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FEDERAL AVIATION ADMINISTRATION
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Future Aviation Activities

Ninth International Workshop

National Academy of Sciences
September 18-20, 1995
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TRANSPORTATION RESEARCH BOARD/NATIONAL RESEARCH COUNCIL

FOREWORD

The Ninth International Workshop on Future Aviation Activities was conducted by the Transportation Research Board on September 18-20, 1995, at the National Academy of Sciences in Washington, D.C. This workshop, the latest in a biennial series that extends back to 1979, was carried out under the sponsorship of the Federal Aviation Administration to assist public and private-sector managers and decision makers in forecasting long-term trends and developments in commercial, business, and personal air transport. Topics discussed include the domestic and international macroeconomic outlook, the structure and operating patterns of major and regional U.S. air carriers, expected developments in international aviation, aircraft and engine manufacture, trends in business aviation, civil helicopter transport services, and the future of personally owned and operated light aircraft.

More than 100 invited participants, drawn from government, industry, academic institutions, and private consulting firms both here and abroad, took part in this 3-day meeting. Most came from the United States, but there was substantial representation from Europe, Asia, and foreign firms with offices in the United States.

The program was made up of three major parts: an opening plenary session featuring presentations on the broad outlook and strategic issues, eight concurrent discussion panels on sectoral trends and problems, and a concluding plenary session in which the findings and forecasts of discussion panels were presented.

This report of workshop proceedings represents the collective views of panel participants and not necessarily those of discussion panel leaders or their organizations, the Federal Aviation Administration, or the Transportation Research Board.

The Transportation Research Board deeply appreciates the gift of time and the thoughtful contributions of the distinguished experts who attended the workshop. Special acknowledgment is due the workshop co-chairs — Vicki L. Golich of California State University, San Marcos, and Jack P. Wiegand of Forecast International/DMS — for planning and organizing this endeavor and for overseeing preparation of this report.

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SUMMARY

AIRLINES

All air carriers (domestic, regional, and international) confront distinct challenges and opportunities in the future, but they also share many of the same problems. U.S. airlines operating international routes fly domestically as well. Though regional airlines are different companies, they exist in a symbiotic relationship with the domestic and international carriers. Indeed, this year's regional airline panel suggested that an airline operating under the code, name, and market presence of another carrier should be considered a regional airline. Because of the interdependence among the categories of air carriers, the panels at this year's Future of Aviation Workshop met initially as a group to discuss common concerns, issues, and linkages.

In dramatic contrast to the workshop held two years ago, all categories of air carrier categories are now reporting robust profits. This marks a welcome reversal from the past ten years and more, during which airlines suffered significant financial losses.

Despite their recovering economic health, all air carriers face continuing problems in the areas of government policy, labor unrest, industry transformations, and changes in business travel demand. Government policies present challenges to the airline industry, particularly with regard to fuel taxes, which continue to rise despite specific recommendations last year by the Commission to Insure a Safe and Competitive Airline Industry that they be lowered to help the airlines remain competitive. Federal funding for airports has slowed dramatically, putting pressure on airports to impose higher facility user fees. Recent years have seen increases in airport fees at rates higher than inflation. Labor, cognizant of the financial turnaround in the industry, is eager to gain from the increased cash flowing into corporate coffers. Several major airline industry contracts will need to be negotiated over the next few years, and labor can be expected to demand increases in salaries and benefits. Ticketing operations are undergoing a transformation. The transition to "ticketless travel" is predicted to save nearly $8 per passenger in paper handling costs. Expanding computer-based ticketing is also expected to decrease costs as individuals make their own travel arrangements and cut out the middleman — the travel agent. Airlines are also likely to move more aggressively to conclude special marketing agreements with large corporations for business travel discounts to compete for business travel demand that is expected to slow over the next several years. Advances in telecommunications will eventually facilitate and lower the costs of meetings and negotiations that now require face-to-face interaction. No one believes telecommunications will displace air travel in the near future, rather it is likely to nibble on the edges of demand over time. Business travel has been targeted by corporations as a likely place to cut budgets in these times of financial constraint.

U.S. DOMESTIC AVIATION

For domestic U.S. airlines to remain profitable, it is critical that they keep operational costs low, while continuing to cut them even further. To date, they have succeeded largely by eliminating unprofitable hubs and spinning off unprofitable routes to their regional partners. They have been relatively effective at practicing restraint and avoiding the devastating fare wars so common in the years following deregulation. Domestic airlines will have to continue in these efforts. Perhaps their largest challenge will be in their negotiations with labor.

Domestic airlines fall into four categories: megacarriers with multiple hubs and international route systems, second-tier majors with more narrowly focused route systems, high-frequency low-cost airlines such as Southwest, and low-frequency low-cost airlines such as Kiwi. The panel predicted that the second-tier majors are most vulnerable to challenges from players in the other three categories. Hence, consolidation within this sector is likely over the next few years.

Overall, domestic air travel is expected to increase 2 to 3 percent faster than the Gross Domestic Product (GDP) in the United States.

INTERNATIONAL AVIATION

Tracking developments in international aviation has been hindered in the past by lack of comprehensive data. Until recently, the Federal Aviation Administration (FAA) collected data only on the international activity of U.S. carriers. As transnational airline alliances and code-sharing arrangements proliferate, the boundary between domestic and international air carrier activity has blurred. Henceforth, FAA will collect and analyze data on all international activity (to and from the United States) by all carriers. This should facilitate more

accurate predictions about future trends and traffic patterns.

The panel identified four major market areas: U.S.-Canada, U.S.-Atlantic, U.S.-South and Central America, and U.S.-Pacific Rim. Traffic between Canada and the United States has skyrocketed since the initial steps toward liberalizing the market were taken. An open skies agreement between the United States and Canada is anticipated and will likely result in another leap in traffic. Afterwards, traffic is expected to grow more slowly but steadily.

Transnational alliances and code-sharing arrangements among airlines are most prevalent in the U.S.-Atlantic market. To be more attractive as potential partners and to be more competitive in the increasingly liberal markets of the Atlantic, European airlines have reduced operating costs dramatically. As a result, traffic has risen significantly. It appears that, when routes are rationalized after formation of partnerships, U.S. carriers leave the transatlantic routes to their European partners and redeploy their own capacity domestically.

Despite predictions for steadily increasing traffic in the Pacific Rim over the past several years, activity in this market remains fairly constant. Hence, most Asian carriers are concentrating on intra-asian traffic and not pursuing partnerships with U.S. carriers. Political obstacles still affect traffic and carrier activity in this part of the world. Japan is seeking a new bilateral air transport agreement more favorable to its carriers. This region has resisted the move to liberalization, and Asian states still participate actively in route decisions.

Traffic within the U.S.- South and Central American market continues to be sporadic, with most traffic flying to the Caribbean and Mexico.

The rapid proliferation of a variety of transnational airline alliances remains the most significant factor affecting international aviation activity. Alliances allow airlines to take advantage of economies of density and scope to increase market share and/or yield. Recent events suggest that transnational alliances may also lead to greater concentration at U.S. hubs. It also appears that foreign airlines are shifting routes away from traditional U.S. gateways to the hubs of their partner carriers. When allied airlines seek antitrust immunity, the Department of Transportation gives careful consideration to whether the carriers operating as a single firm will have an untoward affect on prices in the market. The determining factor seems to be whether or not the country where the foreign airline is headquartered has an open skies agreement with the United States. If they do, immunity is typically granted.

REGIONAL AVIATION

Regional airlines continue to expand at a dizzying rate. Traffic has consistently grown at double-digit rates over the past two decades. The continued success of regional airlines is inextricably tied to that of their major airline marketing partners. Any change in major airline operating structure affects regional carriers. Perhaps the most important change in the operating structure of major airlines is the transfer of unprofitable routes to regional partners. Since most regional airlines currently enjoy lower operational costs, they are able to fly most of these routes profitably. Some concern was expressed about whether the increased load factors recently experienced by the majors decreases the value of feeder traffic from regional partners.

In addition to adapting to the needs of major carriers, regional airlines have been affected by technological advances in fleet aircraft and a government policy unique to the regionals. Specifically, the regional airline fleet now operates much larger aircraft than ever before (turboprop aircraft with over 60 seats and jets with up to 100 seats) while moving away from the use of 19-seat aircraft. The new fleets allow regional airlines to operate efficiently the routes discarded by the majors. A proposed new government policy (the single safety standard) promises to have a dramatic affect on regional airlines. The new rule, which goes into effect by the end of 1996, will require regional carriers to have en route communications, dispatchers, new record-keeping procedures, and increased initial operating experience and more extensive training of pilots.

