issue in recent years—to be gradually overcome through collective bargaining.

Most participants anticipate that carriers will manage their schedules more aggressively to account for day-of-the-week and seasonal fluctuations in travel demand in the years ahead. With labor and fuel costs accounting for a greater share of total costs than in the past, the incentive to "micro-manage" capacity in this manner is intensifying. There was less agreement among the panel on whether the network carriers would move aggressively away from traditional

hub-and-spoke schedules that confine arrivals and departures to narrow “banks.” Although “rolling hubs” can enhance equipment and manpower utilization, as well as lower facility costs—American is apparently using this strategy with some success in Dallas/Fort Worth. It increases travel times for passengers and can reduce connection opportunities.

Almost all panelist discussions supported the idea that there will not be a major consolidation to occur over the next several years, but they do expect alliances and co-sharing arrangements to marginally increase in significance. While they expect the demise of several low-fare carriers, panelists feel that existing low-cost operators (or possibly new carriers) would fill the vacated niches. Opinions on the panel were mixed, however, about how soon venture capital will again flow to start-up airlines.

Panel members have differing opinions about whether JetBlue Airways has adopted a business model that will emerge as a major national force in the marketplace. Nevertheless, most believe that there are few constraints to prevent the low-fare sector from expanding its share to 30% of the market over the next 5 years. At the same time, upward pressure on costs (especially labor expense) at these airlines will likely lessen the difference in CASMs between this sector and network carriers.

The downturn in traffic and rise in security costs since the autumn of 2001 has raised concerns that resources and attention might be diverted away from efforts to improve air traffic control (ATC) systems. A presentation by Charles Keegan, FAA’s Associate Administrator for Research and Acquisitions, illustrated some of the emerging issues in this area. Even if passenger enplanements are lower than estimates made prior to the events of 2001, the panel warns that ATC limitations could constrain growth in the latter periods of the forecast.

The fees levied on passengers to cover the rising costs of security and the rise in passenger facility charges have tended to offset much of the decline in average fares to the detriment of commercial airlines. Although the “hassle factor”—the burden placed on travelers due to longer dwell times at airports and more extensive security procedures—may be less significant than most experts anticipated a year ago, it will likely reduce RPM growth by several points, especially in short-haul markets.

YIELD

Passenger yield—the amount of revenue earned per passenger, measured in cents per mile—has declined at a rate faster than most industry observers envisioned in early 2002. Although the previous FAA forecast and other projections suggest significantly higher yields in 2003, most panelists do not expect this to materialize (Table 1). They expect yield to remain essentially unchanged during 2003—a phenomenon that will put enormous pressure on network carriers to cut costs.

Two developments related to yield have assumed added significance since the last panel gathering 3 years ago: First, the propensity for business travelers to travel on so-called “pleasure fares” (i.e., fares with restrictions intended to prevent business use) has risen at an unexpectedly rapid rate. In some markets, full-fare travel is reportedly down more than 30% since the beginning of 2000. The transparency in fares made possible by Internet distribution systems, along with the growing sophistication in corporate travel departments in lowering reliance on “walk-up” or unrestricted one-way fares, has contributed significantly to this trend.

Second, electronic forms of communication (e.g., teleconferencing and e-mail) appear to be having quantitatively significant effects on the high-yield segment of the market. Although data about this proposition is practically nonexistent, anecdotal evidence suggests that these

TABLE 1 Yield Outlook for Domestic Aviation

	Percent Change for Year Ending					
	2003	2004	2005	2006	2003-2010	Average
Current Forecast	+6.2	1.1	1.8	1.8	1.5	
Panel Alternative		0	1	0	0	0.8

technologies (which were anticipated for many years but apparently slow to materialize) are now popular substitutes for air travel in both small and large businesses.

In this low-yield environment, carriers will exercise considerable restraint in adding new capacity to the market—much as they did during the financial crisis during the early 1990s. Partly for this reason, most panelists expect yield to rise slightly (1%) in 2004 and then stay flat in 2005. Although they agree that the FAA’s forecast for a 12.80-cent yield in 2006 (compared to 13.47 cents in 2001) is reasonable, they also believe the short-term yield environment will be less favorable for major airlines.

An important theme resonating throughout the 2-day panel discussion was that current yields will not sustain the operations of even low-cost carriers in many markets. Nevertheless, many participants stressed that one of the most critical variables monitored by airlines—revenue per available seat mile (RASM)—has not been explicitly integrated into FAA forecasts. The industry’s rising load factors have allowed RASM’s to be more stable than changes in yield.

RPMS AND ENPLANEMENTS

The previous FAA forecast mirrored industry expectations about a sharp recovery of traffic during 2003. Recently released data, however, suggest that this recovery will not be nearly as strong as anticipated. Many panelists believe RPMs will rise approximately 4% in 2003 compared to the previous year—despite substantially lower fares than those forecasted by the FAA. The FAA had anticipated traffic growth would exceed 10% next year.

Many participants’ relative pessimism on this issue is due to the probable weakness of business demand and to the demonstrated price elasticity of both pleasure and business travel. They believe that the FAA’s projections for 2004 and beyond are reasonable, if perhaps slightly too high, and that low-fare airlines (which currently have 20% of the market) will expand markedly. Implicit in these numbers is the belief that RPMs will diminish sharply for at least one major network carrier.

The panelists’ general forecast for enplanement growth is similar to their forecast for RPMs ([Table 2](#)). However, growth in this area will be slightly less due to the lengthening distance of the average passenger trip, a phenomenon attributable in part to dampening effects of the “hassle factor” on travel in city-pairs involving distances 300 mi or less.

LOAD FACTOR AND AVERAGE AIRCRAFT SIZE

Load factors for the first three quarters of 2002 for domestic airlines were in the vicinity of 72%—slightly higher than those projected by the FAA. Due to the anticipated substitution of small aircraft for larger aircraft on many routes and cutbacks in capacity by several network carriers, the panelists expect load factors to be approximately one to two points higher than those in the FAA forecast for the years 2003 and beyond. The urgency felt by the network carriers to ground larger aircraft has become evident in recent months. Such adjustments will help stabilize

TABLE 2 Percentage Change in RPMs and Enplanements

	RPMs					
	2003	2004	2005	2006	2003-2010	Average
Current Forecast		+10.92	4.2	4.1	4.0	3.9
Panel Alternative		4	4	3.5	3.5	3.6

	Enplanements					
	2003	2004	2005	2006	2003-2010	Average
Current Forecast		11.5	4.1	4.0	3.9	3.8
Panel Alternative		3.9	3.9	3.4	3.4	3.5

yields and increase load factors to 75% in 2004, where they will remain through the end of the decade.

Recent advances in information technology, especially improvements to Internet ticketing, suggest that there are few notable barriers on the further escalation of load factors. The industry is already achieving average load factors in excess of 80% during certain peak travel periods and in excess of 70% in certain off-peak periods. The decline in yield will encourage carriers to continue to be assertive in bolstering seat utilization—even if this comes at the expense of passenger perceptions of service quality.

The average size of the aircraft operated by major airlines dropped from almost 152 seats in 1990 to around 137 seats today (Table 3). The forecast released by the FAA in early 2002 anticipates a gradual rise in average aircraft size, thus reversing this notable trend. The forecast foresees a rise in average aircraft size of about one seat per year through 2010. (It should be noted that these

TABLE 3 Load Factor and Average Aircraft Size

	Load Factor by Calendar Year (%)					
	2003	2004	2005	2006	2003-2010	Average
Current Forecast		73.3	73.3	73	73	73.1
Panel Alternative		74	75	75	75	75

	Change in Average Aircraft Size (measured in seats)					
	2003	2004	2005	2006	2003-2010	Average
Current Forecast		+0.5	0.8	1.0	1.0	0.7
Panel Alternative		0	0.5	0.5	0.5	0.5

numbers exclude the RJs operated by several commuter-partner affiliates). Most panelists concur that the retirement of older aircraft and delivery of larger planes (most notably 777s and various Airbus models) will increase the average size of aircraft in the domestic fleet. Recent experience has shown, however, that the market and technological forces favoring small aircraft have been more significant than many expected several years ago. Accordingly, these panelists expect no change in average aircraft size in 2003 and only a 0.5 seat-per-plane increase in 2004 and beyond.

FORECASTS AND THE FUTURE

The industry's financial problems and the continuing challenges to security are creating an environment in which it may be necessary to prepare several different forecasts based on alternative scenarios. The accuracy of the FAA forecast will remain conditional on the assumption that incidents of terrorism do not (once again) fundamentally alter public perceptions about the safety, cost, and convenience of air travel. The events of September 11, though, provide a vivid reminder of the interrelationship between global affairs and the performance of the domestic marketplace.

Air Cargo

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Dick Vandenberg

KLM Cargo

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Robert West

DRI-WEFA

INTRODUCTION

The panel discussion was divided into three parts: presentations of air cargo forecasts; identification and discussion of factors that can affect air cargo forecasts; and review of the FAA air cargo forecast within the framework of the factors and other air cargo forecasts. Cargo is a derived demand: The needs of customers drive the need to move shipments. Air cargo is a portion of the overall demand for freight services.

AIR CARGO FORECASTS

The FAA and DRI-WEFA presented their current forecasts for air cargo. In addition, the panel reviewed and discussed the forecasts released by Boeing and IATA. The forecast discussion also included the underlying economic projections.

The DRI-WEFA presentation on current world economic and U.S. forecasts was used as a starting place for the discussion. The discussion also was informed by recent economic projections developed or used by other panel members, including information on the U.S. economy prepared for the New England Regional Aviation System Plan.

The consensus of the panel was that the U.S. economy is not moving into a double dip recession but remains extremely vulnerable to a large number of potential “shocks.” Assuming no shocks occur, the U.S. economy should show recovery by 2004.

The world economy is currently in a recession. The economic situations in Europe, Japan, and Latin America range from weak to outright recession. The “other Asia” (countries other than Japan) shows the most promise. Nevertheless, the world economy appears to be moving in general towards recovery.

Air cargo, similar to maritime cargo, is projected to grow faster than the economy. This growth is primarily driven by the steady increase in international trade. However, the panel strongly concurred that the outlook for air cargo must be adjusted by a series of factors.

FACTORS AFFECTING AIR CARGO FORECASTS

The panel identified three categories of factors that could affect air cargo forecasts. These categories look at what could dampen demand, strengthen demand, or have an uncertain effect on air cargo.

Factors Diminishing Air Cargo Demand

These factors were of the most concern to the panel. As the newest and most expensive of the freight transportation options, air cargo is most vulnerable to industry trends and conditions. The factors that could diminish demand are as follows:

- **Truck substitution.** The panel concluded that truck substitution for domestic air cargo has a profound impact on the industry and the forecasts. Truck substitution can alter the level and type of demand for cargo facilities on or adjacent to airports. Truck substitution can also alter aircraft use and the need for airside access. FedEx and United Parcel Service already have significant ground operations. BAX Global Inc. is growing their ground operation more than their airside operation. Airlines are also tendering shipments to expedited trucking firms to carry. DHL Worldwide Express has announced a new ground product. In addition, the current datasets appear to be including “air cargo” shipments that move by trucks, which means that domestic air cargo movement statistics are likely overestimating movements. The issue is that shipments tendered to air cargo and integrated carriers are handled via an air waybill whether they actually move on a truck or aircraft. The panel noted that this data issue should become a priority.
- **Ocean substitution.** Less expensive ocean-borne cargo movement can be a substitute for international air cargo when delivery times are less critical.
- **Security.** New security measures regarding mail and known shipper rules, as well as pending new requirements, may dampen air cargo demand in the short-term as the system adjusts to the new regulations. If the security measures are considered particularly difficult to international carriers, then some shipments may be rerouted to airports in Canada and Mexico and shipped by truck into the United States.
- **E-mail substitution.** The increase in electronic document use and distribution is anticipated to continue to grow and reduce the demand for mail movements.
- **Cargo balance.** Unlike passenger movements, where it is likely that a roundtrip ticket is purchased, cargo moves in one direction. Yield and profit requirements dictate that cargo tonnage be available in both directions in order to keep a route active.
- **Yield and profitability.** Cargo operations must meet company yield and profitability requirements or they will be discontinued. Recent business closures and mergers in the industry illustrate this requirement.
- **Overcapacity.** Particularly in the current post-September 11 environment, excess air cargo capacity exists on some routes. This has led to rate reductions in order to fill space. Overcapacity, similar to cargo balance, impacts yield and profitability.

Factors Strengthening Air Cargo Demand

On the other hand, a number of recent factors could strengthen the demand for air cargo:

- **Continued federal efforts to create “open skies.”** While many markets are now open to carriers, several key markets are still limited. These include Hong Kong, the United Kingdom, China, Japan, and Brazil.

- Secondary airports. As space becomes constrained at several primary airports, the integrated carriers are developing successful operations at nearby second tier airports. Manchester, New Hampshire, was cited as an example. The use of these secondary airports has allowed air cargo to continue to grow.

- Round-robin routes. In order to balance cargo movements, the air cargo carriers are increasing moving aircraft through a circuit of airports, as well as using feeder aircraft and trucks. These solutions help provide the necessary yields and profitability.

- Unforeseen industry conditions. The recent situation at the U.S. West Coast ports demonstrates that air cargo use can increase when a significant event affects customer supply chains. As vessels were unable to unload at U.S. ports, customers switched, where possible, to use of air cargo carriers—despite the increased cost. Note that such situations contribute “one-time” increases in cargo demand, which may not be sustainable in the long term.

Factors Not Readily Identified

Other factors could affect air cargo—but in a way that could not be readily identified by the panel:

- Overall condition of the aviation industry. The reduction in routes, increases in passengers per aircraft, resizing of aircraft, and financial conditions of the airlines will impact the availability and profitability of cargo operations.

- Belly versus freighter use. The panel determined that use of belly space for cargo will continue. It is a profit center for the airlines, particularly necessary in the current environment. Some new aircraft do provide additional belly capacity for cargo while others do not. For example, the panel noted that it is unlikely that RJs have belly capacity for cargo.

- New cargo aircraft. Many cargo aircraft are older. This equipment will be replaced either from the existing stock of aircraft “parked in the desert” or by some new aircraft purchases. The only new cargo aircraft anticipated to come to the market is the cargo version of the A380. It was noted that many of the cargo planes are derivations of passenger aircraft. Some military designs have also been adapted for the movement of oversized, heavier-weight shipments (such as the AN-124).

Other Developments to Consider

The panel also discussed other developments that could have an effect on air cargo:

- Development of stand-alone cargo airports and the reuse of military bases for air cargo. Unless the location is acceptable to cargo carriers, the panel felt that this type of development remained unrealistic.

- Mail statistics and the FedEx/U.S. Postal service contract. The panel noted that the recent agreement for FedEx to carry U.S. mail may result in some shipments that no longer may be classified as mail and instead classified as cargo. Statistics for Memphis International Airport were cited as an example. Accordingly, mail statistics may not be currently accurate reflection of actual movements.

COMMENTS ON THE FAA FORECAST

The panel determined that the underlying economic forecast needs to be modified to reflect current conditions. In general, economic growth rates should be reduced. Accordingly, the panel also felt that the FAA air cargo forecasts should grow at a lower rate.

Panel members also felt that the mail forecast should be adjusted downward to reflect the increased substitution of electronic document movement and the shift to cargo classification through the FedEx contract.

Panel members suggested that the aircraft forecast be reviewed and adjusted downward given the reduced demand for narrow-body cargo aircraft and the reduced demand for new aircraft in light of the current availability of mothballed recent aircraft models.

The panel also recommended that FAA note that air cargo statistics may reflect the upper limit because of the air waybill/truck substitution issue. The panel further recommended that research on the percentage of air cargo moving by truck be undertaken to clarify the forecast.

Airports and Infrastructure

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INTRODUCTION

The airports and infrastructure panelists were asked to review the FAA forecast projections of commercial passenger enplanements and total aircraft operations, offer any suggestions for changes in the anticipated growth rates, and comment on factors that could affect future growth rates of enplanements or operations. The panel leader suggested structuring the discussion around three aspects: identifying issues that are likely to affect future growth rates and that need to be considered by the FAA in preparing the forecasts; reaching a range of possible figures on the likely future growth rates in enplanements and operations; and offering ideas for a research agenda that could be undertaken to better understand the issues that will shape future activity levels.