Perhaps most interesting was the panel's discussion regarding the definition of regional airlines. The participants agreed that the current working definition used by FAA is no longer relevant to the activities of the regionals. They suggested a new working definition for regional carriers: "airlines that predominately operate aircraft with fewer than 100 seats and/or those that have the primary role of affiliate with another carrier."

Overall, regional airline traffic is expected to grow over the next few years at a rate much slower than in the past.

AIRCRAFT AND ENGINE MANUFACTURERS

For aircraft and engine manufacturers not a lot has changed since the last workshop two years ago. The consensus forecast remains at roughly 4.9 percent average annual traffic growth for the next 15 years, resulting in demand that will be more than double the

present level by 2010. During this same time period, average load factor is expected to increase from 67 percent to 69 percent.

Even the questions about forecast accuracy remain much the same. Uncertainty remains with respect to the continued validity of linking traffic growth predictions to GDP growth. In addition, the panel did not have great confidence in the forecasts of aircraft retirements. The assumptions commonly used have not generated accurate forecasts.

Factors that are expected to affect traffic (and hence demand for aircraft and engines) include congestion and its potential to limit aircraft movements, emerging markets particularly in the former Soviet Union bloc of nations and mainland China, persistent environmental concerns, and fragmentation on long-haul routes leading to the supplanting of large widebodies, such as the Boeing 747, by the Boeing 767 on transoceanic flights.

The panel's consensus forecast predicted 12,500 aircraft deliveries over the next 15 years. Despite concerns about their ability to forecast retirements accurately, the panel agreed that roughly 5,500 retirements will occur over this time period. As always, manufacturer activity is dependent upon airline activity and ability to buy.

AVIATION INFRASTRUCTURE

The panel focussed on seven issues likely to influence changes in the aviation infrastructure in the future. First, the panel considered access to capital needed for airport rehabilitation and expansion and concluded that larger airports are more likely to have access to enough capital in the near future, with midsize and smaller airports facing serious shortages, while the smallest airports will face severe economic and financial difficulties. Again government policies will play an important role. In particular, the Airport Improvement Program and changes in the Air Navigation System (ANS) will be critical. The panel expressed concern about the use of tax-exempt bonds to raise capital, since they can perversely drive out private investment. Second, the panel discussed technologies related to new ANS, new large aircraft, common-use terminal facilities, and intermodal technologies. Of these, the most promising are advances in ANS technologies, particularly the Global Positioning System (GPS), and common-use terminal facilities. New large aircraft would increase capacity gains but generate a new set of problems with respect to peaking and landside capacity. Intermodalism, popular and effective in Europe, is hindered in the United States by the need for large investments to make intermodal connections worthwhile. Third, institutional change (defined as fundamental changes in organization structure, ownership or financing) was seen as critical to improving capacity. Specifically, changes in ANS organization, procedures and capital access together with changes in tax treatment of airport investment were identified as necessary to facilitate important changes over the next 15 years. Fourth, the panel discussed the need for improved, market-focused, economic mechanisms to improve airport infrastructure development. More policy analysis with respect to the value and the outcomes of employing market-pricing mechanisms was desired. Fifth, commercial airline activity related to de-hubbing was seen as having the greatest impact on airport capacity and survival. Sixth, specific infrastructure concerns were identified, including land and groundside capacity, additional security demands, the trend to expanded airport concessions, and limits to multiple use of airport terminals. Finally, the panel was concerned, as were the experts on the manufacturers panel, with continuing environmental issues.

BUSINESS AVIATION

At the start of the workshop the business aviation panel held a plenary session attended by top-ranking executives from various sectors of the industry who discussed the key problems and issues facing business aviation. The topics defined in this executive session served as a guide to the workshop that followed.

The early 1990s were a difficult period for business aviation. The outlook now, however, is brighter; and the market is currently in the midst of a transition period with several new light, medium, and heavy jets entering service or under development. Like nearly every other segment of the aerospace industry, the business aircraft market has too many competitors, some with broad product lines and others with only one product. Market dynamics and success criteria dictate, at least for business jets, that a company must offer either one superior product or a family of related products to survive and grow. The business aircraft market is currently concentrated in the hands of five companies. All others are playing either at the margins or in special niches with one or two products. These marginal and niche firms could eventually succumb to the competitive power of those with more complete product lines that can fill nearly every business user's needs.

Although problems in the world's industrial economics have depressed sales levels, the market for business aircraft is sound. The remainder of the 1990s

should see volume production of several new aircraft. Further consolidation of the industry is also possible, although the industry is healthy enough to forestall the rapid consolidation seen in the defense industry.

Even so, the outlook is not entirely positive, and there are factors that could have a negative impact on business aviation. These include airport access and local noise regulations, air traffic control standardization in Europe, rising landing fees in Europe and North America, and high-density rules at major slot-restricted U.S. airports. Air traffic control standardization must accelerate for international business aircraft travel to expand. The current multiplicity of ATC systems effectively inhibits business aircraft flights to and from many nations in Asia and Europe.

VERTICAL FLIGHT

The overall growth of vertical flight activities is expected to be slight over the next 10 years. The panel believed that the growth in fleet size and hours flown will be less than FAA currently forecasts. All operating sectors are expected to continue the rather flat current trend. The most promising sector is emergency medical service (EMS).

On the supply side there is a sharp contrast to the protracted doldrums of recent years. The market over the past year has seen an increases in announcements of new helicopter models and derivatives. Manufacturers are attempting to stimulate market demand by introducing new designs or improved versions of existing designs to enhance the overall market appeal of their product lines. Competition in the commercial helicopter segment can be expected to intensify in the future.

One of the clear trends in the commercial segment is a marked shift to multiengine rotorcraft. Light and intermediate twins, while considerably more expensive than their single-engine counterparts, continue to increase their market share as operators demand better performance and safety. Another trend already apparent in the vertical flight market is collaboration and cooperation between Russian helicopter manufacturers and Western firms.

Two areas of concern identified by the panel were the use of bogus parts and the release of used military helicopters into the civil marketplace. The controversy surrounding the U.S. Army plan to offer nearly 3,000 surplus helicopters for resale continues to simmer. For the near term, at least, the Army has indicated that it will probably hold the retired aircraft until the issue is resolved. The projected growth in new aircraft deliveries over the next 10 years is considerably less pronounced than the projected growth in the value of the vehicles produced. This is due to the increase in the number of relatively expensive models and the growing market share of multiengine turbine helicopters.

LIGHT GENERAL AND PERSONAL AVIATION

Since the last Future of Aviation Workshop in 1993, the U.S. Congress enacted the General Aviation Revitalization Act. As a result, manufacturers announced plans to produce updated single-engine aircraft. In early 1995 the first executive council meeting of the Advanced General Aviation Transport Experiments (AGATE) project was held. The AGATE project is a joint effort involving NASA, FAA, industry, and academia with the stated aim of developing and proving technologies to modernize and enhance general aviation aircraft and support systems. Nearly three dozen companies have been added to the AGATE consortium since its inception in 1994. Initially the team plans to address integrated cockpit systems, icing protection systems, propulsion sensors and controls, and integrated design and manufacturing techniques. Another area that manufacturers believe requires attention is general aviation powerplants. There is a need for new engines designed for multifuel operation and more environmentally friendly performance (low noise and cleaner emissions).

In recent years the view has often been expressed that only with a quantum leap in aircraft manufacturing and engine technology would the market have any chance of major growth. Independent studies have repeatedly shown that there has been, and continues to be, pent-up demand for inexpensive light single-engine piston aircraft with engines delivering between 150 and 300 horsepower. The demand has never been quantified with any degree of confidence because there are too few aircraft types to choose from at the appropriate price.

An important factor that must be considered is that the general population is undergoing a fundamental change in tastes and preferences. This change is reflected in the steady decline in new pilot starts and the total pilot population over the past 10 years and more.

If the industry is to recover and grow, it must do a better job of marketing and promotion. If people are not attracted to flying, improvements such reduced aircraft prices, lower operating costs, advanced engines and avionics, better training facilities, and general economic growth may not be sufficient to revive the market.

A CALM BETWEEN STORMS

Christopher Mills
DRI-McGraw Hill

In putting this presentation together, my colleagues and I wrestled with a title that summed up how we see the world economy at the current time. During the first half of 1995 the world economy was in turmoil. More recently the storms have died down, and the picture now looks more calm. However, this is only temporary, and there are sure to be new upsets and new storms — if not this year then next. Therefore, we decided the situation was best described as a calm between the storms.