The panel began its discussion with some questions about the current FAA forecast process. The FAA staff members involved in producing the forecasts were asked whether they plan to develop a range of forecasts or continue to produce a single forecast. They indicated that there is a proposal for a study to address how they might develop a range of forecasts, but at the present time the intent is to continue to produce a single forecast. It was noted that the forecast projections are used within the FAA for a variety of financial and personnel planning and that

having more than one forecast would complicate this process. The FAA forecast staff members present also were asked whether there is a summary of which factors have been addressed in the forecasts that have been produced and how this was done. In particular, the question was raised of how additions to system capacity are handled.

The FAA forecast staff members indicated that they did not think that individual airport constraints were particularly important at a national level. They stated that they have used an econometric model to produce the forecast traffic for the years beyond 2003, which implicitly incorporates many of the issues through the calibration process, with judgment being used for the period to 2003, while traffic is recovering from the recent downturn.

Several panel members expressed doubt that the traffic recovery would simply be a matter of returning to the level and pattern that would be projected using models based on pre-2001 data. They felt that there is a structural change occurring in the industry, with some sectors on a growth trajectory and others in decline. It was suggested that it might be time to adopt a modeling approach that considers different market segments.

It was noted that the current forecasting approach does not address the issues that surround the Small Community Air Service program. It was recognized that this might not be particularly important for forecasts at the national level, but is a significant issue for the states. The question was raised whether the terminal area forecasts (TAF) sum to the national forecast. The FAA forecast staff responded that they do not force the TAF to sum to the national forecast but try to achieve consistency in growth rates. Some panel members suggested that it would be useful for the FAA to develop regional forecasts to supplement the TAF and that could take account of diversion of traffic between airports in a regional system.

ISSUES AFFECTING FUTURE ACTIVITY LEVELS

Participants were presented with a list of issues about which the FAA hoped to gather knowledgeable opinions. These included the following:

- The effect of airport security and related issues on demand for air travel;
- Changing airline economics, such as increased use of RJs, changes in airport costs, and the rise of secondary hubs;
- General aviation (GA) issues, such as greater use of business jets and funding for reliever airports; and
- Air travel valuation, including changes in the cost and convenience of air travel compared to other modes and the increasing role of low-cost carriers.

Many panelists were particularly concerned about the first two issues and expressed a strong feeling that the inconvenience, intrusiveness, and uncertainty involved in the new airport security environment (loosely referred to as the “hassle factor”) is causing many people to seek alternative modes or travel substitutes, particularly for short-haul trips. They identified three related issues:

- The effect of capacity constraints on demand;
- The role of non-fare costs, including travel time and travel agent fees, in the demand for air travel; and
- The impact of the post-September 11 environment on GA airports, including the closure of some airports and the costs of new security measures.

Panelists then discussed the impact of enhanced security measures on air travel demand at some length. It was noted that the extreme delays that were experienced in the first few months after September 2001 have largely disappeared, and the security screening process generally goes quite smoothly—although delays can still be a problem at peak times. The TSA is gradually implementing a standard screening process, although it may take another year for this to be fully deployed. Some panel members expressed concern about what will happen in December 2002, if the full implementation of checked baggage screening takes place as scheduled. It was stated that some business travelers are questioning whether the screening is effective, and that this contributes to the sense of unnecessary hassle. However, it also was noted that leisure travelers seem less concerned about the inconvenience and actually welcome the increased sense of security. The point was made that senior airline and aviation leaders felt strongly that something had to change to reassure travelers that security had been improved in order to encourage people to start flying again.

The critical question is whether these concerns over the inconvenience of enhanced security measures and the residual fear of another terrorist attack will permanently reduce air travel demand below the levels that would have occurred based on the relationships observed prior to September 11. Some panel members felt that people would eventually adjust to the new environment and resume their earlier behavior, although this could change dramatically if there is another incident. It was suggested that there may also be a ratchet effect, whereby people who have switched to driving for short-haul trips may continue to do so. Several panel members quoted examples that they were aware of where people were now driving for relatively short trips that they previously would have flown.

It was noted that there did not appear to have been a long-term effect after the Persian Gulf War, although one panel member questioned whether there might be a different response for different types of business travel. The panelists recognized that questions of this sort were hard to answer, because there is very little data on trip purpose—although a great deal is known about travel patterns in terms of passenger itineraries. It was suggested that greater use could be made of air passenger surveys that are performed by airport authorities. It might also be useful to find out what data the online reservation system providers already have.

It was pointed out that the long-term effect of the additional time required for security processing is a specific instance of the more general issue of the role of travel time and travel reliability on the demand function. This includes the effects of air traffic delays, as well as the impact of changes in flight times due to faster aircraft such as the proposed Boeing Sonic Cruiser. Most panelists agreed that these travel time frictions must have some effect on demand. Even if it is not possible to explicitly identify the effect of each factor, it may be possible to address whether they are likely to get worse or better. One example would be the difficulty of picking people up at the terminal curbside. It was suggested that it would be useful to have an index of travel inconvenience. It would also be useful to know whether people's response to changes in cost or travel time varies with how and when the cost or time is incurred.

The discussion then turned to the effects of the introduction of larger numbers of RJ aircraft into the fleet. It was noted that American Airlines had recently started service in the Northeast Corridor market using RJ aircraft. However, panelists were cautioned to be careful about drawing long-term lessons from the short-term response to financial difficulties by the airlines. It also was suggested that RJ service tends to be designed to serve the premium passenger, particularly in markets where travelers might otherwise drive to a more distant airport with low-cost service. They are also being increasingly used to provide feed to airline hubs from

a greater distance than can be served by turboprop aircraft. Although RJs cost more per seat-mile to operate than larger aircraft, they can cost less on a passenger-mile basis if the demand is not strong enough to achieve a reasonable load factor on a larger aircraft. This allows airlines to test changes in service in a market more readily than with larger equipment. It was noted that to date there had not been much direct substitution of RJs for large aircraft service, and the RJs have been generally used for replacement of turboprop service or for the introduction of service to new markets.

Some panel members felt that it was unclear what constraints on RJ use might result from airline pilot scope clauses. It was recognized that this will depend on labor negotiations that are yet to take place, which argues for a more scenario-based approach to forecasting. It was pointed out that the cost advantages of RJs depend on two factors: the lower flight crew costs and the way that airports charge for the use of the airport through landing fees. Changes in either of these factors will change the relative economics of RJ use. In particular, the use of peak-period surcharges that do not depend on aircraft size would put RJs at a significant disadvantage compared to larger aircraft. Most panelists agreed that there is a need for a better understanding of the role of airport pricing on air travel demand. It was noted that the U.S. Department of Transportation has asked for comments on congestion pricing, and that there are limited prospects for significant additions to airport capacity in the short term.

One panel member observed that there was little current discussion about the extent to which the system is close to its capacity and wondered whether this was because it was now realized that this is not a real issue or because the drop in activity after September 11 had caused the problem to disappear for a while. If demand growth resumes at a faster rate than capacity growth in the system and no actions are taken to change the current pricing structure, other self-correcting mechanisms will occur that will limit traffic growth. However, the effects of these on demand are not well understood.

Although there are some technology opportunities to increase capacity, such as controller-pilot data link, it has been estimated that the technologies contained in the FAA Operational Evolution Plan will only give between about 1% and 8% increase in capacity. In contrast, there are about 11 new runways that are expected to come on line over the next 5 years, which will add about 1% per annum to the capacity of the large hubs. Of course, this increase is concentrated at particular airports. It was noted that these estimates imply that the uncertainty of the future growth in demand is a critical issue, since the increase in capacity is fairly close to the projected increase in demand. This could make the question of airport pricing of central importance, since most of the growth in aircraft operations will be in smaller aircraft, particularly RJs.

In the longer term, if the Small Aircraft Transportation System lives up to the expectations of some of its proponents, this program could generate a large amount of GA operations, which could shift the capacity concerns to smaller airports, as well as having a significant impact on the ATC system.

In the near term, GA activity is likely to be affected by two separate issues. The first is the changes in factors influencing the amount of flight training that takes place. The second is the continuing growth of business jet use, and in particular growth in fractional ownership programs. The effect of restrictions on foreign nationals taking flight training, together with the reduced demand for pilots since most airlines have furloughed many of their pilots, is likely to significantly reduce the amount of flight training that will take place. With the increasing number of business jets, there may be a need for additional airport facilities. This may result in a concentration of the funding at a smaller number of airports, although this may still be a

significant number. Since navigation capability is increasingly on the aircraft, most of the needed improvements will be in airport infrastructure, which tends to be driven by the number of operations by the design aircraft.

In summary, contributing panelists identified five significant factors that are likely to affect demand in a positive way and five that could affect demand in a negative way. The significant positive factors are

- Internet-based ticket purchasing systems,
- Growth of low-cost airlines,
- Airline bankruptcy,
- Airline restructuring, and
- Recovery of the economy.

The growth of Internet-based ticketing provides a way for travelers to readily compare fares offered by different carriers. The effect has been to reduce average fares and allow low-cost carriers much greater market visibility. As the low-cost carriers add frequency on existing routes and start new service, they will stimulate new air travel, as well as divert passengers from higher-cost carriers. Bankruptcy and airline restructuring will allow higher-cost carriers to reduce their cost structure and provide new opportunities to reduce fares to compete with the low-cost carriers, which will stimulate additional air travel. Economic recovery will generate increased business travel as well as provide a climate in which people are more likely to spend money on personal travel.

The significant negative factors are

- Security procedures that significantly increase travel time or disrupt the air travel experience;
- Increased deployment of RJs and business jets using the same airports and airspace as air carrier operations;
- Costs of security measures and other user fees;
- Any future terrorist act involving aviation; and
- A war against Iraq.

Several panel members expressed concern that the introduction of 100% baggage screening planned for the end of 2002 would generate significant delays to air passengers, particularly at peak times, just as the passenger screening process is becoming less of a disruptive factor in the travel experience. This could result in a further shift of short-haul trips to alternative modes.

The reduction in average aircraft size from the deployment of more RJs by the airlines and shift of premium business travel to corporate aircraft will lead to greater delays, affecting both the travel time and cost of airline service. Meanwhile, the loss of the premium customers from airline services using larger aircraft will both tend to increase discount fare levels and reduce service through the elimination of unprofitable services. Recovery of the cost of enhanced security measures and related infrastructure expansion through user fees included in the ticket price will increase the cost of air travel. These fees can be a significant fraction of the price of cheaper tickets or short-haul trips. Another terrorist attack involving aviation is not only likely to increase the public hesitation to take air trips but is likely to result in a demand for even tighter

(and more expensive) security measures. The commencement of hostilities against Iraq would further depress the demand for international air travel and would be likely to result in an increase in the price of oil—at least for a time—which would force airlines to raise fares and further reduce service.

LIKELY FUTURE GROWTH RATES

As requested, panelists read and discussed the preliminary forecast growth rates for commercial passenger demand and aircraft operations that had been developed by the FAA.

Most felt that the FAA projections for the growth of domestic enplanements by large air carriers were too high for the period until 2005, particularly for 2003. These panelists anticipated only a modest growth of 1.5% in 2003 over 2002, with a stronger recovery of 3.8% growth in 2004–2005. They saw no reason to change the FAA projection of 3.9% growth in 2006, but felt that thereafter growth might be slightly higher than the FAA had projected, at 3.8% per year for the period 2007–2010. Similarly, many felt that the growth in international passengers to and from the United States in 2003 would be lower than projected by the FAA, with a likely growth of 3.5%. They saw no reason to change the FAA growth projections for international passengers for the years from 2004–2010.

They saw no reason to challenge the FAA projections for the growth in regional/commuter enplanements for the period 2003–2006. However, some panelists felt that the growth would remain somewhat stronger than projected by the FAA for the period from 2007–2010, with an average of about 5.5% per year.

Consistent with the revised growth rates for passenger enplanements, many panelists felt that the FAA projection for the growth in air carrier operations for aircraft with 60 seats or more in 2003 was too high, and expected that this would be closer to 2.5%. Even so, this represents a small decline in average aircraft size or load factor. For the period from 2004–2010, most panelists thought that the FAA projections for the growth in air carrier operations were too low—implying an increase in average size that the panel did not expect would occur. They anticipated that air carrier operations would grow by about 3.5% per year for the period from 2004 to 2010.

On the other hand, many thought that the FAA projection for regional/commuter aircraft operations for aircraft with less than 60 seats for the period 2003–2005 were too low, and anticipated that these operations would grow by 5.4% in 2003, 4.2% in 2004, and 2.8% in 2005. They saw no reason to change the FAA projection for 2006, but believed that the growth in regional/commuter aircraft operations would be slightly higher than the FAA projections for the period 2007–2010, averaging 2.6% per year.

Most participants thought that the FAA projections for the growth in GA operations were too high and anticipated a growth of only 1.5% in 2003—declining to 1.0% per year thereafter.

SUGGESTED RESEARCH AGENDA

As became clear in the course of the discussion, a large number of issues will shape the future growth rates of aviation activity that are neither well understood nor explicitly addressed in the current FAA forecast process. These include the following:

- The role of non-fare costs, including travel time and inconvenience, on air travel demand;

- The factors that affect the growth rates of different market segments for commercial air transportation, such as business versus non-business travel;
- The effect of changes in the distribution of air fares offered, including the impact of low-fare airlines;
- The response of air travel demand to inadequate airport capacity or different strategies to address this, such as congestion pricing;
- The factors that determine the share of the total air travel market handled by regional/commuter airlines;
- The factors driving activity in the different segments of the GA sector, such as flight training and corporate aviation; and
- The impact of the growing use of corporate aviation and fractional ownership programs on airline yields.

Most panelists, therefore, would hope to see the FAA undertake a research program directed at achieving a better understanding of these issues as well as how to better account for them in the forecast process. In addition, they felt strongly that there would be great benefit in FAA taking steps to explicitly address the inherent uncertainty in any projection of the future by adopting a scenario-based forecasting process or one that generates confidence bands around the forecast values. This would not only acknowledge the extent of the uncertainty in the forecasts, but would allow the users of the forecasts to more easily develop contingency plans for what they would do if aviation activity grows faster or slower than projected.

Fleets and Manufacturers

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INTRODUCTION

Prior to the Fleets and Manufacturers Panel meeting, the participants submitted their forecasts to the cochairs for comparison and production of a consensus set of results. In addition, qualitative issues of importance to forecasting in the short and medium term were identified and prioritized prior to the meeting. Additional points were raised and discussed during the presentation of the consensus results in the panel meeting.

FORECASTS

The consensus forecast of the panel was that worldwide passenger traffic would grow by 4.6% per annum over the next 20 years. The views of the panelists ranged from 3.9% to 5.3% per annum (Figure 1). In terms of regional growth, the consensus forecasts were: North America 3.7%; Europe 4.5%; Asia/Pacific 6.3%; and rest of world 5.3%. Freight traffic is forecast to rise by an average of 7% per annum over the next 20 years.

Cumulative deliveries of commercial passenger jets with greater than 75 seats are projected to reach 16,216 aircraft over the next 20 years, with 5,979 retirements, resulting in a net fleet increase of 10,237 aircraft, and reaching a fleet of 22,158 by the year 2021 (Figures 2, 3, and 4). The addition of the jet freighter fleet for aircraft of equivalent size to the greater than 75 seat category, increases the fleet size to 25,300 aircraft versus 13,900 today.

The panel consensus for aircraft deliveries showed that average aircraft size would continue to grow, particularly from the demand for larger regional aircraft and for longer-range large aircraft, which is driven particularly by Asian carrier demand.

QUALITATIVE ISSUES

Many qualitative issues were raised that will affect the demand for commercial aircraft:

- Industry growth. Much attention was given to the severity of the cycle and whether the industry will plateau or begin to grow in the short term. U.S. economic stability/growth was seen to be a major driver, and airline profitability and yield management/pricing policies were agreed to have major influences on industry growth. Corporate travel policies/budgets and security costs were seen as inhibiting industry growth.

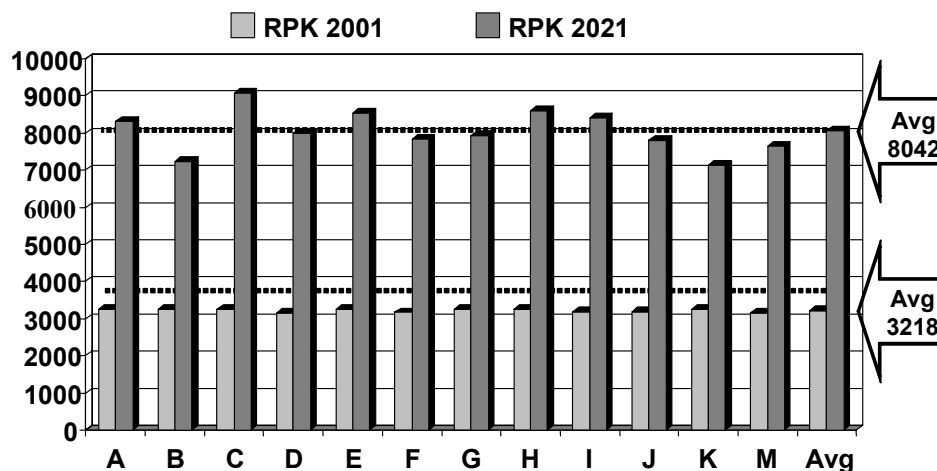


FIGURE 1 Worldwide RPK forecast (billions).

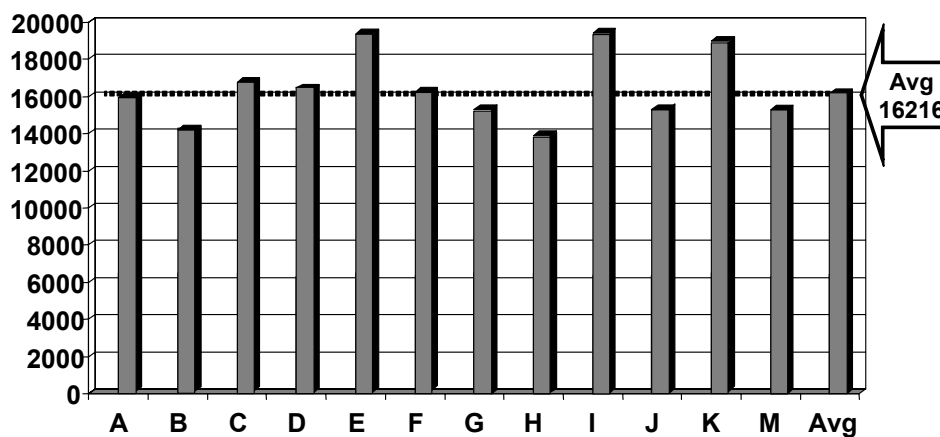


FIGURE 2 Passenger jets (>75 seats): cumulative deliveries 2002 to 2021.

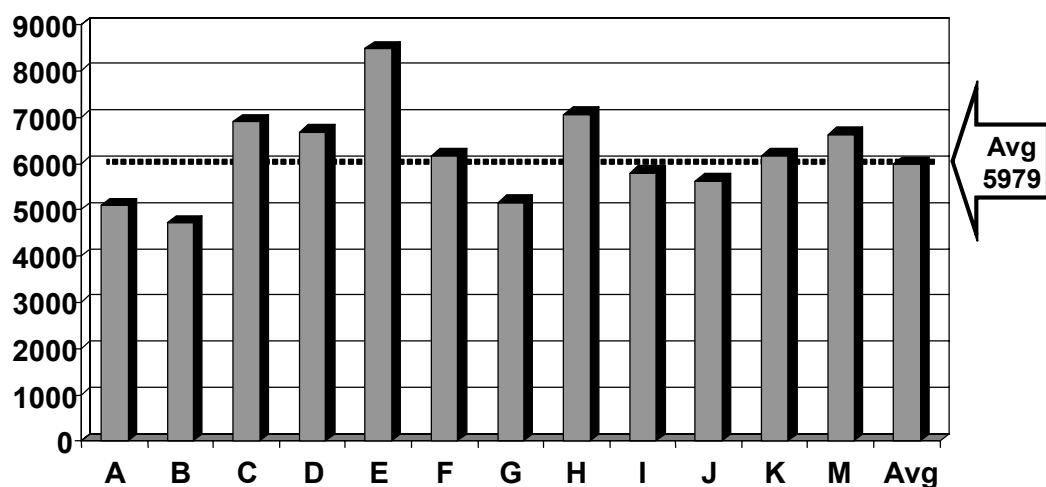


FIGURE 3 Passenger jets (>75 seats): cumulative retirements 2002 to 2021.

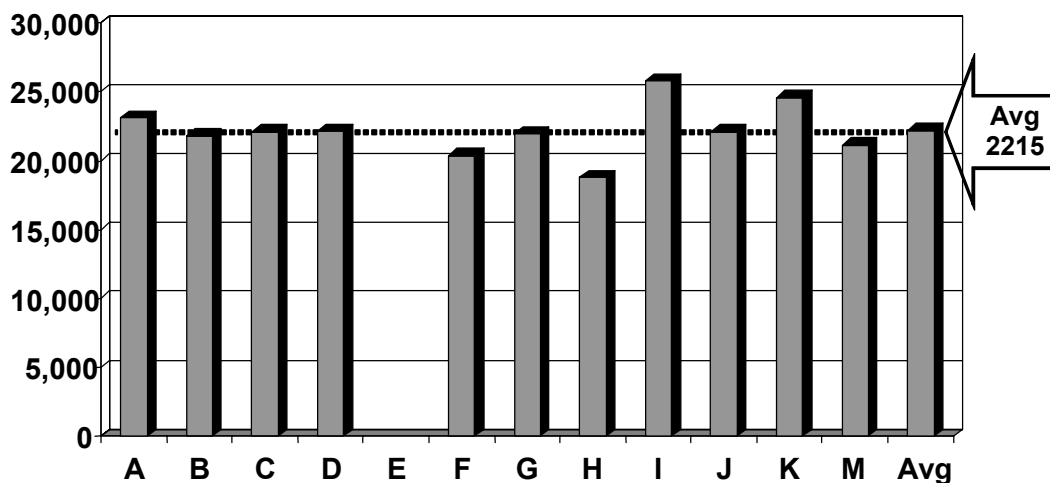


FIGURE 4 Passenger jets (>75 seats): fleet size in 2021.

The panel focused on RPK growth in 2003, and it was felt that the consensus may be optimistic, particularly in the light of recent adverse economic trends. The forecasts excluded the impact of any additional demand shocks, such as an Iraq conflict, but if this were included, it would suppress growth considerably in the short term due to higher interest rates and a large spike in fuel prices. This would probably lead to another significant loss of future aircraft deliveries.

In the medium term, the increasing proportion of leisure travel was observed to be a challenge to yields—hence main line carrier growth.

Steady state RPK growth was forecast to return for all world regions by 2006, with traffic growth in the Asia-Pacific region seen to outpace growth in other regions over the 20-year period.

- Aircraft retirement. Short-term issues included early retirement caused by technology obsolescence, environmental legislation, higher oil prices, and aircraft price versus productivity trends. In the medium term, parked aircraft returning to service was seen as a significant issue impacting upon new aircraft production.
- Airline change. The globalization of airline operations and alliances/code-sharing will continue to drive change. The impact of increased security measures was discussed, and its impact upon the attractiveness of air travel versus ground-based alternatives. Enhanced ticketing distribution channels, for example via the Internet, and the increasing market share of low-cost operators, are significant factors influencing the near term shape of the airline industry. Load factors are forecast to increase at a steady pace throughout the period. New routes and route frequency are seen to continue to develop, although infrastructure issues are a potential constraint to aircraft operations. In the medium term, potential changes to scope clauses could change the model of domestic airline operations. Further traffic constraints could be caused by limits of the air traffic management system.

COMMENTS ON THE FAA FORECAST

Growth in the fleet of U.S. large passenger jet aircraft was believed to be too high. Most panelists forecasted lower traffic growth and higher aircraft productivity, and projected the fleet by the year 2010 to be around 300 aircraft lower than the FAA figure, with the difference mostly in narrow-body aircraft.

For the fleet of U.S. large cargo jet aircraft, the FAA forecast was considered to be a little high, as the panel believed that there will be a move to larger aircraft with greater utilization.

U.S. RJ fleet growth was considered too high, with the panel forecasting a long-term growth of 7.5% per annum, compared with the FAA figure of 12%. This results in some 600 aircraft less in the fleet by 2010.

The U.S. regional/commuter passenger fleet was also seen to be too high. The panel assumed a lower traffic forecast, with more turboprops being retired and a move to larger regional jets resulting from potential scope clause changes. The reduction in the turboprop fleet was assumed to be more than offset by a smaller number of RJs, exhibiting much increased speed and utilization.

Regional Airlines

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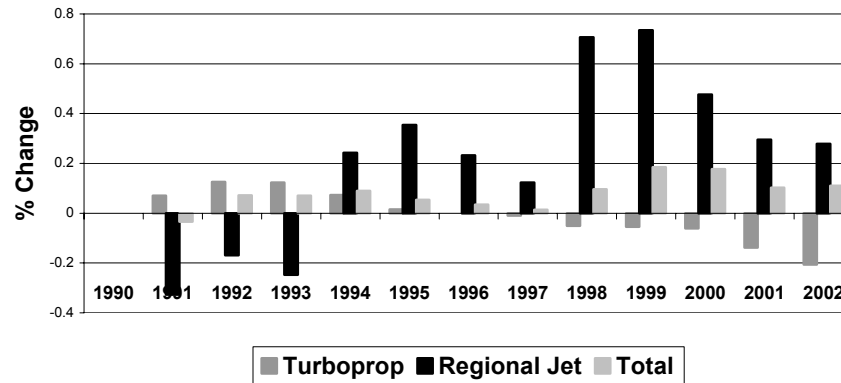
INTRODUCTION

The Regional Airlines Panel convened to discuss emerging trends in the regional airline industry and the potential impact of these trends on the growth of the regional airline industry in the United States. Despite the declines in mainline carrier growth, the regional airline industry has continued to increase capacity and grow by all factors considered by the FAA.

Growth in the regional airline industry has been driven by the increasing operation of RJs (Table 4). Since 1998, turboprop capacity, measured in ASMs, has been declining, while RJs' ASMs have been increasing at a rate which results in overall industry annual capacity growth.

CONSIDERATIONS

FAA currently classifies airlines operating predominately less than 50-seat aircraft as regional airlines. Operations of the 66-seat ATR72s by American Eagle, Atlantic Southeast Airlines, and Continental Express have been included as regional operations. The FAA will be adding back into the databases the operations of Air Wisconsin.

TABLE 4 U.S. Turboprops and RJ Annual Rates of Change

Source: BACK Aviation Schedules Database, Capacity Measured in ASMs

The ultimate purpose of the forecast is to determine FAA workload and staffing requirements. Staffing definitions are related to aircraft seat size. Most panelists agreed that there is a need to keep regional aviation separate from the mainline airlines. The two sectors of aviation differ in

- Operating environment,
- Aircraft limitations,
- Airports served,
- Business model,
- Cost base,
- Revenue base,
- Political, legislative, and regulatory issues, and
- Views by the mainline airlines of regionals as separate.

In recognition of the introduction of the larger RJs—CRJ700 and Embraer 179/175, 190, plus the 70-seat turboprops such as the ATR72 and the Dash8-400, the panel suggests increasing the definition to aircraft seating up to 90 seats.

In addition, there is a growing international sector of regional aviation from the United States to Canada, Mexico, and the Caribbean. Currently, the FAA does not address this international aviation sector.

Panelists also discussed the growing semi-scheduled airlines, such as Indigo, where corporate shuttle-like services are offered to the general public. In addition, they discussed the opportunities for single-engine and single-pilot aircraft to provide rural air service and, based on this, suggest that the FAA consider this sector for the regional airline industry.

LABOR ISSUES

The regional airline panelists identified what they see as the number one issue for the industry—labor relations. The current scope clauses contained in the contracts of the mainline airlines define role of regionals. Scope clauses are part of collective bargaining agreements between management and labor groups within the mainline airline. Scope Clauses define routes and services that mainline airlines may subcontract to regional airlines.

In general, scope clauses limit regional airlines to jets seating less than 70 passengers. Additionally, a cap is often placed on the number of RJs that can be operated in the mainline airlines’

route system. Scope clauses have limited the ability of regional airlines to optimally match the right size aircraft to the market demand.

The panelists also discussed the implications of the Railway Labor Act on labor relations in the regional airline industry, opining that alternative legislation should be considered for the regulation of labor relations in the airline industry.

KEY LEGISLATIVE/REGULATORY LONG-TERM ISSUES

Over the decade of the FAA forecast, the panelists felt that significant legislative and regulatory actions may be expected. Increasing regulation will impact the regional airline industry's growth. These impacts include

- Congestion and potential for congestion pricing;
- Security regulations;
- Taxes, fees, and regulatory costs;
- Rural Air Service problems and potential solutions;
- Labor—replacement of the Railway Labor Act; and
- ATC funding and development.

INDUSTRY RESTRUCTURING

As the mainline industry restructures to profitability, the role of the regional airlines will be impacted. Regionals will continue to be the lowest cost provider of capacity in the commodity-based airline industry and, therefore, will be relied upon to provide air service in markets un-economic for the mainline airlines to serve.

Most panelists expect the number of regional airlines to continue to decline as the number of mainline carriers decline. Concentration of the regional industry will likely continue. Currently, the top 20 regional airlines control 95% of the regional airline industry traffic. The remaining regional airlines, outside of Alaska, have an uncertain future.

Regional airlines are moving towards operating for multiple mainline partners. This allows the regional airlines to depend upon more than one airline for revenue. The most recent example of multiple codes is Air Wisconsin's decision to become a partner with AirTran Airways, in addition to serving as a United Express airline.

New regional airlines will have difficulty finding capital. However, if turboprop lease rates drop to true market rate and leasing companies holding these aircraft become aggressive in remarketing the idle aircraft, the economics may make new entry possible. Many panelists also foresee the opportunity for an entrepreneur to provide small and rural community service with low-cost turboprops operated on straight pro-rate or at no risk to the mainline carrier.

REGIONAL AIRLINE COSTS

Currently, the mainline carriers compensate regional airlines either by a revenue-sharing formula or on a fixed fee for service contract. For the most part, only turboprop aircraft services operate on the revenue-sharing basis. Under revenue sharing, the regional airline is fully responsible for all operating costs.

RJs are operated under fixed-fee contracts. Fixed fee contracts limit regional airlines' cost control to labor, aircraft maintenance, and insurance.

The cost labor is the biggest factor in the regional airline cost structure. Entering into fixed-fee maintenance contracts known as power-by-the hour can control maintenance costs. Insurance premiums, especially since the terrorist attacks last year, are difficult to control.

Many panelists expressed concern that the aggregation of the costs of regulations directly impacts the economics of providing air service to rural and small communities.

OUTLOOK FOR REGIONAL MARKETS

Panelists foresee regional airlines providing increasing point-to-point services as the hubs are fragmented and mainline airlines move towards continuous hubbing. The regional airlines will operate on longer stage lengths as larger RJs are introduced. Short-haul flights will be dropped due to the lack of demand resulting from the security screening hassle factor and economics, unless a new generation of regional airline emerges to serve these markets with the excess turboprops. Highway improvements also are impacting air service to these communities. The decision to drive versus fly is generally impacted by the time rather than distance.

Rural and small community air service is expected to be a major issue over the next decade. The retirement of the 19-seat turboprops and the increasing costs of operations for all aircraft will put rural and small communities at an economic disadvantage. New programs on the federal, state, and local levels will need to be developed to address the air service needs of these communities.