REVIEW OF ECONOMIC PROBLEMS IN 1995

Let me start by reviewing of some of the happenings in the first half of 1995 that caused turmoil in the world economy and upsets in world financial markets. The year started with the collapse of the Mexican peso, which began at the end of December 1994 and unrolled throughout the first quarter of 1995, causing both considerable damage to the Mexican economy and severe strains in world financial markets.

In the first quarter of this year there was a major earthquake in Kobe, Japan, that caused ripples in the world's financial markets and ongoing problems that plague the Japanese economy to this day. Early 1995 also saw a period of free fall, or what appeared to be free fall, of the U.S. dollar against other major currencies, notably the German deutschemark and the Japanese yen. This set off a series of reverberations in European currency markets. Some European currencies, particularly the Swedish krona and the Italian lira, were very badly hit by investors' fears about the global financial situation. The strong value of the yen during early 1995 contributed to persisting financial problems in Japan by raising the cost of Japanese products in world markets.

With the exception of Japan, the general world picture has become calmer than it was in the first half of the year. The dollar has made a satisfying recovery in the last few months, not only against the deutschemark and the yen, but also against a wide range of other currencies. The Mexican situation, while still problematic, is improving. The value of the peso has stabilized, Mexico is returning to international markets to borrow funds, and the slump in the economy appears to have bottomed out. European financial markets have stabilized as well, and a level of confidence has returned to some of the high-risk markets such as Italy and Sweden in the past two or three months. This has had a general encouraging effect on financial markets and exchange rates throughout Europe.

At least in part, recent global financial jitters are due to anxiety about low levels of savings in industrial countries and Latin America (Figure 1). Low levels of savings put pressure on global capital markets during 1994 and continuing into the early part of 1995. This pressure caused substantial increase in global bond yields and set the scene for many of the problems that have unfolded this year.

These problems were made worse by a general lack of confidence in the macroeconomic policies of key countries — not just emerging markets but major industrial countries as well, including the United States. During 1994, and early 1995, confidence in the ability of the Federal Reserve Board to manage the U.S. economy was very low indeed. It appeared that the Fed could really do no right as far as the financial markets were concerned. Every time the Fed raised interest rates, the financial markets sold off the dollar, believing that the Fed had basically lost control of the situation.

In retrospect, those fears appear to have been exaggerated, but financial markets and investors remain uneasy with the situation in many places throughout the world. In Canada, for example, there has been a loss of confidence in Canadian fiscal policy. The Canadian Government continues to run very large budget deficits, and there is ongoing concern about the separatist movement in Quebec. Hopes are that the October 1995 referendum on independence for Quebec will be defeated, but in the meantime Canada has been paying quite a high price in terms of risk premium that investors are demanding to hold Canadian assets.

In Italy and Sweden, the problems mentioned earlier have led to investor concerns about control over fiscal policy. Several other European countries where there have been very loose fiscal policies in the last two years also suffer the same problem to some degree. In a global environment where interest rates have risen sharply since 1994, investors have become worried about the sustainability of high levels of government and private borrowing.

In France, the concern is different. The French policy of pegging the franc against the German deutschemark has proved unsustainable in the face of

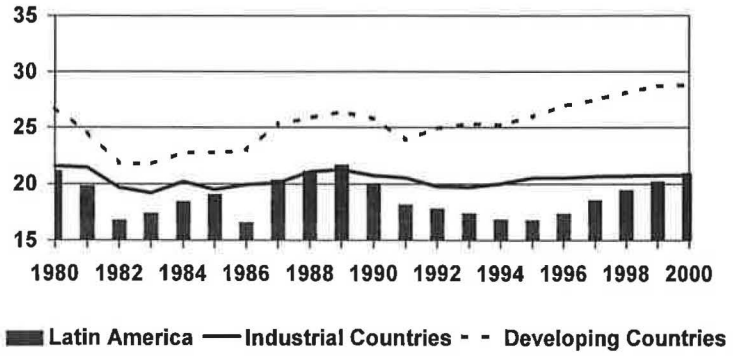

FIGURE 1 National saving rates for industrial and developing countries, 1980–2000.

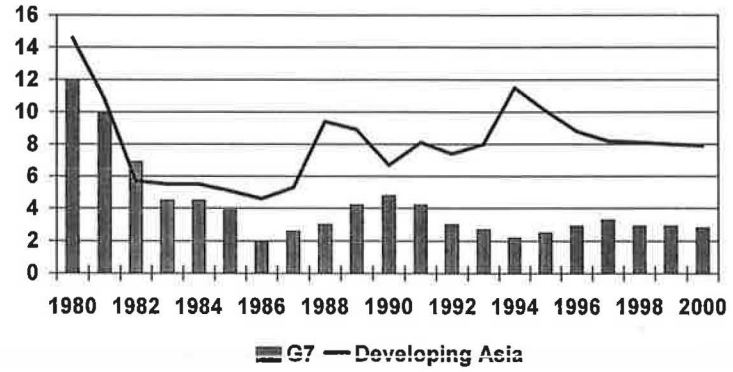

FIGURE 2 G7 and Asian inflation rates (CPI), 1980–2000.

very low economic growth and rising unemployment that have created serious social and political unrest. Here, too, it appears that fears have been overstated, and the situation seems to have improved in recent months.

The good news is that financial crises do not usually cause recessions. For evidence of this, look back to the U.S. economic situation in 1987, when there was a major shakeout in the equity market both here and abroad. As it turned out, the impact of that financial crisis on the U.S. economy and on other major industrial nations was very limited. The causality the other way around is much stronger. Financial turmoil is closely associated with a recession, but it is economic problems that are causing financial turmoil, not vice versa. A clear case of that is Mexico, which got itself into a very difficult economic and political situation in 1994 that triggered a financial crisis.

This is good news because it implies that world economic growth is unlikely to be hurt seriously by financial disturbances in the near future. Inflation remains low in most regions of the world and long-term bond rates have been falling in recent months (Figure 2).

SHORT-TERM OUTLOOK

The U.S. economy is likely to grow at around 2.5 percent in 1995. While this is not a particularly high figure, it is nowhere near the recession that many feared earlier in the year. The European economy is likely to grow at around three percent, or perhaps a little below, in 1995 , with similar performance expected in 1996. This is quite encouraging, given Europe's relatively lackluster performance in recent years.

Japan is the only major industrial country with really serious problems now. The Japanese economy will probably show zero growth at best this year, and it is unlikely to see growth as high as two percent in 1996, even if the yen remains around current levels. If the yen holds at the current rate of 80 to the dollar, 1996 could be another year of zero growth in Japan.

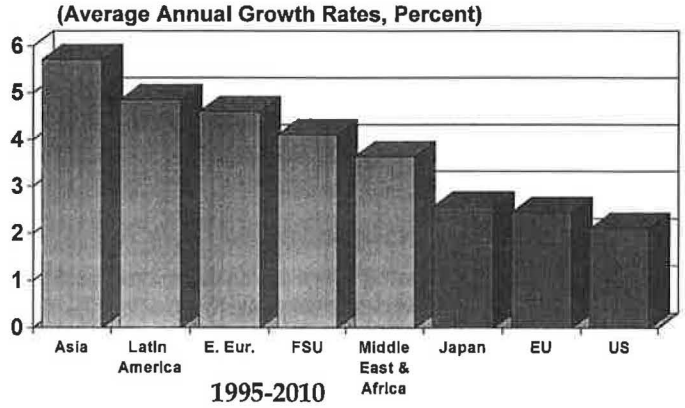

FIGURE 3 DRI forecasts of growth in emerging markets.

Despite the problems in the Japanese economy, DRI's forecast is that the major industrial economies as a whole will grow at the rate of 2.5 percent this year and next. These are not outstanding growth figures, but it is perfectly respectable performance and not one that should not cause concern to most businesses.

For the short term, and for the long term as we will see later, it is the developing countries that will show the most rapid growth. Despite the problems in Mexico and other parts of Latin America, developing countries overall are likely to grow by an average of about five percent in 1995 and 1996, i.e., twice as fast as the major industrial economies.

LONG-TERM OUTLOOK — 1995 TO 2010

It is long-term developments that really drive business prospects in many economic sectors. This is particularly true in the aviation industry. Figure 3 summarizes the DRI forecasts for average annual economic growth rates in different regions over the next 15 years. The most evident point is the extent to which the emerging markets, particularly in Asia, are going to outperform the major industrial countries over the long term. There are two major reasons this conclusion: production capacity and risk.

Production Capacity

To assess long-term growth prospects it is necessary to analyze supply. Demand is important in determining the performance of an economy in the short term; but when looking at the long term, what matters in economic performance is the ability of the economy to increase capacity, the amount that it can produce.

In economic terms, production capacity depends on several factors. Labor supply, the number of people available to work in an economy, is of obvious importance. In the major industrial economies, labor supply is growing quite slowly in most cases because the population is growing quite slowly as well. In fact, in some European countries and in Japan, population growth is essentially zero, and it will become negative by 2010.

Equally important is the growth in the capital stock: the tools, machinery, equipment, and plant available for workers to use. Major industrial countries have quite low levels of investment. This is particularly true in the United States where only around 15 percent of total output is plowed back in for investment, but it is generally true across the board in industrial countries.

Finally, there is the technology used by labor and capital in order to produce. Oftentimes in major industrial nations, and in the United States in particular, technology has to be created before it can be introduced. Emerging markets, on the other hand, can essentially copy technologies that have already been developed elsewhere and gain quantum leaps in productivity. In the United States most technological improvements have to be researched and developed before they can be introduced. Moreover, the pace at which they can be introduced is held back by the fact that investment is relatively low. Technology is embedded in capital in the sense that a new software program or a new kind of machine tool cannot be used until computers have been purchased and factories built to house the new machinery.

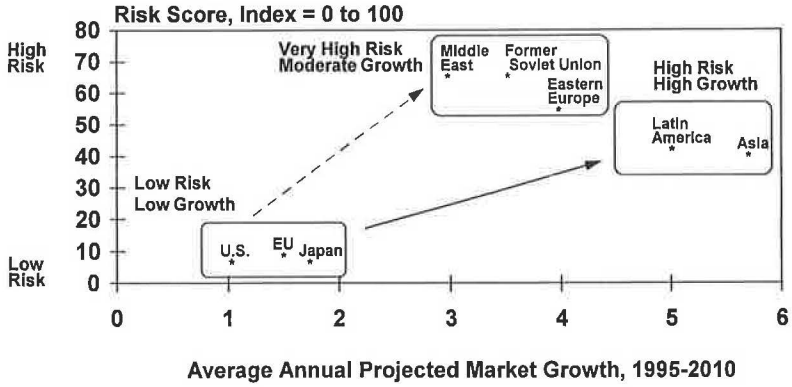

FIGURE 4 Risk-reward trade-offs by region.

If the factors determining the long-term growth prospects just mentioned are applied to Asia, it is clear why Asian economies can continue to grow much more rapidly than highly industrialized countries. Population in Asia is growing much more rapidly, and there is an adequate labor supply. Investment is continuing at much higher rates than in the west. In most Asian countries investment is running around a third of GDP, and in some countries it is approaching half of GDP, which is a figure difficult to comprehend. But what it means is that half the total production of the economy is being plowed back into new investment, new infrastructure, new buildings, and new equipment.

These countries are able to apply technologies that already exist to gain quantum leaps in productivity; and with very high rates of investment, those new technologies can be introduced very rapidly.

These factors allow Asian economies like China and Singapore to grow at around 10 percent a year and to sustain this rate for perhaps the next 15 years. Obviously, there are good performers and bad performers, but the Asian economies as a whole can reasonably be expected to grow at roughly six percent per year through to 2010.

Risk

Emerging markets are a mixture of opportunities and risks. The opportunities are quite clear. One, just mentioned, is much more rapid market growth. Many companies are looking at emerging markets as low-cost production centers. Fund and portfolio managers see emerging markets as sources of high return on investment.

On the other hand, all of these opportunities have risks attached — risks that have been driven home by events such as those in Mexico and Latin America during the past year. Growth can be high, but can also be volatile from year to year. Abrupt economic swings can matter greatly to some businesses, and perhaps not so much to others. In emerging markets one must always expect the risks of fluctuating exchange rates and inflationary surges.

Political risk is an important factor in emerging markets. The sanctity of contracts and the rule of law do not mean much in many emerging markets. Companies that are used to working in such countries know this full well, but those less familiar with the political climate find unpleasant surprises when they move into emerging markets. Even the most experienced firms have come to expect a much riskier and more difficult business climate than those of the United States, Western Europe, and other familiar markets

Traditionally, DRI's business has been forecasting opportunities and market growth. Because of the increasing interest in emerging markets and the higher level of risk associated with them, DRI has put more effort into risk analysis. While DRI has always done a certain amount of risk analysis, extra attention is now being given to systematizing the analysis of risk and providing the results to clients on a regular basis.

RISK ANALYSIS BY REGION

The following is a presentation of preliminary results of the type of analysis DRI is undertaking. Figure 4 is a

- ❑ **Territorial Disputes and the Potential for Military Conflicts**
- ❑ **Political and Leadership Transitions**
- ❑ **Overheating Economies**
- ❑ **Infrastructure and Labor Market Constraints**
- ❑ **High Foreign Debt Levels**
- ❑ **Anti-Western Undercurrents**
- ❑ **Corrupt, Capricious Bureaucracies**
- ❑ **Thin, Volatile Financial Markets**

FIGURE 5 Risk profile: Asia.

- ❑ ***Tequila* Effect Still Hurting**
- ❑ **Overvalued Exchange Rates**
- ❑ **Vulnerability to International Capital Flows**
- ❑ **High Levels of Poverty**
- ❑ **Slow Progress on Political Reform**
- ❑ **Poor Infrastructure Hurts Competitiveness**
- ❑ **Culture of Corruption/Nepotism**
- ❑ **Narco-Terrorism Still a Problem**
- ❑ **Strong Populist Tendencies**
- ❑ **Dependence on Commodity Exports**

FIGURE 6 Risk profile: Latin America.

graph that compares opportunity, the growth in markets, on the horizontal axis, with aggregate measures of risk in different economic regions of the world.

One conclusion is obvious. The United States, the European Union (EU), and Japan are low-growth markets, but they are also relatively low-risk markets. Looking at Asia and Latin America, one sees much higher growth. However, firms doing business in these markets must also accept, on average, a higher level of economic and political risk.

What is perhaps less intuitive, when looking at other emerging regions such as the Middle East, Africa, the former Soviet Union, and Eastern Europe, is a much worse tradeoff between risk and reward in comparison to Asia and Latin America. The Middle East and Africa exhibit particularly high levels of risk, and they do not have the growth opportunities to be found in Asia and Latin America.

Given below are summary risk profiles by region. The focus is on emerging markets, where risks are highest. This is not to imply that North America is a riskless market; clearly it is not. Nor is it the case in Europe, and certainly not in Japan. All markets have some degree of risk, but it is relatively lower in the mature economies of advanced industrial nations.

Asia

See Figure 5. One key risk not found in the major industrial countries but one that must be reckoned with in Asia is territorial disputes and potential military conflicts. The continuing contention between the Peoples Republic of China (PRC) and Taiwan or the long-standing enmity between North and South Korea are two familiar examples. The takeover of Hong Kong by the PRC in 1997 is also a source of concern. The India-Pakistan situation has been simmering for 50 years, and the fragile peace in this area could break down at anytime.

- ❑ **Painful Effects of Economic Transformation**
- ❑ **Ethnic Wars/Aggressive Nationalism**
- ❑ **The Ugly Face of Capitalism**
  - ◆ **Crime**
  - ◆ **Corruption**
  - ◆ **Monopolies**
- ❑ **Lack of Political Stability due to Primitive Democratic Institutions**
- ❑ **Financial Volatility Because of Embryonic Market Structure**

FIGURE 7 Risk profile: Central and Eastern Europe.

- ❑ **Extreme Levels of Poverty and Illiteracy**
- ❑ **High Levels of Political Instability**
- ❑ **Ethnic/Religious/Tribal Wars**
- ❑ **Islamic Fundamentalism**
- ❑ **AIDS Epidemic (Sub-Saharan Africa)**
- ❑ **Fragile Economies**
- ❑ **Poor Macroeconomic Policies**
- ❑ **Dependence on Commodity Exports**
- ❑ **Restrictive Capital Markets**

FIGURE 8 Risk profile: The Middle East and Africa.

There are political issues and questions of leadership transition in several Asian countries. The PRC is a case in point. India's unstable democracy provides another instance of political risk. There are political problems in Thailand, where the military has been making threatening noises since the new government was elected. In Pakistan, Prime Minister Bhutto is in serious danger of being dislodged, and serious political upheaval or even armed conflict could result.

Several Asian economies have the potential to grow rapidly, but some have been growing too rapidly in recent years for the government to cope with, and their economies are seriously overheated. Here again, the PRC is a case in point. Too rapid growth means that there are underlying infrastructure constraints and shortages in the labor market — conditions that make it more difficult to do business. The traffic congestion in Bangkok is well-known for the cost it imposes on businesses in Thailand. This is a prime example of how inadequate infrastructure inhibits the ability of an economy to produce.