REGIONAL AIRLINE FLEET

Most panelists agreed that turboprops can be expected to remain in the fleet over the next decade, but substantial retirements are anticipated. Scope clause limitations on RJs will cause turboprops, especially the larger turboprops, to remain in the fleet. Turboprops need to overcome negative perceptions. Airport facilities, such as lack of covered bridges to the airport, cause passengers to discriminate against turboprops.

There is a steadily growing role for smaller, less than 50-seat RJs to replace turboprops (Table 5). Over the decade of the forecast period, 50-seat RJs will remain the core growth aircraft. The larger RJs will be introduced into the fleet over the next decade, depending upon the limitations of the scope clauses. Thus, the fleet mix will be determined by the labor agreements and the resolution of the scope clause issues.

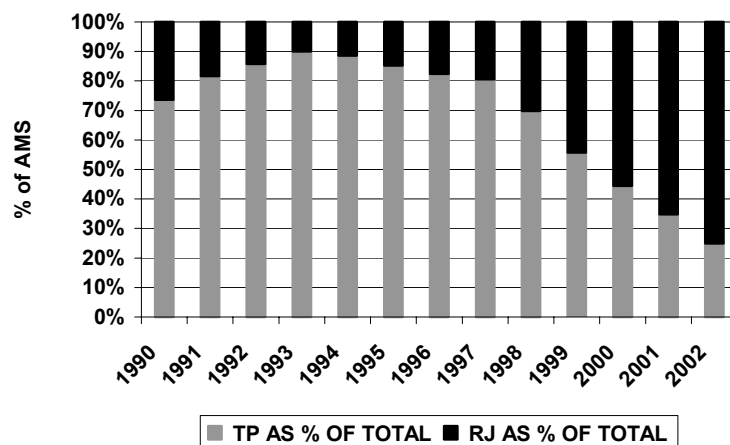
KEY FAA FACTORS

Most panelists felt that the FAA draft forecast data did not reflect the changes in the regional airline industry over the past year. After updating the data, these panelists offered the following position on key FAA forecast factors:

Enplanements

FAA suggests an average of 5.5% growth deriving from 87.9 million enplanements in 2002 to a projected 139.2 million enplanements in 2010. Many panelists believe that the dynamics of the mainline restructuring will drive regional airline growth to be higher as more routes are transferred to the regional airlines. Therefore, they project 171.3 million enplanements in 2010 and will approach 10% on average over the decade.

Historically, regional airline enplanements grew at an average annual rate of 6.5% from 1990 to 2001. However, from 2001 to 2002, the FAA estimates growth of 12.3%.

TABLE 5 U.S. Turboprop and RJ Share of Total ASMs by Year

Source: BACK Aviation Schedules Database

RPMs

FAA proposes modest average annual growth of 6.8% from 2003 to 2010. Most panelists feel the continued introduction of larger RJs and longer stage lengths will drive the RPM growth to be over 15% over the decade.

Trip Length

The FAA proposes a modest increase in trip length to 364.9 mi in 2010. Most panelists believe that the trip length will approach 439 mi by 2010 due to the number of RJs being introduced into the fleet.

Load Factor

The FAA proposes an average load factor of 63 by 2010. Panelists believe that load factors will depend upon the fleet mix. Turboprops tend to have average load factors of 40%, while RJs have load factors 65% to 68%. Panelist discussions project that the industry load factor will be 67% by 2010.

Fleet

The FAA projected RJ fleet numbers seem to be appropriate—2,373 units by 2010. Turboprop numbers have been revised to reflect the current fleet of 1,046 units (includes both piston and turboprop aircraft). The fleet is projected to drop to 424 units by 2010 due to the retirement of 19-seat aircraft and the increased costs to operate the larger turboprops. Most panelists therefore anticipate a fleet of 3,497 units in 2010—more than 300 units less than the FAA draft forecast.

Average Seats per Aircraft

Average seats per aircraft depend upon fleet mix. Panelists calculated the average seat size based upon the projected fleet. They feel that by 2010, the average seat size will be 44 seats—up from 39.9 seats in 2001.

Business Aviation

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INTRODUCTION

Most panelists believe that the outlook for business aviation (turbine-powered, fixed-wing, GA aircraft) remains favorable for the 2003 to 2006–2010 forecast period despite some market sluggishness over the years 2002 to 2004. They feel that the turbojet segment of business aviation is expected to show continued strength, especially over the second half of the FAA's forecast period. The possible introduction of a small, relatively inexpensive twin-engine business jet in the middle of the decade has the potential for redefining the business jet segment by expanding business jet flying and offering performance that may support true air-taxi business service.

The turboprop segment of business aviation is expected to show modest growth in fleet size over the forecast period, but total hours flown by the turboprop fleet will stay flat as age diminishes the average utilization rate. Turboprop aircraft fit very well with some well-defined missions—large payloads, relatively short range, and short take-off/landing distances. These attributes and the introduction of single-engine business turboprops should support a stable level of new deliveries. FAA operations will grow commensurate with the growth in business aviation. Research and development by original equipment manufacturers (OEMs), engine manufacturers, and avionics suppliers will continue to press against the capability of the FAA to certify aircraft as products are introduced using new technologies in manufacturing, engine design, and avionics.

The U.S. business aviation fleet should exceed 17,400 turbine aircraft by 2010. Fleet hours should exceed 7 million hours. These numbers don't consider the impact of a small, relatively inexpensive twin-engine jet entering the market place, a possibility considered in Appendix A. With this growth in fleet size and hours flown, business aviation operations will show commensurate growth, increasing one-third by the year 2010. Research and development by OEMs, engine manufacturers, and avionics suppliers will continue to press against the FAA's ability to certify aircraft in a timely manner as new product introductions in the middle of the forecast period fuel growth in deliveries, fleet size, and operations.

This informal assessment by business aviation panelists presumes that a number of conditions prevail over the decade:

1. That the U.S. economy will continue on a modest growth path (average annual real growth in the 2.5% to 3.0% range), avoiding a double-dip recession or a move into a new (major) recessionary cycle later in the forecast period. There will be year-to-year variation in aggregate economic activity, but any negative downturns will be slight. Similarly, that the major industrial economies of the world (those located in Europe, Asia, and South America) will avoid serious recessions. Over the longer term, these economies will show modest growth/recovery paths yielding real growth in the 1.0% to 2.0% range, on average. The global expansion of business will continue to spur the demand for business travel.

2. Most panelists assume that policy makers (e.g., the TSA) will avoid overly restrictive homeland security measures. Any measures taken must recognize the importance of business aviation to our nation's aggregate economic performance, overall corporate profitability and our ability to compete in the market place. Most participants expressed strong negative comments about some of the preliminary ideas offered to increase security of the air traffic system because these did not reflect an understanding of currently practiced security measures, the management of corporate and fractional fleets, the nature of business aviation missions, and the clientele that uses business turbine aircraft for business purposes.

3. The panelists assumed that the FAA will not impose punitive landing fees on GA or initiate regulations that restrict access to airports and airspace by business turbine aircraft. The economic contribution of business aviation has been clearly established, both in terms of aggregate economic activity and corporate profitability. With the decline in commercial air transportation service (route structures and quality of service), the importance of access to maintaining a competitive position in the marketplace has increased substantially. Further, they assumed that the FAA will not impose overly severe avionics and environmental requirements on business turbine aircraft, especially in the short term when the cost of such requirements would be prohibitive compared with current market conditions.

4. The discussions assumed that international political tensions will be contained and that major military conflicts in the Middle East will be avoided. Any prolonged military conflict would likely stall the current economic recovery—constraining oil supplies and the availability of aviation fuel, reducing overall corporate profitability, and shaking consumer and investor confidence. In the current economic environment, anything that increases uncertainty likely will reduce overall corporate investment, including investment in new business turbine aircraft.

5. Assumption that OEMs, engine manufacturers, and avionics suppliers will continue the research and development necessary to develop new business turbine products that bring greater value to the market place. Market history shows that new product introductions increase

unit sales and bring new operators into the business turbine segment. Expansion of the operator base feeds fleet growth, operations, and total hours flown.

6. Assumption, improved fleet management and continued growth in the fractional sector will increase business turbine operations, as will new technologies that improve speed and range and expand mission capabilities.

In addition to these key conditions, most panelists assumed that

1. Seventy percent of world production of new business turbine aircraft enters the U.S. system.
2. Attrition and retirements affect about 1% of the U.S. fleet, except over the 2004–2005 period when reduced vertical separation minimums (RVSMs) will push very old business jet aircraft into retirement as operators confront unavoidable expenses.
3. The business turboprop utilization rate (hours/plane/year) will decline over the forecast period as the fleet ages. The business jet utilization rate will increase because of growth in fractional ownership, improved fleet management, and the introduction of avionics that allow operations in poor weather and the continuing globalization of business.
4. While new technologies have increased productivity, this improvement will not push the average annual rate of real growth into the 3.5% to 4.5% range. There will not be a “new economy” effect on business aviation.

2002–2010 FORECAST

The panelists agreed to retain the heuristic model of business aviation activity that previous panelists adopted to develop predictions about future business aviation activity (1). Deliveries of new business turbine aircraft drive fleet growth; fleet growth drives operations and hours flown. U.S. fleet size for any year is determined by the size of the fleet at the end of the previous year, plus the sum of new turbine aircraft entering the fleet, the net export of existing aircraft, and business turbine attrition (write-offs) and retirements. From among these factors, the largest contributor to growth in the U.S. fleet size has been the flow of new business jet aircraft into the fleet. The flow of new jet aircraft depends on aggregate economic growth, corporate profitability, new product development, prices of new and used business jets, interest rates, and operating/fleet management costs. Total fleet hours, in turn, is influenced by fleet size, the composition of users, operating costs, the organization of the management and operation of business aircraft (e.g., individual, corporate, fractional), the level of economic activity, and the geographic distribution of business activity (e.g., domestic versus international). Needless to say continued access to the air traffic system is a fundamental background condition affecting all three elements to this heuristic model (new units sold, the flow of these into the fleet, and the use of the fleet).

Most panelists believe that fundamental market conditions will support 700 new business jet deliveries annually between 2005 and 2010. This rate for worldwide deliveries is supported by the introduction of new products in the 2004–2006 period, the continued growth of fractional ownership, the continued globalization of business, and continuing difficulties in the commercial aviation sector that adversely affect route structures and the quality of service.

Deliveries of new business turbine aircraft over the near term also are encouraged by the more favorable tax treatment of capital investments under the Job Creation and Worker Assistance Act of 2002. This act provides for an additional first-year depreciation deduction for new aircraft acquired after September 10, 2001, and before September 11, 2004, and placed into

service prior to 2005. For 2002–2004, however, annual deliveries of new business jets will average approximately 600 units because of the lingering effects of the 2001 recession, corporate financial scandals, and Middle East political tension. With this worldwide rate of deliveries, 450 new business jets will enter the U.S. fleet annually over the next 3 years. This inflow will increase to 490 units for each of the remaining years of the forecast period. Retirements from the U.S. jet fleet are expected to increase substantially (200 units annually) for the years 2003–2004 as RVSM requirements push older business jet aircraft into retirement, and this will slow fleet growth in the short run. Over the second half of the forecast period, attrition and retirements should number 1% of the fleet, increasing from 85 units in 2005 to 100 units by 2010. A 1% attrition/retirement rate is slightly higher than seen previously. This increase reflects the general aging of the business jet fleet and the impact of regulatory changes.

Net exports are not expected to play an important part in either the business jet or the business turboprop segments. As such, most panelists believe that net exports will have no appreciable impact on the size of the U.S. fleet. Of course, there will be year-to-year variation in net exports, with some years reporting positive flows and other years reporting negative flows. By the end of the forecast period, the net impact on the size of the business turbine fleet (jets or turboprops) will be negligible.

In regard to business turboprop aircraft, most panelists felt that worldwide deliveries will number approximately 200 units annually over the forecast period. The stability in this market reflects the special missions that match well with business turboprop aircraft (large payloads, cost efficient operations over small ranges, short takeoff and landing capabilities, and ability to get into and out of unimproved landing areas), and the introduction of single-engine business turboprop aircraft that brought new operators into the business turboprop segment. As in the turbojet segment, the panel believes that attrition and retirements will take approximately 1% of the fleet (60–70 turboprop aircraft) out of the system annually.

TURBOJETS

Relevant snapshots of the impact of business turbine deliveries on the business jet and business turboprop fleets and hours flown are provided in [Table 6](#). With these flows at play, the panel believes that the U.S. business jet fleet will increase by 250 units per year during 2003–2004,

TABLE 6 Turbojet Outlook

Number of Active Aircraft							
Actual							
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
4,100	7,150	7,570	7,945	8,195	8,445	8,850	10,430
Average Annual Growth Rate (%)							
	1990–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	5.2	5.9	5.0	3.1	3.1	4.8	4.0
Hours Flown (in Thousands)							
Actual							
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
1,396	2,715	3,500	3,700	3,900	4,100	4,300	5,100
Average Annual Growth Rate (%)							
	1990–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	6.2	28.9	5.7	5.4	5.1	4.9	4.7

with growth increasing to approximately 400 units per year for 2005–2010. The lower values in the early years reflect the impact of the recession on new deliveries and the increase in retirements due to RVSMs. With a fleet numbering approximately 7,570 business jets in 2002, it is expected that by 2010, the U.S. business jet fleet will number approximately 10,400 aircraft. This corresponds to an average annual growth rate of 4%.

The U.S. business turboprop fleet will grow by 130 to 140 units annually. By 2010, the U.S. business turboprop fleet is expected to hold nearly 7,000 aircraft. This corresponds to an average annual rate of 2.1% for the forecast period. With these growth rates, the panel expects the size U.S. business turbine fleet to exceed 17,400 aircraft by 2010.

In developing predictions about fleet hours, the participants noted that business jet aircraft used in traditional operations fly approximately 400 hours per year, while business jet aircraft operated through fractional providers fly approximately 1,200 hours per year. Furthermore, approximately 600 of the 5,750 business jet aircraft in the 2002 fleet are operated by fractional providers and that this number is expected to increase to 1,200 aircraft by 2010. Using a linear trend for the growth in the number of fractional aircraft in the U.S. fleet, the panel expects fleet hours to increase from approximately 3.5 million hours in 2002 to 5.1 million hours in 2010. The annual increments to total hours will be relatively uniform—increasing by approximately 200,000 hours per year. This growth corresponds to an average annual growth rate of 4.7% over the forecast period.

TURBOPROP AIRCRAFT

In regard to the business turboprop fleet, the panelists saw different factors at play (see [Table 7](#)). Members noted that business turboprop aircraft currently fly approximately 350 hours per year. This utilization rate is expected to fall to 300 hours per year by 2010 as the turboprop fleet ages. This rate of decline in the aircraft utilization just balances the expected annual growth in the turboprop fleet (130 to 140 aircraft per year) so that total hours flown by the U.S. business turboprop fleet is expected to remain constant at 2.1 million hours. In combining business jet and business turboprop operations, total business turbine hours flown is expected to grow from 5.6 million hours in 2002 to 7.2 million hours in 2010. This increase corresponds to an average annual increase of 3.2% (2).

TABLE 7 Turboprop Outlook

Number of Active Aircraft							
Actual							
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
5,300	5,750	5,893	6,035	6,175	6,310	6,450	6,980
Average Annual Growth Rate (%)							
	1990–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	0.7	2.5	2.4	2.3	2.2	2.2	2.1
Hours Flown (in Thousands)							
Actual							
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
2,319	1,995	2,100	2,100	2,100	2,100	2,100	2,100
Average Annual Growth Rate (%)							
	1990–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	(1.4)	5.3	0.0	0.0	0.0	0.0	0.0

BUSINESS TURBOPROPS

A resurgence in business aviation occurred over the 1990s. Shipments of new business jet aircraft increased at an average annual rate of 19% between 1995 and 2000. Over this period record levels of new business jet shipments were reported annually, with shipments increasing from approximately 300 units per year to 700 units per year. The active fleet and hours flown showed similarly impressive gains as the active fleet grew at an average annual rate of 12% between 1996 and 2000, and total hours flown grew at an average annual rate of 17%. At the same time, the business turboprop segment stabilized. Annual shipments of turboprops increased from approximately 100 units per year to 200 units per year with the introduction of new aircraft and the realization that business turboprop aircraft meet some very important mission characteristics. At the same time, fractional operations and ownership became firmly established in the business jet segment as the number of shares sold annually increased from 364 in 1995 to 1,725 in 2001.

While the recession of 2001–2002 dampened subsequent business aviation activity (especially the delivery and sale of new business turbine aircraft for 2002–2004), the outlook for business aviation remains positive over the FAA’s forecast period of 2003–2010. While growth in U.S. deliveries, fleet size, and total fleet hours is expected to slow over the 2003–2004 period, the industry’s outlook remains strong for 2005 and beyond. Annual U.S. business jet deliveries should be re-established at the 700 unit level over the second half of the forecast period, while business turboprop deliveries remain stable at the 200 unit level. These inflows of new business turbine aircraft will cause the business jet and turboprop fleets to grow so that the combined business turbine fleet could exceed 17,400 aircraft by the year 2010. With this increase in fleet size, the panelists anticipate total turbine fleet hours to reach the 7.2 million hour level by 2010, with most of this growth coming through business jet operations.

ECLIPSE AIRCRAFT

With the development of the Williams engine (a small, lightweight jet engine producing approximately 500 pounds of thrust), a group of innovators is proposing the introduction of the Eclipse twin-engine business jet aircraft in 2004. The Williams engines have already flown and a new manufacturing process, which significantly reduces the need for labor-intensive riveting, has been developed for joining airframe panels.

Introductory prices for the Eclipse have been set below \$1 million, recognizing that by the time the plane enters the market, its price may fall in the \$1 million to \$1.5 million range. The Eclipse is designed to attract operators out of the multi-engine piston segment of GA, the turboprop segment for those operators that do not require the payload of a typical business turboprop aircraft, and individual operators out of the current very-light business jet segment. It is reported that the Eclipse is also getting attention for current fractional operators as an addition to their fleet. The Eclipse is also marketed as an aircraft suitable for true air taxi service. If the Eclipse or a similar aircraft is successfully introduced, there would be a significant change to the composition of business jet operators and the use of business jet aircraft. Business aviation after an Eclipse or Eclipse-type aircraft would be different from what exists today.

It was noted that the probability is greater than 50% that the Eclipse aircraft will meet its technical expectations, general price target, gain certification, and enter the market in the 2004–2005 timeframe. There are still multiple factors or events that could preclude this—or similar—aircraft from entering the market. Panelists were very uncertain about the business case for the Eclipse, especially its use as an economically viable air taxi. Published anticipated production

TABLE 8 Turbojet Outlook with an Eclipse or Eclipse-Type Aircraft

Number of Active Aircraft							
Actual							
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
4,100	7,150	7,570	7,945	8,335	9,085	10,390	15,735
Average Annual Growth Rate (%)							
	1990–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	5.2	5.9	5.0	4.9	9.0	14.4	10.3
Hours Flown (In Thousands)							
Actual							
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
1,396	2,715	3,500	3,700	4,000	4,400	5,100	8,900
Average Annual Growth Rate (%)							
	1990–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	6.2	28.9	5.7	8.1	10.0	15.9	13.4

rates depend on an air-taxi application. Public information indicates that the manufacturer expects to deliver 140 aircraft in 2004, with deliveries increasing to 1,500 Eclipse aircraft by 2007. This rate of deliveries is expected to be maintained for the remainder of the FAA forecast period. Of course, once the development costs have been incurred (a sunk cost), it may be possible to develop a viable business case without air taxi applications around the direct manufacturing costs.

Needless to say, a successful launch of the Eclipse aircraft would have a dramatic impact on fleet growth, fleet operations, and fleet hours (i.e., FAA workload). **Table 8** presents a summary of this impact, with the caveat that the variance in possible impacts is significant. This assumes a viable air-taxi application. The introduction begins in the year 2004 with 140 deliveries. Deliveries ramp up to full production by the year 2007, reaching a predicted number of 1,500 aircraft. With full production, the size of the business jet fleet would approach 15,750 aircraft by the year 2010. Total jet hours would approach 8.9 million hours, as this substantial number of additional aircraft enter the business jet fleet.

NOTES

1. The final page of the panelist discussions summarizes an alternative forecast for the business jet segment that incorporates the introduction of a small, relatively inexpensive business jet aircraft around the year 2004. While some panel members remain somewhat skeptical about this event, they believe the probability is greater than 50% that the technical/certification challenges presented by such an aircraft will be met. Panelists are not positioned to judge the business case for such an aircraft in air taxi service.

2. Most participants believe that there is room for greater growth in the business turboprop sector if engine manufacturers (perhaps in collaboration with OEMs) commit to developing new technology turboprop engines; something similar to the Williams engine that may have a significant impact on the business jet segment (in regard to this, see the final page of this panel report).

Vertical Flight

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INTRODUCTION

In regard to fleet size, generally accepted industry data continue to disagree with the FAA's estimates of the U.S. fleet, although the disparity has decreased since the last Forecast Workshop in 1999 (Table 9).

Most panelists believe that not only does the FAA understate the number of "active" helicopters, but that the most used industry source may itself be 7% to 10% too high—including a number of nonoperational helicopters that remain on the register. The Helicopter Subcommittee will continue to address a reconciliation, since the difference impacts such critical measures as accident rates and their further effect on insurance costs.

As for fleet growth, they concur with the draft growth rates for both turbine and piston fleets, but we would assign those rates to industry's fleet estimates, which results in annual sales and assumed attrition rates consistent with historical data (Table 10).

TABLE 9 FAA's Estimates of the U.S. Fleet

	Turbine Rotorcraft 2002	Piston Rotorcraft 2002
FAA	4,350	2,650
Industry	5,600–7,000	4,900

TABLE 10 Annual Sales

	1998	1999	2000	2001
Civil turbine shipments	515	440	512	521
Civil piston shipments	292	320	438	363
Average age of turbine helicopters: 20.4 years (median: 24 years)				
Average age of piston helicopters: 26.9 years (median: 30 years)				

For fleet hours, most panelists concur with the growth in hours for both turbine and piston helicopters, which suggests improved efficiency and newer aircraft in the fleet in the out years, both of which seem reasonable and consistent.

As for the pilot population, substantive data is lacking, and panelists are again unable to comment.

2002–2011 FORECAST HIGHLIGHTS

For forecast highlights, courtesy of Rolls-Royce and the Teal Group, there were

- Worldwide sales of about \$14 billion in airframes, and \$1.9 billion in engines; and
- Lag effect from 2001 terrorist attacks and recession-impacted civil sales through 2002–2005 (about 5% to 7%). Growth is expected to recover thereafter.

A number of forecast issues should be considered:

- Lack of both public and private investment in rotorcraft research in the United States will change the mix of the U.S. fleet to predominantly European design.
- Events of 2001 have improved sales of light and intermediate helicopters, especially with emergency medical services and other public services. Improvement in corporate helicopter usage may be transitory as flight restrictions impact rotorcraft, as well as fixed-wing GA.
- The pattern of worldwide shipments from 1998 through the first half of 2002 suggests a shift away from single-engine helicopters. This is believed to reflect EU and ICAO limitations of single-engine aircraft over cities and hostile environments. It is projected to remain a factor in aircraft selection during the period.
- Competition for conventional rotorcraft from other transportation modes will not be significant in the forecast time frame. High-speed rail and unmanned aerial vehicles are considered possible threats to some helicopter market segments in the years beyond the forecast time frame, but the civil research needed for their viability may not be committed.
- Similarly, advanced rotorcraft will not significantly compete with conventional helicopters until late in the forecast timeframe, when they might penetrate certain traditional markets and perhaps stimulate additional growth. Some compounds and gyroplanes currently are in development now and could enter the fleet sooner on restricted certificates if sufficient funding becomes available. The civil tiltrotor's entry will be delayed until ongoing V-22 studies are concluded, and it may thereafter wait for meaningful military experience.
- Regulatory constraints already in place, primarily on noise and emissions, will continue to dampen growth of rotorcraft utilization in some areas.
- Maturity of ongoing technology to reduce helicopter operating costs will mitigate the gap in sales now projected for the out years.
- The focus of many original equipment manufacturers on strengthening their military product lines, driven by the recession and increasing world tensions, suggests a potential crowding out of civil production in the near years.
- Offshore oil is expected to remain a strong rotorcraft market: all major offshore operators have reported good financials despite sluggish petroleum prices. The market is expected to be particularly strong for 10,000- to 15,000-pound twins.

Light and Personal General Aviation

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Be A Pilot Program

INTRODUCTION

The prospects for the light and personal flying segment of GA appear to be stabilizing because of new product developments that will reduce the cost of personal and sport flying (both acquisition costs and operating costs), while improving the safety and reliability of light GA aircraft. Fleet composition, however, will tilt toward single-engine piston aircraft and away from multi-engine piston aircraft as advanced products are introduced into the turboprop and turbojet segments of GA during the middle of the FAA's forecast period.

Overall, participants estimated the number of student pilots (counted on a calendar year basis) to increase by more than 10,000 students between 2003–2010, increasing at an average annual rate of 2.3%. With this growth pattern, the number of student pilots by 2010 will number approximately 102,700. With this growth in the number of student pilots, it is not surprising that the number of private pilots is predicted to increase also, albeit at a lower rate of 0.9% per year. Between 2003–2010, the number of private pilots is predicted to increase by nearly 20,000, reaching 283,000 licensed individuals by the end of the forecast period.

The panel forecasts modest annual growth in the single-engine piston fleet (0.4% per year), in large part because of changes in the treatment of ultralight aircraft and the introduction of light sport aircraft. Between 2003-2010, the 4,500 additional single-engine piston aircraft should enter the fleet, increasing fleet size from 146,000 aircraft to 150,500 aircraft. Total hours flown by the single-engine piston fleet are forecasted to grow at a slightly higher rate (1.3% per year, exceeding 18.4 million hours per year by the year 2010), resulting in higher utilization rates (hours per plane per year) for single-engine piston aircraft.

The panel forecasts no growth for the multi-engine piston fleet, after a slight decline in fleet size between 2002-2003, when the fleet is predicted to number 20,700 aircraft. Total hours flown each year by multi-engine piston aircraft are expected to decline slightly, falling from 3.1 million hours in 2002 to 2.9 million hours in 2010. In large part, the decline in total hours flown reflects the aging of the multi-engine piston fleet. Specific positive and negative factors

underpinning this general assessment of the lighter and personal flying segment are highlighted below, with factors presented in approximate order of significance.

PRIMARY FACTORS INFLUENCING THE STUDENT/PRIVATE PILOT POPULATION

The positive factors in influencing this pilot population—in rough order of significance—are (Tables 11 and 12)

- Introduction of new products, including advanced avionics [wide area augmentation system (WAAS), global positioning system (GPS), datalink, primary light displays, and multifunction displays], airframe designs and more efficient engines (electronic fuel controls, diesels, small turbines)—all of which make flying safer, more economical, and more reliable;
- Creation of the sport pilot certificate, a new category of pilot certification, that will make it more economical to learn to fly—thereby attracting more student pilots while retaining pilots who might have otherwise stopped flying, but instead choose to exercise sport pilot privileges;
- Favorable long-term economic environment (especially disposable income);
- Industry promotion of learning to fly;
- Career pilot hiring (including more *ab initio* training by airlines);
- Innovative ways of sharing the cost of aircraft ownership (shared ownership, flying clubs, fractional ownership); and
- Industry/association efforts to improve the public perception of GA.

TABLE 11 “Light” GA Student Pilots

Number of Student Pilots					
Estimated	Forecast (End of CY)				
CY2002	CY2003	CY2004	CY2005	CY2006	CY2010
91,640	92,560	94,400	97,700	100,390	102,700
Average Annual Growth Rate					
	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	+1.0 %	+2.0%	+3.5%	+2.75%	+2.3 %

TABLE 12 “Light” GA Private Pilots

Number of Private Pilots					
Estimated	Forecast (End of CY)				
CY2002	CY2003	CY2004	CY2005	CY2006	CY2010
264,000	265,000	267,000	269,000	271,500	283,000
Average Annual Growth Rate					
	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	0.8%	+0.6%	+0.7%	+0.9%	+0.9%

The negative factors in influencing this pilot population—in rough order of significance—are as follows:

- Increased restrictions placed on GA operations due to security concerns, especially restrictions imposed on training students from outside the United States;
- Increased operating costs, such as insurance (both airframe and liability), hangaring and fuel;
- Competition with other recreational pursuits that may provide the same “thrill” but require less skill or training (boating, motorcycles);
- Demographics, with many World War II-era pilots who are dying and “baby boom” generation pilots who are retiring—thereby reducing their disposable income. The disposable income of individuals most likely to want to become pilots—“Gen X” and “Gen Y”—is declining;
- The declining number of GA airports and airspace restrictions that make GA access difficult;
- Short-term economic problems—a “double dip” recession; and
- Environmental problems, such as noise and emission restraints.

PRIMARY FACTORS INFLUENCING THE PISTON AIRPLANE FLEET

The positive factors in influencing the piston airplane fleet—in rough-order of significance—are as follows (see [Tables 13](#) and [14](#)):

- Introduction of new products, including advanced avionics (WAAS, GPS, datalink, primary flight displays and multifunction displays), airframe designs and more efficient engines (electronic fuel controls, diesels, small turbines)—all of which make flying safer, more economical, and more reliable.
- Increase in light sport aircraft (LSA). The cost of flying LSA will be significantly less than current aircraft. Therefore, creating this new type of certificated aircraft will significantly increase the number of active piston-powered aircraft. In 2004, approximately 2,000 existing ultralights, currently classed as “vehicles” and not included on the FAA’s aircraft registry, will be registered as LSAs, swelling the number of piston-powered aircraft. In 2005, approximately 1,000 existing ultralights will become registered LSAs. In addition, in 2004, 300 newly manufactured LSAs will enter the fleet, and in 2005, 700 newly manufactured LSAs will enter the piston fleet. By 2010, the fleet of LSAs will consist of between 8,000 and 12,000 aircraft.
- Innovative ways of sharing the cost of aircraft ownership (shared ownership, flying clubs, fractional ownership). Innovative, low-cost financing arrangements also lower the cost of ownership.
- Favorable long-term economic environment (especially disposable income).
- Industry promotion of learning to fly.

The negative factors in influencing the piston airplane fleet—in rough-order of significance—are the following:

- Increased restrictions placed on GA operations due to security concerns.

TABLE 13 Single-Engine Piston Airplane Fleet

Number of Active Single-Engine Piston Aircraft					
Estimated	Forecast (End of CY)				
CY2002	CY2003	CY2004	CY2005	CY2006	CY2010
146,500	146,000	146,000	146,500	147,000	150,500
Average Annual Growth Rate					
	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	–0.3 %	0.0%	+0.3%	+0.3%	+0.4%
Hours Flown By Single Engine Piston Aircraft					
Estimated	Forecast (End of CY)				
CY2002	CY2003	CY2004	CY2005	CY2006	CY2010
16,850,000	16,80,000	17,010,000	17,210,000	17,420,000	18,440,000
Average Annual Growth Rate					
	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	+0.1%	+0.9%	+1.2%	+1.2%	+1.3%

TABLE 14 Multi-Engine Piston Airplane Fleet

Number of Active Multi-Engine Piston Aircraft					
Estimated	Forecast (End of CY)				
CY2002	CY2003	CY2004	CY2005	CY2006	CY2010
20,800	20,700	20,700	20,700	20,700	20,700
Average Annual Growth Rate					
	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	+0.5%	–0.2%	0.0%	0.0%	0.0%
Hours Flown By Multi-Engine Piston Aircraft					
Estimated	Forecast (End of CY)				
CY2002	CY2003	CY2004	CY2005	CY2006	CY2010
3,120,000	3,058,000	3,027,000	2,997,000	2,967,000	2,937,000
Average Annual Growth Rate					
	2002–2003	2003–2004	2004–2005	2005–2006	2003–2010
	–0.2%	–0.1%	–0.1%	–0.1%	0.1%

- Demographics, with many World War II-era pilots who are dying and “baby boom” generation pilots who are retiring—thereby reducing their disposable income. The disposable income of individuals most likely to want to become pilots—“Gen X” and “Gen Y”—is declining.
- The declining number of GA airports and airspace restrictions that make GA access difficult.
- Increased operating costs, such as insurance (both airframe and liability), hangaring and fuel.
- Competition with other recreational pursuits that may provide the same “thrill” but require less skill or training (boating, motorcycles).
- Potential pilots are intimidated by the complexity of cockpit designs, instrumentation, perceived safety problems with flying in GA aircraft.