High levels of foreign debt are a problem in some Asian countries, although by no means as serious a problem as we see in Latin America. Indonesia, Malaysia, and the Philippines all have seriously high levels of foreign debt that expose them to financial risk and the danger of a declining exchange rate in due course. There are anti-Western undercurrents in many Asian economies; and, if anything, they have become stronger in the last few years as economic confidence and power have grown in the region.

Corrupt and capricious bureaucrats whose actions add cost and risk to doing business can be found everywhere. They are certainly well in evidence in Asia. Thin, volatile financial markets are another risk, particularly for portfolio investors and the managers of financial operations in manufacturing companies.

Nonetheless, DRI considers Asia a less risky region in which to do business than other emerging markets.

Latin America

See Figure 6. The Mexican crisis has had an effect throughout Latin America. The so-called "tequila effect", the hangover from recent Mexican economic and financial problems, continues to hurt other Latin American economies. Overvalued exchange rates present problems, particularly in Brazil and Argentina. Both these economies are vulnerable to changes in capital flows. They need to attract foreign investment and finance external deficits. Their overvalued currencies jeopardize the flow of capital.

Latin America has a host of other problems — high levels of poverty, need for political reform, inadequate infrastructure, and political corruption. Terrorism, either politically inspired or the result of drug trafficking in northern countries such as Peru, Colombia, and Venezuela. The political structure tends to favor populist regimes. Many Latin American economies have a high dependence on commodity exports. Even a country such as Chile, which is relatively well-run and has low risks for business, depends heavily on exports of copper and other raw materials or agricultural products that make it vulnerable to swings in the commodities markets.

Central and Eastern Europe

Central and Eastern Europe, including the Confederation of Independent States (CIS) face a different set of problems as the region makes the transition from a planned to a free-market economy (Figure 7). The effects of this transition are very painful, not the least of which are civil warfare and armed secessionist movements. Many countries in the region have an ugly, Wild West, kind of capitalism that makes the prospects of doing business extremely problematic. Lack of political stability, due to a lack of democratic tradition, is an endemic problem almost throughout the region, perhaps with the exception of the Czech Republic, where there is a history of democracy and economic enterprise that has made possible a stable transition. Many countries suffer from financial volatility because their market structures are embryonic and have not been properly developed or tested.

The Middle East and Africa

The Middle East and Africa are the nadir as far as risk analysis goes (Figure 8). Nearly every problem imaginable can be found in the region, it is a very high-risk (and to a large extent unprofitable) place to do business. This is not to say that particular countries and particular industries do not offer exciting market opportunities. There are bright spots, but the overall picture is not inviting.

RISK ANALYSIS OF SELECTED COUNTRIES

The product of DRI risk analysis can be provided to clients in several forms. One is an aggregated risk profile by region, such as those presented above. The regional profiles can be disaggregated country by country for detailed comparison within a region or among countries in different regions. (DRI is in the process of preparing individual risk profiles for 175 countries around the world.) A further level of disaggregation can be made to pinpoint various sources of risk (financial, economic, political) and specific investment or business concerns. An example of this disaggregated risk analysis is shown in Figure 9.

Seven countries have been selected here for comparison of the types of risk that exporters may face in specific foreign markets — Brazil, Greece, Japan Taiwan, Thailand, Turkey, and the United States. For each type of risk, the calculated risk scores (0 = least risky, 100 = most risky) of each country are arrayed.

In this example, Brazil is the most risky of the seven selected export markets. There are several reasons for this conclusion. One of the key risks that exporters face is that the market could shrink due to economic problems that reduce the ability of customers in that country to buy the exporter's product. This is a serious risk in Brazil at this time. The Brazilian economy appears to be slowing down after a period of rapid growth. There is a real danger that the slowdown could turn into a fullblown recession, particularly if the government encounters financial problems and has to slam on the brakes with a credit squeeze. The situation could be exacerbated if investors lose confidence in the Brazilian market. Exporters' problems could be made much worse if there were a serious decline in Brazilian currency — an occurrence that appears very likely in DRI's assessment.

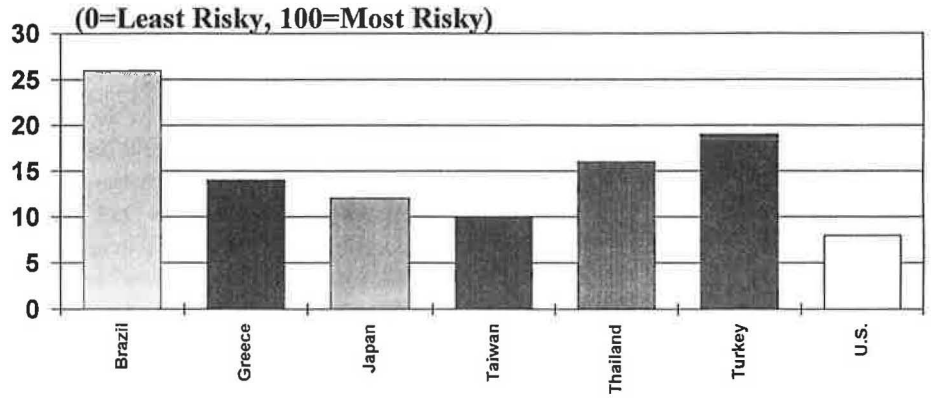

FIGURE 9A Comparison of financial risk.

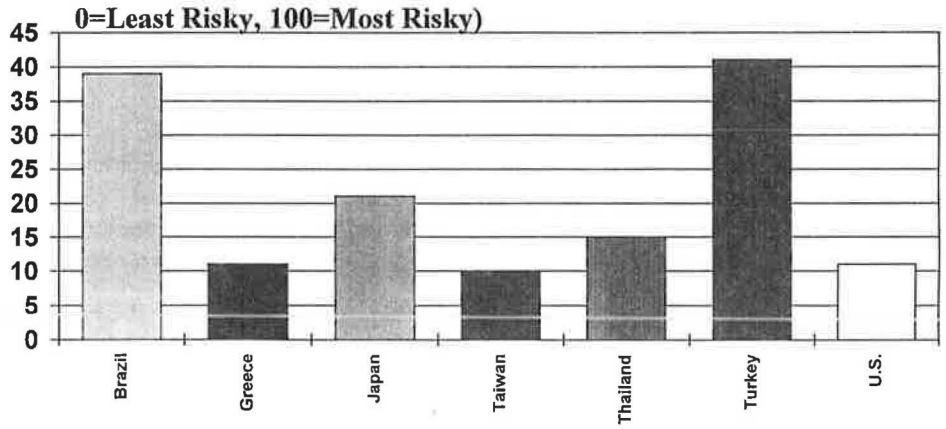

FIGURE 9B Comparison of economic risk.

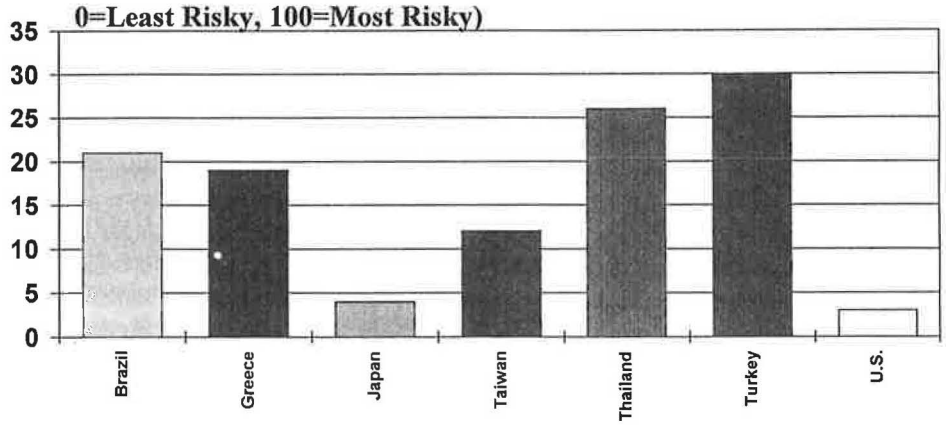

FIGURE 9C Comparison of political risk.