APPENDIX A

FAA Draft Forecasts

PASSENGER DEMAND: INTERNATIONAL

Average Seats Per Aircraft

1. Atlantic Routes

Reasons for Change:

Average Seats/Aircraft							
Actual			Forecast				
FY 1990	FY 2001	FY 2002e	FY 2003	FY 2004	FY 2005	FY 2006	FY 2010
278.6	232.6	233.5	235.5	238.0	239.5	240.5	242.5
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
(4.2)	0.9	2.0	2.5	1.5	1.0	1.0	
Your Projection:							
No Changes							

Factors to Consider:

2. Pacific Routes

Reasons for Change:

Average Seats/Aircraft							
Actual			Forecast				
FY 1990	FY 2001	FY 2002e	FY 2003	FY 2004	FY 2005	FY 2006	FY 2010
318.6	304.1	299.1	299.0	299.2	300.0	300.5	302.3
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
(1.3)	(5.0)	(0.1)	0.2	0.8	0.5	0.5	
Your Projection:							

Factors to Consider:

3. Latin American Routes

Reasons for Change:

Average Seats/Aircraft							
Actual			Forecast				
FY 1990	FY 2001	FY 2002e	FY 2003	FY 2004	FY 2005	FY 2006	FY 2010
194.0	168.1	167.4	168.0	168.5	169.0	169.5	171.5
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
(2.4)	(0.7)	0.7	0.5	0.5	0.5	0.5	
Your Projection:							

Factors to Consider:

Atlantic Routes

1. Europe Real GDP

Europe GDP (Billions 1990 Dollars)							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
8,353.1	10,456.1	10,626.2	10,964.7	11,282.7	11,595.9	11,913.4	13,247.9
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
2.1	1.6	3.2	2.9	2.8	2.7	2.7	

See August 2002 *Economist*. Range of 1.8% to 3%.

2. Passengers (U.S. and Foreign Flag)

Passengers (In Millions)							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
29.0	46.8	46.5	49.3	52.2	55.0	57.8	69.4
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
4.4	(0.5)	6.0	5.7	5.4	5.2	5.0	
Your Projection: MID			4	4.5	5	5.5	4.5
HIGH			9	4.9	6	6	5
LOW			3	3	3	3	3

Reasons for Change:

Summer traffic down—recovery not here yet. Recovery coming slower. Reluctance to fly. CY 02 too optimistic.

Factors to Consider:

Iraq. Mature market will have lower growth than other international markets.

3. Passenger Yield in 2001 Dollars (U.S. Carriers Only)

Passenger Yield in 2001 Dollars (Cents)								
	Actual			Forecast				
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	13.09	9.71	8.87	8.96	8.92	8.83	8.74	8.57
CY	13.26	9.42	8.96	9.01	8.96	8.87	8.78	8.61
Average Annual Growth Rate (%)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	(2.7)	(8.6)	1.0	(0.5)	(1.0)	(1.0)	(0.6)	
CY	(3.1)	(4.9)	0.5	(0.5)	(1.0)	(1.0)	(0.6)	
Your Projection: MID				-1	-0.5	-0.5	-0.75	-0.75
HIGH				1	1	0	-0.5	-0.5
LOW				-3	-2	-1	-1	-1

Reasons for Change:

Depressed current yields means rise in short run—unclear when. Later recovery. Transition to newer aircraft a larger part of fleet reduces costs (older ones stay parked).

Factors to Consider:

4. Passenger Load Factor (U.S. Carriers Only)

Load Factor (%)								
	Actual			Forecast				
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	69.8	76.4	77.0	78.9	79.5	79.8	80.0	80.0
CY	69.7	74.9	78.8	79.1	79.5	79.8	80.0	80.0
Average Annual Growth (Points)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	0.6	0.6	1.9	0.6	0.3	0.3	0.2	
CY	0.5	3.9	0.3	0.4	0.3	0.3	0.1	
Your Projection:				MID	1	0.3	0	0
				HIGH	2	0.5	0.3	0.3
				LOW	0.2	0	-1	-1

Reasons for Change:

Load factors reaching upper limit.
 Passenger tolerance loads already high at 80%.

Factors to Consider:

Pacific Routes

1. Asia Real GDP

Asia GDP (Billions 1990 Dollars)							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
4,965.2	7,148.3	7,286.6	7,567.1	7,891.2	8,225.5	8,564.3	10,025.6
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
3.4	1.9	3.9	4.3	4.2	4.1	4.1	

How is Japan weighted in these GDP data? Seems optimistic.

2. Passengers (U.S. and Foreign Flag)

Passengers (In Millions)							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
15.1	22.7	22.4	23.1	24.5	26.0	27.4	33.7
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
3.7	(1.2)	3.2	6.1	5.9	5.7	5.6	
Your Projection: MID			2	2	3	4	5
HIGH			6	4	5	6	7
LOW			-4	0	0	0	2

Reasons for Change:

Weak Japan and U.S. economies. Enplanements will be down 2002 vs. 2001 almost 14%.

Factors to Consider:

3. Passenger Yield in 2001 Dollars (U.S. Carriers Only)

Passenger Yield in 2001 Dollars (cents)								
	Actual			Forecast				
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	15.81	9.52	8.61	9.17	9.12	9.07	8.98	8.63
CY	15.73	9.11	8.64	9.13	9.08	9.04	8.95	8.59
Average Annual Growth Rate (%)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	(4.5)	(9.6)	6.5	(0.5)	(0.5)	(1.0)	(0.9)	
CY	(4.8)	(5.2)	5.7	(0.5)	(0.5)	(1.0)	(0.9)	
Your Projection: MID				1	1	1	-0.75	-0.75
HIGH				3	3	3.5	-0.5	-0.5
LOW				-2	-0.5	-0.5	-1	-1

Reasons for Change: Yield rebound unlikely.

Factors to Consider:

4. Passenger Load Factor (U.S. Carriers Only)

Load Factor (%)								
	Actual			Forecast				
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	71.4	76.2	76.2	76.0	76.5	77.0	77.5	77.5
CY	70.9	73.3	80.1	77.1	76.5	77.0	77.5	77.5
Average Annual Growth (Points)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	0.4	0.0	(0.2)	0.5	0.5	0.5	0.2	
CY	0.2	6.9	(3.0)	(0.6)	0.5	0.5	0.1	
Your Projection: MID				-1	0.25	0.75	0.5	0.2
HIGH				1.5	1	1	1	-0.1
LOW				-3	-0.5	0.5	0.3	0.6

Reasons for Change:

Discounting aggressively to fill aircraft. High loads factors difficult to sustain.

Factors to Consider:

Latin American Routes

1. Latin America Real GDP

Latin American GDP (Billions 1990 Dollars)							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
1,023.8	1,409.6	1,410.7	1,456.9	1,518.8	1,585.2	1,657.0	1,979.7
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
3.0	0.1	3.3	4.3	4.4	4.5	4.5	
		1 to 2	2 to 3	3 to 4	3 to 4	3 to 4	

One respondent thinks GDP growth is too high.

2. Passengers (U.S. and Foreign Flag)

Passengers (In Millions)							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
26.3	37.8	40.9	42.1	44.4	47.1	50.1	64.7
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
3.3	8.2	2.9	5.4	6.1	6.5	6.3	
Your Projection: MID			0	2.5	4	4.5	5
HIGH			2	4	5.5	6	6
LOW			-2.5	1	2	3	3

Reasons for Change:
Economy will recover more slowly. Big economies (Brazil and Argentina) are in trouble.

Factors to Consider:
Latin carriers are weak financially.

3. Passenger Yield in 2001 Dollars (U.S. Carriers Only)

Passenger Yield in 2001 Dollars (cents)								
	Actual			Forecast				
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	16.44	13.60	12.36	12.39	12.33	12.26	12.20	11.96
CY	16.28	13.28	12.39	12.42	12.36	12.29	12.23	11.99
Average Annual Growth Rate (%)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	(1.7)	(9.1)	0.2	(0.5)	(0.5)	(0.5)	(0.5)	
CY	(1.8)	(6.7)	0.2	(0.5)	(0.5)	(0.5)	(0.5)	
Your Projection: MID				-0.1	-0.5	-0.3	-0.3	-0.4
HIGH				0.2	0	1	1	0
LOW				-0.5	-1.5	-0.5	-0.5	-0.5

Reasons for Change:
Over capacity. Carrier instability.

Factors to Consider:
Weak economies will put pressure on yields to maintain loads. Exchange rates.

4. Passenger Load Factor (U.S. Carriers Only)

Load Factor (%)								
	Actual			Forecast				
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	62.3	69.0	67.6	68.1	68.5	69.0	69.3	70.0
CY	63.0	68.0	68.4	68.0	68.5	69.0	69.3	70.0
Average Annual Growth (Points)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	0.6	(1.4)	0.5	0.4	0.5	0.3	0.3	
CY	0.5	0.5	(0.4)	0.5	0.5	0.3	0.3	
Your Projection: MID				-0.2	0.5	0.75	0.5	0.4
HIGH				0.5	1	1	0.5	0.5
LOW				-1	-0.4	0.5	0.3	0.3

Reasons for Change:
High already.

Factors to Consider:

U.S./Canada Transborder

1. Canada Real GDP

Canada GDP (Billions 1990 Dollars)							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
584.3	779.3	795.6	826.8	853.7	879.6	906.0	1,011.4
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
2.7	2.1	3.9	3.3	3.0	3.0	2.9	

2. Passengers (U.S. and Foreign Flag)

Passengers (In Millions)							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
13.7	19.5	19.0	21.2	22.0	22.7	23.5	26.7
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
3.2	(2.6)	11.5	3.8	3.5	3.5	3.4	
Your Projection: MID			5.5	3.5	3.75	3.5	3.4
HIGH			6	4	4	4	4
LOW			0	2	3.5	3	3

Reasons for Change:
Slower economy.
Recovery later.

Factors to Consider:

PASSENGER DEMAND: DOMESTIC**U.S. Domestic Air Carriers—Large****1. U.S. Real GDP**

U.S. GDP (Billions 1996 Dollars)								
	Actual				Forecast			
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	6,700.2	9,322.6	9,493.2	9,831.8	10,190.4	10,541.3	10,893.9	12,335.8
CY	6,707.9	9,333.8	9,580.6	9,921.6	10,278.6	10,629.1	10,983.0	12,430.4
Average Annual Growth Rate (%)								
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
FY	3.0	1.8	3.6	3.6	3.4	3.3	3.3	
CY	3.0	2.6	3.6	3.6	3.4	3.3	3.3	

2. CPI

CPI (2001 = 100)								
	Actual				Forecast			
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	73.0	100.0	101.6	104.1	106.6	109.2	111.8	122.8
CY	73.8	100.0	101.7	104.3	106.8	109.3	112.0	122.9
Average Annual Growth Rate (%)								
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
FY	2.9	1.6	2.5	2.4	2.4	2.4	2.4	
CY	2.8	1.7	2.5	2.4	2.4	2.4	2.4	

Reasons for
Change:Factors to
Consider:**3. Passenger Yield**

Passenger Yield (FY 2001 Dollars—In Cents)								
	Actual				Forecast			
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	18.15	13.94	12.54	13.26	13.12	12.89	12.66	11.92
CY	18.20	13.47	12.63	13.41	13.27	13.03	12.80	12.05
Average Annual Growth Rate (%)								
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
FY	(2.6)	(10.0)	5.7	(1.1)	(1.8)	(1.8)	(1.5)	
CY	(3.0)	(6.2)	6.2	(1.1)	(1.8)	(1.8)	(1.5)	
Your Projection:				0	1	0	0	–0.8

Reasons for
Change:
See panel
narrative.Factors to
Consider:

U.S. Domestic Air Carriers—Large

1. Enplanements

Reasons for Change:

Enplanements (In Millions)								
	Actual				Forecast			
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	424.1	594.9	535.4	606.1	630.9	656.2	681.8	787.6
CY	423.4	568.5	553.9	617.8	643.1	668.8	694.9	802.8
Average Annual Growth Rate (%)								
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
FY	3.1	(10.0)	13.2	4.1	4.0	3.9	3.8	
CY	2.7	(2.6)	11.5	4.1	4.0	3.9	3.8	
Your Projection:				3.9	3.9	3.4	3.4	3.5

Factors to Consider:

2. Domestic RPMs

Reasons for Change:

Domestic RPMs (In Millions)								
	Actual				Forecast			
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	339.1	499.3	461.9	525.6	547.7	570.1	592.9	687.0
CY	340.2	479.0	481.4	533.8	556.2	579.0	602.2	697.7
Average Annual Growth Rate (%)								
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
FY	3.6	(7.5)	13.8	4.2	4.1	4.0	3.9	
CY	3.2	0.5	10.9	4.2	4.1	4.0	3.9	
Your Projection:				4	4	3.5	3.5	3.6

Factors to Consider:

3. Domestic Passenger Load Factor

Reasons for Change:

Domestic Load Factor (%)								
	Actual				Forecast			
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	60.8	69.7	70.1	73.3	73.0	73.0	73.0	73.1
CY	60.4	69.1	71.0	73.7	73.0	73.0	73.0	73.1
Average Annual Growth (Points)								
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
FY	0.8	0.4	3.2	(0.3)	(0.0)	(0.0)	(0.0)	
CY	0.8	1.9	2.7	(0.7)	(0.0)	(0.0)	(0.1)	
Your Projection:								

Factors to Consider:

U.S. Air Carrier Passenger Fleet

1. Large Jet Passenger Aircraft (Excluding Regional Jets)

Number of Aircraft							
Actual				Forecast			
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
3,722	4,069	4,055	4,079	4,143	4,214	4,298	4,997
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
0.8	(0.3)	0.6	1.6	1.7	2.0	2.9	
Your Projection:							

Reasons for Change:

Factors to Consider:

2. Average Seats Per Aircraft—Domestic Operations

Average Seats Per Aircraft							
Actual				Forecast			
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
151.7	136.5	135.7	136.2	137.0	138.0	139.0	143.0
Average Annual Growth Rate (Seats)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
(1.4)	(0.8)	0.5	0.8	1.0	1.0	0.7	
Your Projection:				0	0.5	0.5	0.5

Reasons for Change:
See panel narrative.