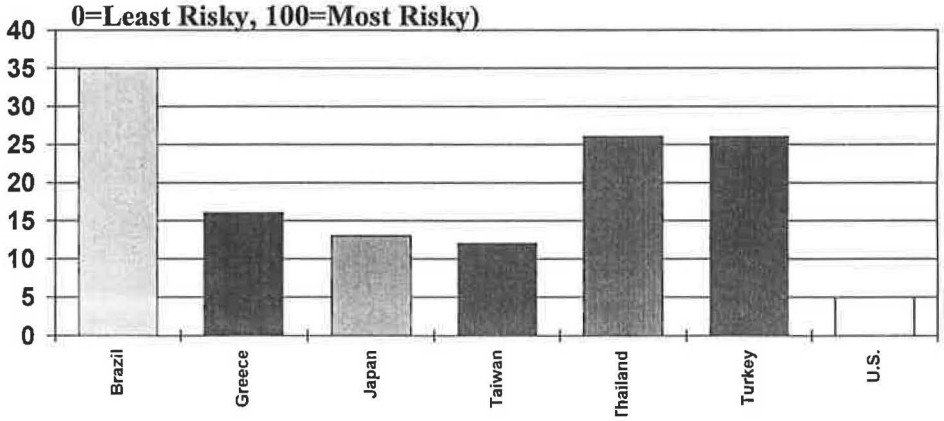

FIGURE 9D Comparison of business risk.

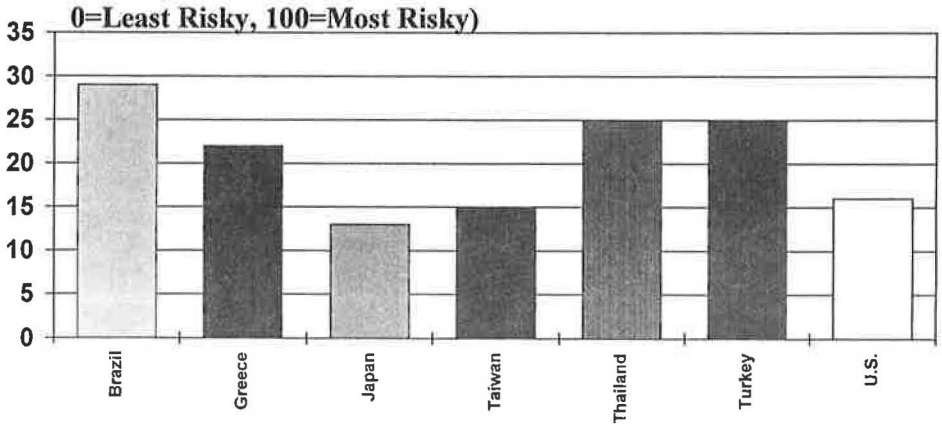

FIGURE 9E Comparison of risk facing portfolio equity investors.

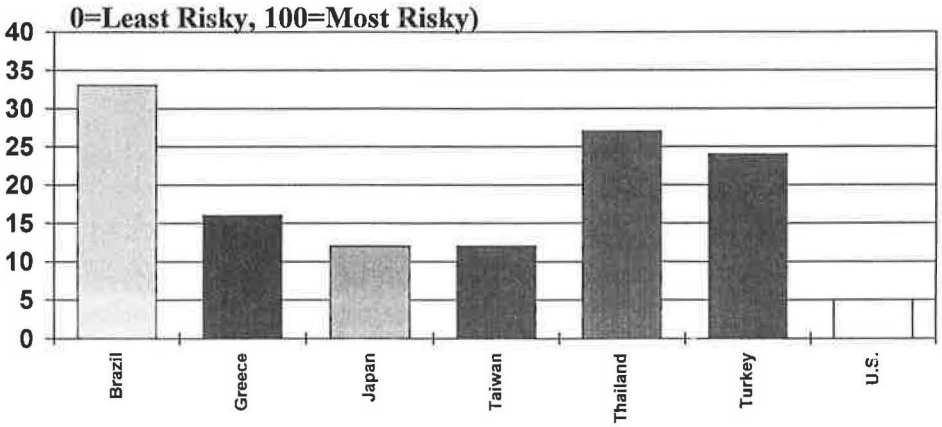

FIGURE 9F Comparison of risk facing direct foreign investors.

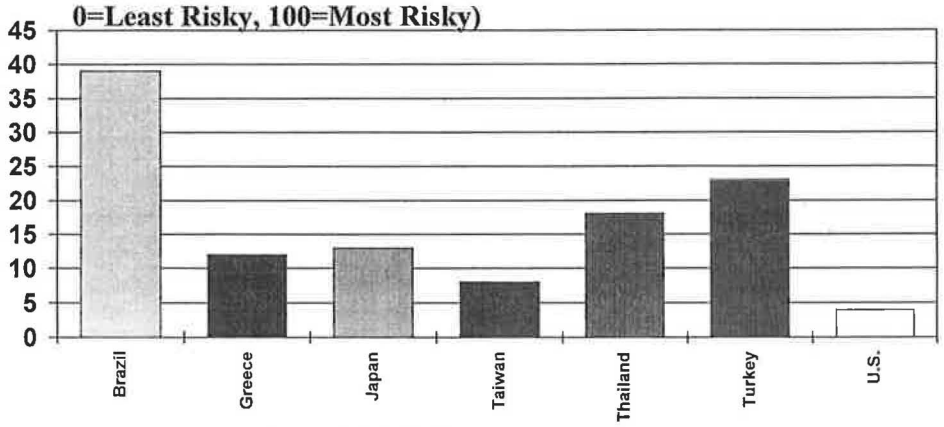

FIGURE 9G Comparison of risk facing exporters.

It has been over a year now since July 1994, when Brazil introduced a new currency (called the *real*) at parity to the dollar. After an initial dip in value, the real recovered and is now slightly stronger than one to the dollar. In nominal terms the exchange rate has not changed very much. However, in the course of the past year, prices and the cost of producing goods in Brazil have risen by 50 percent. As a result, the competitive situation of Brazilian industry (exporters from Brazil and producers trying to sell locally produced goods in the Brazilian market) has deteriorated substantially. This, combined with strong growth in domestic demand, has led to a sharp worsening in Brazil's external trade balance and an increasing trade deficit.

DRI's assessment indicates a very high probability of serious decline in the exchange rate within the next 12 months. This would hit exporters to Brazil very hard if they are not careful to hedge against those risks.

For these reasons, Brazil appears to be a very high-risk export market.

Comparing Brazil to the Taiwanese export market, DRI finds that the latter has risks also. The political and military risks posed by the threat from the PRC cannot be ignored, but the probability of the PRC invading or blockading Taiwan or causing some other problem serious enough to significantly harm exporters to Taiwan is very low, at least on the short-term horizon.

The other components of Taiwan's situation are very favorable. Taiwan has a very strong economy. There is little chance of Taiwan slipping into a recession in the short term. The exchange rate of the Taiwanese dollar remains very robust because it is well supported by the fundamental economics of Taiwan, an external trade surplus, and over $100 billion in foreign exchange reserves. Thus, the risk facing exporters to Taiwan is much lower than it is in Brazil

SUMMARY

1995 started with a series of crises in the global economy, but the situation has calmed somewhat in the last few months. On the other hand, it is fairly sure there will be new upsets either this year or next. It is impossible to forecast exactly what these upsets will be, when they will occur, or where. What we can do is systematically analyze risks in the global economy that may confront businesses and investors and provide information about what could go wrong, the probability of occurrence, and the dangers posed. Detailed risk measures can be combined with traditional analysis of market opportunity to devise strategy for the best risk-reward tradeoffs.

PROSPECTS FOR U.S. MAJOR AIRLINES — 1995 THROUGH 1999

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ESG Aviation Services

I was reminded recently of a story that Robert Benchley told on himself. He was a drama critic in the 1920s; and when he reviewed Abie's Irish Rose, he said it was a flop and would close in weeks. Years later, after setting Broadway records for longevity, it finally did end its run. At that Time Benchley wrote another column saying: "See, I told you it would close!" See, I told you the airlines would make money! The only problem is that I said this three years ago. However, in this forecasting business it is better to be early than late, and most of the reasons cited then are the forces driving the earnings recovery now. The job today is to consider how durable this recovery is likely to be and what is the most probable outlook for the U.S. airline industry over the rest of the decade.

In the 1992 case for an extended period of positive earnings, I pointed out that the most critical relationship characterizing rising or falling operating earnings was the relative percentage change in yield and unit costs. History tells us it is not the size of the change in these two factors that is important; it is just the relationship between them that counts. In quarters when the yield rises more (or falls less) than unit costs, operating earnings increase; and vice versa. The direction of the change in earnings does not correlate well with rising or falling load factors or with the rate of traffic growth. Only the yield/unit cost relationship seems to count.