Factors to Consider:

U.S. Air Carrier Passenger Fleet

1. Large Jet Passenger Fleet—Narrowbody (Excluding Regional Jets)

Reasons for Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
3,080	3,403	3,364	3,376	3,419	3,477	3,538	4,150
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
1.0	(1.1)	0.4	1.3	1.7	1.8	3.0	
Your Projection:							

Factors to Consider:

2. Large Jet Passenger Fleet—Widebody (Excluding Regional Jets)

Reasons for Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
633	666	691	703	724	737	760	847
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
0.5	3.8	1.7	3.0	1.8	3.1	2.7	
Your Projection:							

Factors to Consider:

3. Regional Jets (U.S. Carriers Only)

Reasons for Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
9	732	858	1,025	1,192	1,363	1,545	2,273
Average Annual Growth Rate (%)							
1993-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
73.3	17.2	19.5	16.3	14.3	13.4	12.0	
Your Projection:							

Factors to Consider:

AIR CARGO**U.S Air Carrier Large Cargo Aircraft****1. Large Cargo Aircraft—Total**Reasons for
Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
530	1,039	1,066	1,108	1,156	1,194	1,232	1,422
Average Annual Growth Rate (%)							
1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
6.3	2.6	3.9	4.3	3.3	3.2	3.6	
Your Projection:							

Factors to
Consider:**2. Large Cargo Aircraft—Narrowbody**Reasons for
Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
466	602	613	613	613	605	597	572
Average Annual Growth Rate (In Miles/Seats, Etc.)							
1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
2.4	1.8	0.0	0.0	(1.3)	(1.3)	(1.0)	
Your Projection:							

Factors to
Consider:**3. Large Cargo Aircraft—Widebody**Reasons for
Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
64	437	453	495	543	589	635	850
Average Annual Growth Rate (In Miles/Seats, Etc.)							
1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
19.1	3.7	9.3	9.7	8.5	7.8	8.0	
Your Projection:							

Factors to
Consider:

U.S. Commercial Air Carriers: Domestic Revenue Ton Miles

1. U.S. Real GDP

U.S. GDP (Billions 1996 Dollars)								
Actual			Forecast					
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	6,700.2	9,322.6	9,493.2	9,831.8	10,190.4	10,541.3	10,893.9	12,335.8
CY	6,707.9	9,333.8	9,580.6	9,921.6	10,278.6	10,629.1	10,983.0	12,430.4
Average Annual Growth Rate (%)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	3.0	1.8	3.6	3.6	3.4	3.3	3.3	
CY	3.0	2.6	3.6	3.6	3.4	3.3	3.3	

2. Domestic Freight/Express

Revenue Ton Miles (In Millions)								
Actual			Forecast					
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	7,532.5	11,778.9	11,814.2	12,735.7	13,444.3	14,137.7	14,834.4	17,683.5
CY	7,554.5	11,340.0	12,238.3	12,918.1	13,636.8	14,340.1	15,046.8	17,936.8
Average Annual Growth Rate (%)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	4.1	0.3	7.8	5.6	5.2	4.9	4.8	
CY	3.8	7.9	5.6	5.6	5.2	4.9	4.8	
Your Projection:								

Reasons for Change:

Factors to Consider:

3. Domestic Mail

Revenue Ton Miles (In Millions)								
Actual			Forecast					
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	1,477.5	2,155.0	1,148.6	1,106.1	1,139.9	1,172.9	1,206.1	1,341.9
CY	1,492.3	1,761.9	1,283.1	1,117.9	1,152.0	1,185.4	1,219.0	1,356.2
Average Annual Growth Rate (%)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	3.5	(46.7)	(3.7)	3.1	2.9	2.8	2.8	
CY	1.5	(27.2)	(12.9)	3.1	2.9	2.8	2.8	
Your Projection:								

Reasons for Change:

Factors to Consider:

U.S. Commercial Air Carriers: International Revenue Ton Miles

1. World Real GDP

World GDP (Billions 1990 Dollars)							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
6,707.9	9,333.8	9,580.6	9,921.6	10,278.6	10,629.1	10,983.0	12,430.4
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
3.0	2.6	3.6	3.6	3.4	3.3	3.3	

2. International Freight/Express

Revenue Ton Miles (In Millions)							
Actual			Forecast				
1990	2001	2002e	2003	2004	2005	2006	2010
FY 6,770.3	14,021.4	13,351.7	13,794.3	14,795.9	15,742.7	16,706.3	21,040.2
CY 6,823.1	13,492.0	13,474.5	14,048.6	15,068.7	16,032.9	17,014.3	21,428.1
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY 6.8	(4.8)	3.3	7.3	6.4	6.1	6.2	
CY 6.4	(0.1)	4.3	7.3	6.4	6.1	6.2	
Your Projection:							

Reasons for
Change:

Factors to
Consider:

3. International Mail

Revenue Ton Miles (In Millions)							
Actual			Forecast				
1990	2001	2002e	2003	2004	2005	2006	2010
FY 502.9	507.0	460.9	468.9	485.8	501.8	518.3	584.4
CY 513.9	475.9	478.4	474.0	491.1	507.3	524.0	590.8
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY 0.1	(9.1)	1.7	3.6	3.3	3.3	3.2	
CY (0.7)	0.5	(0.9)	3.6	3.3	3.3	3.2	
Your Projection:							

Reasons for
Change:

Factors to
Consider:

AIRPORTS AND INFRASTRUCTURE**Commercial Passenger Demand****1. Large Air Carrier Domestic Enplanements**

Enplanements (In Millions)								
Actual			Forecast					
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	424.1	594.9	535.4	606.1	630.9	656.2	681.8	787.6
CY	423.4	568.5	553.9	617.8	643.1	668.8	694.9	802.8
Average Annual Growth Rate (%)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	3.1	(10.0)	13.2	4.1	4.0	3.9	3.8	
CY	2.7	(2.6)	11.5	4.1	4.0	3.9	3.8	
Your Projection:			1.5	3.8	3.8	3.9		

Reasons for Change:

See panel report.

Factors to Consider:

2007 – 2010 = 3.8

2. International Passengers To/From United States (U.S. and Foreign Flag)

Passengers (In Millions)							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
84.2	126.7	128.8	136.7	143.0	150.8	158.9	194.5
Average Annual Growth Rate (%)							
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10
	3.8	1.7	6.1	4.6	5.5	5.4	5.2
Your Projection:			3.5	4.6	5.5	5.4	

Reasons for Change:

See panel report.

Factors to Consider:

2007 – 2010 = 5.2

Enplanements (In Millions)								
	Actual			Forecast				
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	37.7	79.6	84.2	93.6	99.7	105.6	111.6	136.0
CY	39.2	78.3	87.9	95.9	102.1	108.1	114.3	139.2

Average Annual Growth Rate (%)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	7.0	5.8	11.2	6.5	5.9	5.7	5.5	
CY	6.5	12.3	9.1	6.5	5.9	5.7	5.5	
Your Projection:			9.1	6.5	5.9	5.7		

	Factors to Consider:
--	-----------------------------

$$2007 - 2010 = 5.5$$

1. Air Carrier Operations—60 Seats Plus

Reasons for Change:
See panel report.

Factors to Consider:

Operations (In millions)							
Actual			Forecast				
FY 1990	FY 2001	FY 2002e	FY 2003	FY 2004	FY 2005	FY 2006	FY 2010
9.0	10.9	11.1	11.5	11.8	12.1	12.4	13.6
	Average Annual Growth Rate (%)						
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10
	1.7	1.8	3.6	2.6	2.5	2.5	2.4
	Your Projection:		5.4	4.2	2.8	2.5	2007 – 2010 = 2.4

Operations (In millions)								Change: See panel report.
Actual			Forecast					
FY 1990	FY 2001	FY 2002e	FY 2003	FY 2004	FY 2005	FY 2006	FY 2010	
9.0	10.9	11.1	11.5	11.8	12.1	12.4	13.6	
	Average Annual Growth Rate (%)							Factors to Consider: See panel report.
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
	1.7	1.8	3.6	2.6	2.5	2.5	2.4	
	Your Projection:		5.4	4.2	2.8	2.5		
2007 – 2010 = 2.6								

3. General Aviation Operations

Operations (In millions)							
Actual			Forecast				
FY 1990	FY 2001	FY 2002e	FY 2003	FY 2004	FY 2005	FY 2006	FY 2010
38.9	37.6	37.8	39.0	39.5	40.0	40.5	42.5
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
(0.3)	0.5	3.2	1.3	1.3	1.3	1.2	
Your Projection:			1.5	1	1	1	
2007 – 2010 = 1.0							

Reasons for Change:
See panel report.

Factors to Consider:

FLEETS AND MANUFACTURERS**U.S. Air Carrier Jet Fleet****1. Large Passenger Aircraft (Excluding Regional Jets)**Reasons for
Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
3,722	4,069	4,055	4,079	4,143	4,214	4,298	4,997
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
0.8	(0.3)	0.6	1.6	1.7	2.0	2.9	
Your Projection:							

Factors to
Consider:**2. Large Cargo Aircraft**Reasons for
Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
530	1,039	1,066	1,108	1,156	1,194	1,232	1,422
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
6.3	2.6	3.9	4.3	3.3	3.2	3.6	
Your Projection:							

Factors to
Consider:**3. Regional Jets**Reasons for
Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
8	732	858	1,025	1,192	1,363	1,545	2,273
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
50.8	17.2	19.5	16.3	14.3	13.4	12.0	
Your Projection:							

Factors to
Consider:

U.S. Air Carrier Large Passenger Aircraft

1. Large Passenger Aircraft—Narrowbody

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
3,087	3,403	3,364	3,376	3,419	3,477	3,536	4,150
Average Annual Growth Rate (%)							
1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
0.9	(1.1)	0.4	1.3	1.7	1.7	3.0	
Your Projection:							

Reasons for Change:

Factors to Consider:

2. Large Passenger Aircraft—Widebody

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
627	666	691	703	724	737	760	847
Average Annual Growth Rate (%)							
1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
0.6	3.8	1.7	3.0	1.8	3.1	2.7	
Your Projection:							

Reasons for Change:

Factors to Consider:

3. Large Passenger Aircraft—Average Seats per Aircraft in Domestic Service

Number of Seats							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
151.7	136.5	135.7	136.2	137.0	138.0	139.0	143.0
Average Annual Growth Rate (Seats)							
1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
(1.4)	(0.8)	0.5	0.8	1.0	1.0	1.0	
Your Projection:							

Reasons for Change:

Factors to Consider:

U.S. Regional/Commuter Passenger Aircraft

1. Regional/Commuter Passenger Fleet—Turboprops and Jets

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
1,819	2,427	2,530	2,678	2,828	2,986	3,155	3,833
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
2.7	4.2	5.8	5.6	5.6	5.7	5.3	
Your Projection:							

Reasons for Change:

Factors to Consider:

2. Regional/Commuter Passenger Fleet—Average Seats Per Aircraft

Number of Seats							
Actual			Forecast				
1990	2000	2001e	2002	2003	2004	2005	2010
20.8	39.9	41.7	42.6	43.4	43.9	44.5	46.7
Average Annual Growth Rate (Seats)							
1990-00	2000-01	2001-02	2002-03	2003-04	2004-05	2000-10	
1.9	1.8	0.9	0.8	0.5	0.6	0.7	
Your Projection:							

Reasons for Change:

Factors to Consider:

3. Regional JetsReasons for
Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
8	732	858	1,025	1,192	1,363	1,545	2,273
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
50.8	17.2	19.5	16.3	14.3	13.4	12.0	
Your Projection:							

Factors to
Consider:**4. Turboprops**Reasons for
Change:

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
1,811	1,695	1,672	1,653	1,636	1,623	1,610	1,560
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
(0.6)	(1.4)	(1.1)	(1.0)	(0.8)	(0.8)	(0.8)	
Your Projection:							

Factors to
Consider:

U.S. Air Carrier Large Cargo Aircraft

1. Large Cargo Aircraft—Narrowbody

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
466	602	613	613	613	605	597	572
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
2.4	1.8	0.0	0.0	(1.3)	(1.3)	(1.0)	
Your Projection:							

Reasons for Change:

Factors to Consider:

2. Large Cargo Aircraft—Widebody

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
64	437	453	495	543	589	635	850
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
19.1	3.7	9.3	9.7	8.5	7.8	8.0	
Your Projection:							

Reasons for Change:

Factors to Consider:

REGIONAL/COMMUTERS**Passenger Demand****1. U. S. Real GDP**

	U.S. GDP (Billions 1996 Dollars)							
	Actual			Forecast				
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	6,700.2	9,322.6	9,493.2	9,831.8	10,190.4	10,541.3	10,893.9	12,335.8
CY	6,707.9	9,333.8	9,580.6	9,921.6	10,278.6	10,629.1	10,983.0	12,430.4
	Average Annual Growth Rate (%)							
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	3.0	1.8	3.6	3.6	3.4	3.3	3.3	
CY	3.0	2.6	3.6	3.6	3.4	3.3	3.3	

2. Regional/Commuter Enplanements

	Enplanements (Millions)							
	Actual			Forecast				
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	37.7	79.6	84.2	93.6	99.7	105.6	111.6	136.0
CY	39.2	78.3	87.9	95.9	102.1	108.1	114.3	139.2
	Average Annual Growth Rate (%)							
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	7.0	5.8	11.2	6.5	5.9	5.7	5.5	
CY	6.5	12.3	9.1	6.5	5.9	5.7	5.5	
Your Projection:								10%

Reasons for Change:
More route transfers.
Larger aircraft.

2010 Projected

Factors to Consider:
Mainline carriers expected to shrink.
More rapid growth due to route transfers.

% Change 2002/2010

121%

3. Regional/Commuter Revenue Passenger Miles

Revenue Passenger Miles (Millions)								
Actual			Forecast					
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	6,779	23,896	27,740	31,119	33,567	36,018	38,613	49,434
CY	7,039	24,137	29,002	31,972	34,487	37,005	39,671	50,788
2010								
75,671								
Average Annual Growth Rate (%)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	12.1	16.1	12.2	7.9	7.3	7.2	6.8	
CY	11.9	20.2	10.2	7.9	7.3	7.2	6.8	
213%								
Your Projection:								15%

Reasons for Change:

Continued introduction of RJs. Based upon fleet assumptions.

Factors to Consider:

Larger share of flights operated by RJs. Longer routes. Larger aircraft.

4. Regional/Commuter Passenger Trip Length

Passenger Trip Length (Miles)								
Actual			Forecast					
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	179.6	300.2	329.4	332.5	336.8	341.1	346.1	363.6
CY	179.5	308.3	329.9	333.5	337.8	342.3	347.1	364.9
2010								
439								
Average Annual Growth Rate (Miles)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	11.0	29.2	3.1	4.3	4.3	5.0	4.4	
CY	11.7	21.6	3.6	4.3	4.5	4.8	4.5	
139								
Your Projection:								13.9

Reasons for Change:

RJs will push average trips longer.

Factors to Consider:

Longer RJ routes. Reduction of short haul.

5. Regional/Commuter Passenger Load Factor

Load Factor (%)								
Actual			Forecast					
	1990	2001	2002e	2003	2004	2005	2006	2010
FY	47.5	58.3	59.2	60.2	60.8	61.3	61.8	63.5
CY	47.4	58.0	59.4	60.5	60.8	61.3	61.8	63.5
2010								
67								
Average Annual Growth (Points)								
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	1.0	0.9	1.0	0.6	0.5	0.5	0.5	
CY	1.0	1.4	1.1	0.3	0.5	0.5	0.4	
9								
Your Projection:								1.00

Reasons for Change:

Fleet mix reflecting more RJs.

Factors to Consider:

TPs have LF in 40% range. RJs tend to have LF in high 60% range.

Passenger Aircraft

1. Total Regional/Commuter Passenger Fleet (Turboprops & Jets)

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
1,819	2,427	2,530	2,678	2,828	2,986	3,155	3,833
Average Annual Growth Rate (%)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
2.7	4.2	5.8	5.6	5.6	5.7	5.3	
Your Projection:							4%

Reasons for Change:
Fleet mix.
More turboprops expected to retire.

Factors to Consider:

2. Average Seats Per Aircraft (Turboprops & Jets)

Average Seats/Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
20.8	39.9	41.7	42.8	43.4	43.9	44.5	46.7
Average Annual Growth Rate (In Seats)							
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
1.7	1.8	1.1	0.6	0.5	0.6	0.6	
Your Projection:							0.4

Reasons for Change:
Calculated based upon projected fleet mix.

Factors to Consider:

Passenger Aircraft

1. Regional Jets

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
8	732	858	1,025	1,192	1,363	1,545	2,273
Average Annual Growth Rate (%)							
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10
	50.8	17.2	19.5	16.3	14.3	13.4	12.0
Your Projection:							12%
Actual Fleet			952				

Back Fleet Data, October 2002.

Reasons for Change:
Required for route transfers.

Factors to Consider:
Based upon expected orders and deliveries.

2. Turboprops

Number of Aircraft							
Actual			Forecast				
CY 1990	CY 2001	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010
1,811	1,695	1,672	1,653	1,636	1,623	1,610	1,560
Average Annual Growth Rate (In Seats)							
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10
	(0.6)	(1.4)	(1.1)	(1.0)	(0.8)	(0.8)	(0.8)
Your Projection:							-10%
Actual Fleet			1046				

Back Fleet Data, October 2002.

Reasons for Change:
Retirement of 19 seat aircraft. Significant retirement of all turboprops.

Factors to Consider:
Increased operating costs. Reduction in short-haul operations.

GENERAL AVIATION AIRCRAFT: BUSINESS AIRCRAFT MIDYEAR FORECAST UPDATE

1. U. S. Real GDP (June 2002 OMB Forecast)

U.S. GDP (Billions 1996 Dollars)									
Actual				Forecast					
	1990	2000	2001	2002e	2003	2004	2005	2006	2010
FY	6,700.2	9,160.5	9,322.6	9,493.2	9,831.8	10,190.4	10,541.3	10,893.9	12,335.8
CY	6,707.9	9,224.0	9,333.8	9,580.6	9,921.6	10,278.6	10,629.1	10,983.0	12,430.4
Average Annual Growth Rate (%)									
	1990–01	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
FY	3.0	1.8	1.8	3.6	3.6	3.4	3.3	3.3	
CY	3.0	1.2	2.6	3.6	3.6	3.4	3.3	3.3	

2. Total Active General Aviation Aircraft

Number of Aircraft									for Change:
Actual			Forecast						
CY 1990	CY 2000	CY 2001p	CY 2002r	CY 2003r	CY 2004r	CY 2005r	CY 2006r	CY 2010r	Factors to Consider:
205,000	217,533	210,200	210,200	211,500	213,000	215,000	217,000	221,000	
Average Annual Growth Rate (%)									
1990-01	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10		
0.2	(3.4)	0.0	0.6	0.7	0.9	0.9	0.6		
Your Projection:									

Note: Forecast for 2001 was 216,150.

3. Total General Aviation Hours Flown

Hours Flown (In Thousands)									for Change:
Actual			Forecast						
CY 1990	CY 2000	CY 2001p	CY 2002r	CY 2003r	CY 2004r	CY 2005r	CY 2006r	CY 2010r	Factors to Consider:
32,100	30,973	29,000	29,700	30,100	30,500	31,000	31,500	33,500	
Average Annual Growth Rate (%)									
1990-01	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10		
(0.9)	(6.4)	2.4	1.3	1.3	1.6	1.6	1.5		
Your Projection:									

Note: Forecast for 2001 was 28,980.

Turboprops

1. Fixed-Wing Turboprop Aircraft Fleet (March 2002 Forecast)

Number of Active Aircraft								for Change:
Actual			Forecast					
CY 1990	CY 2001e	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
5,300	5,750	5,650	5,650	5,680	5,710	5,740	5,860	
Average Annual Growth Rate (%)								Factors to Consider:
1990–01		2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
0.7		(1.7)	0.0	0.5	0.5	0.5	0.5	
Your Projection:								

2. Fixed-Wing Turboprop Aircraft Hours Flown (March 2002 Forecast)

Hours Flown (In Thousands)								for Change:
Actual			Forecast					
CY 1990	CY 2001e	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
2,319	1,995	1,915	1,920	1,930	1,945	1,965	2,030	
Average Annual Growth Rate (%)								
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10		Factors to Consider:
(1.4)	(4.0)	0.3	0.5	0.8	1.0	0.8		
Your Projection:								

Turbojets

1. Fixed-Wing Turbojet Aircraft Fleet (March 2002 Forecast)

Number of Active Aircraft								for Change:
Actual			Forecast					
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	Factors to Consider:
4,100	7,150	7,300	7,500	7,900	8,400	8,900	10,100	
Average Annual Growth Rate (%)								
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10		
5.2	2.1	2.7	5.3	6.3	6.0	4.3		
Your Projection:								

2. Fixed-Wing Turbojet Aircraft Hours Flown (March 2002 Forecast)

Hours Flown (In Thousands)								Reasons for Change:
Actual			Forecast					
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	Factors to Consider:
1,396	2,715	2,780	2,865	3,025	3,240	3,460	4,030	
Average Annual Growth Rate (%)								
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10		
6.2	2.4	3.1	5.6	7.1	6.8	5.0		
Your Projection:								

GENERAL AVIATION: VERTICAL AIRCRAFT MIDYEAR FORECAST UPDATE

1. U. S. Real GDP (June 2002 OMB Forecast)

U.S. GDP (Billions 1996 Dollars)

	Actual				Forecast				
	1990	2000	2001	2002e	2003	2004	2005	2006	2010
FY	6,700.2	9,160.5	9,322.6	9,493.2	9,831.8	10,190.4	10,541.3	10,893.9	12,335.8
CY	6,707.9	9,224.0	9,333.8	9,580.6	9,921.6	10,278.6	10,629.1	10,983.0	12,430.4
Average Annual Growth Rate (%)									
	1990-01	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	3.0	1.8	1.8	3.6	3.6	3.4	3.3	3.3	
CY	3.0	1.2	2.6	3.6	3.6	3.4	3.3	3.3	

2. Total Active General Aviation Aircraft

Number of Aircraft

	Actual				Forecast				
	CY 1990	CY 2000	CY 2001p	CY 2002r	CY 2003r	CY 2004r	CY 2005r	CY 2006r	CY 2010r
	205,000	217,533	210,200	210,200	211,500	213,000	215,000	217,000	221,000
Average Annual Growth Rate (%)									
	1990-01	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
	0.2	(3.4)	0.0	0.6	0.7	0.9	0.9	0.6	
Your Projection:									

Reasons
for
Change:

Factors to
Consider:

Note: Forecast for 2001 was 216,150.

3. Total General Aviation Hours Flown

Hours Flown (In Thousands)

	Actual				Forecast				
	CY 1990	CY 2000	CY 2001p	CY 2002r	CY 2003r	CY 2004r	CY 2005r	CY 2006r	CY 2010r
	32,100	30,973	29,000	29,700	30,100	30,500	31,000	31,500	33,500
Average Annual Growth Rate (%)									
	1990-01	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
	(0.9)	(6.4)	2.4	1.3	1.3	1.6	1.6	1.5	
Your Projection:									

Reasons
for
Change:

Factors to
Consider:

Note: Forecast for 2001 was 28,980.

Piston Rotorcraft

1. Piston Rotorcraft Fleet (March 2002 Forecast)

Number of Active Aircraft								Reasons for Change:
Actual			Forecast					
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	Factors to Consider:
3,200	2,700	2,650	2,650	2,670	2,700	2,730	2,850	
Average Annual Growth Rate (%)								
1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10		
(1.5)	(1.9)	0.0	0.8	1.1	1.1	1.0		
Your Projection:								

2. Piston Rotorcraft Hours Flown (March 2002 Forecast)

Hours Flown (In Thousands)								Reasons for Change:
Actual			Forecast					
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
716	500	490	490	495	505	515	540	
Average Annual Growth Rate (%)								Factors to Consider:
1990–01		2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
(3.2)		(2.0)	0.0	1.0	2.0	2.0	1.4	
Your Projection:								

Turbine Rotorcraft

1. Turbine Rotorcraft Fleet (March 2002 Forecast)

Number of Active Aircraft								Reasons for Change:
Actual			Forecast					
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
3,700	4,450	4,350	4,350	4,370	4,390	4,415	4,510	
	Average Annual Growth Rate (%)							Factors to Consider:
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
	1.7	(2.2)	0.0	0.5	0.5	0.6	0.5	
	Your Projection:							

2. Turbine Rotorcraft Hours Flown (March 2002 Forecast)

Turbine Rotorcraft								Reasons for Change:
Actual			Forecast					
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
1,493	1,665	1,620	1,625	1,640	1,655	1,675	1,745	
	Average Annual Growth Rate (%)							Factors to Consider:
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
	1.0	(2.7)	0.3	0.9	0.9	1.2	1.0	
	Your Projection:							

Pilot Population

1. Student Pilots

Number of Pilots (In Thousands)								Reasons for Change:		
Actual			Forecast							
CY 1990	CY 2001	CY 2002r	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010			
128.7	86.9 ¹	90.5	91.0	91.6	92.3	93.0	96.5			
Average Annual Growth Rate (%)										
			1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	Factors to Consider:
			(3.5)	2.4	0.6	0.7	0.8	0.8	0.8	
Your Projection:										

¹ There appears to have been an undercount of student pilots reported by the FAA Registry for the period 1999–2001. AOPA estimates for 2001 range between 93,257–95,199.

2. Private Pilots

Number of Pilots (In Thousands)								Reasons for Change:
Actual			Forecast					
CY 1990	CY 2001	CY 2002r	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
299.1	261.9	264.0	265.5	267.0	269.0	271.5	283.0	
	Average Annual Growth Rate (%)							Factors to Consider:
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
	(1.2)	0.8	0.6	0.6	0.7	0.9	0.9	
Your Projection:								

3. Commercial Pilots

Number of Pilots (In Thousands)								for Change:
Actual			Forecast					
CY 1990	CY 2001	CY 2002r	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	Factors to Consider:
149.7	137.6	139.0	140.0	141.3	142.7	144.2	152.1	
Average Annual Growth Rate (%)								
1990–01		2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
(0.8)		1.0	0.7	0.9	1.0	1.1	1.2	
Your Projection:								

GENERAL AVIATION: LIGHT AIRCRAFT MIDYEAR FORECAST UPDATE

1. U. S. Real GDP (June 2002 OMB Forecast)

U.S. GDP (Billions 1996 Dollars)									
Actual				Forecast					
	1990	2000	2001	2002e	2003	2004	2005	2006	2010
FY	6,700.2	9,160.5	9,322.6	9,493.2	9,831.8	10,190.4	10,541.3	10,893.9	12,335.8
CY	6,707.9	9,224.0	9,333.8	9,580.6	9,921.6	10,278.6	10,629.1	10,983.0	12,430.4
Average Annual Growth Rate (%)									
	1990-01	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
FY	3.0	1.8	1.8	3.6	3.6	3.4	3.3	3.3	
CY	3.0	1.2	2.6	3.6	3.6	3.4	3.3	3.3	

2. Total Active General Aviation Aircraft

2. Total Active General Aviation Aircraft									Reasons for Change:
Number of Aircraft									
Actual				Forecast					
CY 1990	CY 2000	CY 2001p	CY 2002r	CY 2003r	CY 2004r	CY 2005r	CY 2006r	CY 2010r	Factors to Consider:
205,000	217,533	210,200	210,200	211,500	213,000	215,000	217,000	221,000	
Average Annual Growth Rate (%)									
1990-01	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10		
0.2	(3.4)	0.0	0.6	0.7	0.9	0.9	0.6		
Your Projection:									

Note: Forecast for 2001 was 216,150.

3. Total General Aviation Hours Flown

Hours Flown (In Thousands)									for Change:
Actual				Forecast					
CY 1990	CY 2000	CY 2001p	CY 2002r	CY 2003r	CY 2004r	CY 2005r	CY 2006r	CY 2010r	Factors to Consider:
32,100	30,973	29,000	29,700	30,100	30,500	31,000	31,500	33,500	
Average Annual Growth Rate (%)									
1990-01	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10		
(0.9)	(6.4)	2.4	1.3	1.3	1.6	1.6	1.5		
Your Projection:									

Note: Forecast for 2001 was 28,980.

Single-Engine Pistons

1. Single-Engine Piston Fleet (March 2002 Forecast)

Number of Active Aircraft								for Change: See panel report.
Actual			Forecast					
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
154,000	148,000	146,500	146,000	146,000	146,500	147,000	150,500	
	Average Annual Growth Rate (%)							Factors to Consider:
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
	(0.4)	(1.0)	(0.3)	0.0	0.3	0.3	0.4	
	Your Projection:		-0.3	0	0.3	0.3	0.4	

2. Single-Engine Piston Aircraft Hours Flown (March 2002 Forecast)

Hours Flown (In Thousands)								for Change: See panel report.
Actual			Forecast					
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
21,883	17,320	16,850	16,860	17,010	17,210	17,420	18,440	
	Average Annual Growth Rate (%)							Factors to Consider:
	1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10	
	(2.1)	(2.7)	0.1	0.9	1.2	1.2	1.3	
	Your Projection:		0.1	0.9	1.2	1.2	1.3	

Multi-Engine Pistons

1. Multi-Engine Piston Fleet (March 2002 Forecast)

Number of Active Aircraft								Reasons for Change: See panel report.
Actual			Forecast					
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
21,100	21,000	20,800	20,700	20,700	20,700	20,700	20,700	
Average Annual Growth Rate (%)								
1990–01		2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	Factors to Consider:
(0.0)		(1.0)	(0.5)	0.0	0.0	0.0	0.0	
Your Projection:			0.5	−0.2	0	0	0	

2. Multi-Engine Piston Aircraft Hours Flown (March 2002 Forecast)

Hours Flown (In Thousands)								for Change: See panel report. Factors to Consider:
Actual			Forecast					
CY 1990	CY 2001p	CY 2002e	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
3,897	3,190	3,120	3,115	3,125	3,135	3,145	3,190	
Average Annual Growth Rate (%)								
1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10		
(1.8)	(2.2)	(0.2)	0.3	0.3	0.3	0.3		
Your Projection:			–0.2	–0.1	–0.1	–0.1	–0.1	

Pilot Population

1. Student Pilots

Number of Pilots (In Thousands)								for Change: See panel report.
Actual			Forecast					
CY 1990	CY 2001	CY 2002r	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
128.7	86.9 ¹	90.5	91.0	91.6	92.3	93.0	96.5	
Average Annual Growth Rate (%)								
1990–01		2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	Factors to Consider:
(3.5)		2.4	0.6	0.7	0.8	0.8	0.8	
Your Projection:			1	2	3.5	2.75	2.3	

¹ There appears to have been an undercount of student pilots reported by the FAA Registry for the period 1999-2001. AOPA estimates for 2001 range between 93,257-95,199.

2. Private Pilots

Number of Pilots (In Thousands)								for Change: See panel report.
Actual			Forecast					
CY 1990	CY 2001	CY 2002r	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
299.1	261.9	264.0	265.5	267.0	269.0	271.5	283.0	Factors to Consider:
Average Annual Growth Rate (%)								
1990-01	2001-02	2002-03	2003-04	2004-05	2005-06	2003-10		
(1.2)	0.8	0.6	0.6	0.7	0.9	0.9		
Your Projection:			-(0.8)	0.6	0.7	0.9	0.9	

3. Commercial Pilots

Number of Pilots (In Thousands)								Reasons for Change:
Actual			Forecast					
CY 1990	CY 2001	CY 2002r	CY 2003	CY 2004	CY 2005	CY 2006	CY 2010	
149.7	137.6	139.0	140.0	141.3	142.7	144.2	152.1	
	Average Annual Growth Rate (%)							Factors to Consider:
	1990–01	2001–02	2002–03	2003–04	2004–05	2005–06	2003–10	
	(0.8)	1.0	0.7	0.9	1.0	1.1	1.2	
	Your Projection:							

APPENDIX B

Workshop Participants

<i>Participant Key</i>			
AIRP	Airports and Infrastructure	M	Panel Moderator
BUS	Business Aviation	MFG	Fleets and Manufacturers
CARGO	Air Cargo	REG	Regional/Commuter Aviation
DOM	Domestic Air Carriers	SPK	Speaker
GEN	Light/Personal General Aviation	VFL	Vertical Flight
INT	International Airlines		

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The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. William A. Wulf is president of the National Academy of Engineering.

The **Institute of Medicine** was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, on its own initiative, to identify issues of medical care, research, and education. Dr. Harvey V. Fineberg is president of the Institute of Medicine.

The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both the Academies and the Institute of Medicine. Dr. Bruce M. Alberts and Dr. William A. Wulf are chair and vice chair, respectively, of the National Research Council.

The **Transportation Research Board** is a division of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. The Board's mission is to promote innovation and progress in transportation by stimulating and conducting research, facilitating the dissemination of information, and encouraging the implementation of research results. The Board's varied activities annually engage more than 4,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation. www.TRB.org

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