Since 1979 there have been 66 quarters of operating results. In 35 of them earnings were up, and in 31 they declined. (Table 1) If that surprises you, given all the

TABLE 1 HISTORY OF OPERATING INCOME AND CHANGE IN KEY VARIABLES

Shaded Periods = Improving Earnings | Outlined Periods = Declining Earnings

In Unmarked Periods are Considered to be Neutral as the Total Spread was 1.0 or Less

		Operating Income (000)		Quarterly		Spread I:	Quarterly		Spread II:	Total
Year	Quarter	Quarter	Trailing 12 Quarter	RPM % change	ASM % change	RPM % - ASM %	Yield % change	ASM cost % change	Yield % - Cost %	Spread (I plus II)
1978	Fourth	72,055	1,160,054	16.2	11.2	5.0	(3.1)	1.2	(4.3)	0.7
1979	First	(18,250)	1,048,676	18.0	13.1	4.9	(0.4)	2.1	(2.5)	2.4
	Second	184,266	855,525	11.9	2.7	9.2	0.5	12.9	(12.4)	(3.2)
	Third	86,554	324,625	12.3	13.9	(1.6)	5.6	15.2	(9.6)	(11.2)
	Fourth	(231,325)	21,245	7.2	7.6	(0.4)	15.9	20.3	(4.4)	(4.8)
1980	First	(324,852)	(285,357)	0.0	5.4	(5.4)	27.6	25.0	2.6	(2.8)
	Second	(167,989)	(637,612)	(1.5)	13.2	(14.7)	26.5	16.9	9.6	(5.1)
	Third	180,464	(543,702)	(8.3)	(2.5)	(5.8)	27.6	18.7	8.9	3.1
	Fourth	(21,223)	(333,600)	(7.7)	(6.7)	(1.0)	23.7	18.0	5.7	4.7
1981	First	(156,632)	(165,380)	(10.0)	(6.8)	(3.2)	22.2	14.1	8.1	4.9
	Second	116,696	119,305	(2.8)	(2.6)	(0.2)	16.5	11.6	4.9	4.7
	Third	92,480	31,321	(5.2)	(5.1)	(0.1)	10.4	11.6	(1.2)	(1.3)
	Fourth	(480,992)	(428,448)	(1.3)	(0.2)	(1.1)	2.4	7.6	(5.2)	(6.3)
1982	First	(563,977)	(835,793)	4.5	0.2	4.3	(7.0)	3.1	(10.1)	(5.8)
	Second	126,146	(826,343)	1.7	(0.7)	2.4	(4.4)	(2.0)	(2.4)	0.0
	Third	290,880	(627,943)	2.1	4.3	(2.2)	(1.2)	(5.4)	4.2	2.0
	Fourth	(504,467)	(651,418)	4.1	3.7	0.4	(4.5)	(4.2)	(0.3)	0.1
1983	First	(621,298)	(708,739)	10.4	2.8	7.6	(8.6)	(2.0)	(6.6)	1.0
	Second	76,318	(758,567)	6.4	5.7	0.7	(2.1)	(1.4)	(0.7)	0.0
	Third	528,380	(521,067)	6.9	5.3	1.6	1.4	(0.1)	1.5	3.1
	Fourth	247,793	231,193	6.7	5.3	1.4	6.1	(2.9)	9.0	10.4
1984	First	127,586	980,077	(0.3)	9.8	(10.1)	17.3	(3.0)	20.3	10.2
	Second	758,663	1,662,422	7.2	7.0	0.2	7.1	0.0	7.1	7.3
	Third	846,586	1,980,628	8.7	7.7	1.0	(0.8)	(2.5)	1.7	2.7
	Fourth	335,487	2,068,322	10.2	9.9	0.3	(2.8)	(3.4)	0.6	0.9

TABLE 1 HISTORY OF OPERATING INCOME AND CHANGE IN KEY VARIABLES (continued)

Shaded Periods = Improving Earnings | Outlined Periods = Declining Earnings

In Unmarked Periods are Considered to be Neutral as the Total Spread was 1.0 or Less

Year	Quarter	Operating Income (000) Quarter	Operating Income (000) Trailing 12 Months	Quarterly RPM % change	Quarterly ASM % change	*Spread I:* RPM % Less ASM %	Quarterly Yield % change	Quarterly ASM cost % change	*Spread II:* Yield % Less Cost %	*Total Spread (I plus II)*
1985	First	93,192	2,033,928	13.2	5.7	7.5	(6.2)	0.6	(6.8)	0.7
	Second	710,286	1,985,551	13.7	5.5	8.2	(6.5)	1.6	(8.1)	0.1
	Third	640,872	1,779,837	11.4	9.9	1.5	(5.1)	(1.3)	(3.8)	(2.3)
	Fourth	(229,796)	1,214,554	7.2	9.5	(2.3)	(3.8)	0.8	(4.6)	(6.9)
1986	First	(621,060)	500,302	8.8	10.1	(1.3)	(7.7)	(1.0)	(6.7)	(8.0)
	Second	193,353	(16,631)	4.0	14.4	(10.4)	(7.4)	(10.7)	3.3	(7.1)
	Third	972,293	314,790	10.4	8.5	1.9	(7.5)	(8.7)	1.2	3.1
	Fourth	373,993	918,579	10.5	7.6	2.9	(7.1)	(10.4)	3.3	6.2
1987	First	30,013	1,569,652	11.0	9.1	1.9	(1.8)	(6.8)	5.0	6.9
	Second	872,214	2,248,513	14.5	6.6	7.9	0.8	1.4	(0.6)	7.3
	Third	961,595	2,237,815	9.4	5.3	4.1	4.4	8.5	(4.1)	0.0
	Fourth	(28,379)	1,835,443	6.7	5.3	1.4	7.3	11.0	(3.7)	(2.3)
1988	First	99,473	1,904,903	5.0	5.9	(0.9)	9.1	6.0	3.1	2.2
	Second	964,244	1,996,933	2.1	3.3	(1.2)	10.3	8.0	2.3	1.1
	Third	1,201,156	2,236,494	4.4	3.5	0.9	4.9	4.3	0.6	1.5
	Fourth	350,653	2,615,526	6.9	4.3	2.6	2.7	1.6	1.1	3.7
1989	First	173,171	2,689,224	0.7	0.8	(0.1)	10.6	9.5	1.1	1.0
	Second	953,780	2,678,760	1.0	(0.7)	1.7	6.0	8.7	(2.7)	(1.0)
	Third	666,593	2,144,197	2.6	0.9	1.7	1.5	8.2	(6.7)	(5.0)
	Fourth	(489,131)	1,304,413	4.3	2.9	1.4	0.3	8.9	(8.6)	(7.2)
1990	First	(642,867)	488,375	8.2	6.8	1.4	(1.7)	5.4	(7.1)	(5.7)
	Second	649,837	184,432	7.7	10.1	(2.4)	1.2	1.4	(0.2)	(2.6)
	Third	98,248	(383,913)	7.1	8.8	(1.7)	3.5	6.0	(2.5)	(4.2)
	Fourth	(2,389,374)	(2,284,156)	3.6	5.7	(2.1)	5.8	16.2	(10.4)	(12.5)
1991	First	(1,509,345)	(3,150,634)	(7.9)	(4.1)	(3.8)	3.7	7.8	(4.1)	(7.9)
	Second	(35,224)	(3,835,695)	(2.1)	(3.7)	1.6	(1.6)	6.2	(7.8)	(6.2)
	Third	205,363	(3,728,580)	(0.4)	(1.1)	0.7	0.8	0.5	0.3	1.0
	Fourth	(1,045,906)	(2,385,112)	0.9	(1.4)	2.3	(0.1)	(6.4)	6.3	8.6
1992	First	(453,250)	(1,329,017)	9.1	6.9	2.2	3.6	(4.2)	7.8	10.0
	Second	(615,104)	(1,908,897)	4.7	6.0	(1.3)	(2.1)	(0.2)	(1.9)	(3.2)
	Third	(158,369)	(2,272,629)	10.4	4.3	6.1	(7.6)	1.0	(8.6)	(2.5)
	Fourth	(1,257,562)	(2,484,285)	3.1	4.2	(1.1)	(2.0)	(1.2)	(0.8)	(1.9)
1993	First	(377,583)	(2,408,618)	4.5	2.8	1.7	(1.2)	0.9	(2.1)	(0.4)
	Second	488,554	(1,304,960)	3.0	2.2	0.8	6.5	0.1	6.4	7.2
	Third	1,089,784	(56,807)	(5.5)	0.3	(5.8)	12.7	(1.2)	13.9	8.1
	Fourth	(269,568)	931,187	2.9	(0.6)	3.5	2.6	0.4	2.2	5.7
1994	First	(49,147)	1,259,623	1.8	(2.6)	4.4	(3.1)	0.6	(3.7)	0.7
	Second	624,018	1,395,087	3.1	(1.4)	4.5	(2.8)	1.9	(4.7)	(0.2)
	Third	1,367,979	1,673,282	4.5	(0.6)	5.1	(4.3)	(1.1)	(3.2)	1.9
	Fourth	(229,406)	1,713,444	6.4	2.4	4.0	(5.3)	(1.9)	(3.4)	0.6
1995	First	336,109	2,098,700	5.6	3.7	1.9	(3.6)	(4.6)	1.0	2.9
	Second	1,865,877	3,340,559	4.0	1.7	2.3	1.7	(3.9)	5.6	7.9
	Third									
	Fourth									

negative words about airline profitability in recent years, it may also come as a surprise to know that 40 of those 66 quarters were profitable, while 26 had an operating loss. Of course, nine of those loss quarters came between the fourth quarter of 1990 and the first quarter of 1993, and several of them were by far the worst the

industry has ever had. Recent events always tend to stand out in our minds more than distant ones, particularly when those events were as traumatic as the early 1990s were for the airlines. This fact is part of the cure, as the industry is unlikely to soon forget this time of troubles. After all, it took 20 years and a world war for the depression generation to get over the 1930s.

Returning to the key relationship between yield and unit costs, in only four of those 31 quarters when earnings fell did the yield improve relative to unit costs; and three of them were in the quarter immediately preceding an earnings upturn. On the other side, prior to 1994, the change in yield was worse than the change in unit costs in five of the 35 periods when earnings increased. Four of these events came in the quarter immediately preceding an earnings decline. This is the record that drives the conclusion that this relationship is the most significant indicator of airline earnings. Then came 1994. In all four quarters of last year the yield to unit cost relationship was negative yet operating earnings increased in all of them.

What happened? I suggest last year was a unique exception to the established pattern that was caused by an unprecedented decline in capacity at a time when traffic was rising. Never before has this happened, and never before has the positive gap between the percentage change in traffic and that of capacity been so large for so long. This overcame the unfavorable yield/unit cost relationship, allowing earnings to rise. It was unlikely that the traffic/capacity condition could continue at this pace, as the load factor increased three points in 1994 to 66.5 percent, and it has not. In the first half of 1995 the traffic/capacity gap was half that of 1994, and in July it disappeared entirely. However, the yield to unit cost relationship again became positive, and in the second quarter this was the main energy source for the reported 60-percent rise in trailing twelve month earnings. I submit that from here on this will again be the key determinant of earnings.

What is the five-year outlook? Table 2 is a projection of airline economic factors through 1999. The yield to unit cost relationship is judged likely to remain favorable through 1996. 1997 will be the cusp year when the balance turns negative; but, as usual in past cycles, the margin is so small that the earnings momentum will remain positive. 1998 and 1999 will be negative, with earnings falling. This decline is projected to continue, perhaps leading to a loss in 2000.

A number of things were considered in reaching these conclusion, but none were more important that the obvious change in management philosophy toward the business. This can be summed up by noting that cost reduction, not market share, is now the dominant objective of most airline managements. It may be impossible to overstate the significance of this shift in thinking, which is a direct product of the financial black hole that most companies have been drawn into. Airlines have always paid lip service to cost control, but those who follow the industry have always known that the airlines did not have their hearts in it. The eyes of airline managers began to sparkle only when they talked about fleet plans, the new markets they planned to enter, and the new hubs they were establishing.

Throughout the 1980s the defense of the established carriers against low-fare startups such as People Express was built around growth and a pricing strategy based on an unwillingness to surrender market share at any service point. The only effective cost reduction effort in those years came through the "B-scale" wage plan that depended on rapid growth to work. Today all this has changed. Another wave of startups fills the landscape, but the establishment is more inclined to ignore than confront them. It remains to be see whether this strategy will work in the long run, but the near-term effect should be positive.

The strategy of the 1990s is to concentrate on marketing strengths, which for most airlines is moving large numbers of passengers with complex itineraries through megahubs, and for the first time truly working hard to reduce the cost of doing this. The final plank in this platform is a pricing strategy based less on what fare the latest startup offers than on the value of the service provided. The key to this change is management emphasis on unit revenue, usually expressed as revenue per available seat mile, or RASM. This focus on unit revenue tends to lead to more optimum fleet utilization, which means fewer airplanes, higher load factors, and a serious effort to reduce costs.

Sayings these things does not imply a belief that the basic economics of the airline business have changed. Air transportation is still very like a commodity service that is an intermediate rather than an end product in the eyes of the consumer. Within the limitations implied by this, however, the industry is exploring the narrow window that exists due to the fact that air transport is not a pure commodity. There is some room to differentiate prices (or as some put it, to achieve a revenue premium), and airline managers seem determined to find out just how wide that window might be. Certainly it has its limits, but until now there has been no true will among airline managers to probe the outer limit of the envelope.

Such a will is crucial to a sustained profit recovery. Clearly it will take the trauma of the 1990-1992 depression and its lingering aftereffects, which added two more years of losses and will keep the balance

TABLE 2 MAJOR AIRLINES — FIVE-YEAR EARNINGS MODEL

	1989	1990	1991	1992	1993	1994	1995E	1996E	1997E	1998E	1999E
Airlin											
Reven											
Passenger	$50,979.6	$55,557.7	$54,554.3	$56,928.4	$60,499.4	$60,473.2	$63,533.9	$67,779.3	$72,357.2	$76,682.9	$80,787.0
Other	5,108.4	5,565.9	5,793.6	5,914.4	6,517.0	6,888.3	6,864.6	7,330.0	7,830.0	8,280.0	8,730.0
Total	56,088.0	61,123.6	60,347.9	62,842.8	67,016.4	67,361.5	70,398.5	75,109.3	80,187.2	84,962.9	89,517.0
Pct. Change	6.7	9.0	(1.3)	4.1	6.6	0.5	4.5	6.7	6.8	6.0	5.4
Expenses ($ mil.)	54,783.5	63,407.8	62,733.1	65,327.1	66,122.9	65,647.8	65,340.1	68,234.2	72,612.6	78,232.8	84,435.9
Pct. Change	9.9	15.7	(1.1)	4.1	1.2	(0.7)	(0.5)	4.4	6.4	7.7	7.9
Operating Income (000)	1,304,413	(2,284,156)	(2,385,139)	(2,484,285)	893,578	1,713,484	5,058,336	6,875,046	7,574,645	6,730,057	5,081,082
Operating Ratio %	97.7	103.7	104.0	104.0	98.7	97.5	92.8	90.8	90.6	92.1	94.3
Oper. Inc.-Total (000)	1,417,524	(2,231,357)	(2,404,109)	(2,566,065)	1,051,854	1,850,518	5,353,335	7,075,046	7,774,645	6,930,057	5,281,082
Non-Oper. Inc.& (Exp.)	(472,237)	(2,768,903)	(416,706)	(2,219,202)	(2,448,595)	(2,626,359)	(1,994,558)	(2,070,000)	(2,035,000)	(1,963,000)	(1,857,000)
Pretax Income	945,287	(5,000,260)	(2,820,815)	(4,785,267)	(1,396,741)	(775,841)	3,358,777	5,005,046	5,739,645	4,967,057	3,424,082
Tax Rate %	95.7	3.5	16.9	26.1	6.7	(50.4)	43.1	38.7	37.5	37.9	39.4
Taxes	904,258	(174,829)	(477,730)	(1,249,352)	(94,024)	391,059	1,447,432	1,938,974	2,153,985	1,883,905	1,349,969
Net Income (000)	41,029	(4,825,431)	(2,343,085)	(3,535,915)	(1,302,717)	(1,166,900)	1,911,345	3,066,072	3,585,659	3,083,152	2,074,114
Net Profit Margin	*0.07%*	*(7.89%)*	*(3.88%)*	*(5.63%)*	*(1.94%)*	*(1.73%)*	*2.72%*	*4.08%*	*4.47%*	*3.63%*	*2.32%*
Traffic: RPMs (mil.)	413,631.2	441,000.7	431,127.7	460,813.8	464,595.3	483,240.6	496,934.9	520,898.7	547,474.6	569,300.2	588,078.6
Pct. Change	2.2	6.6	(2.2)	6.9	0.8	4.0	2.8	4.8	5.1	4.0	3.3
Capacity: ASMs (mil.)	652,774.0	704,126.6	686,243.4	722,838.7	731,126.0	727,098.1	739,267.3	764,862.5	800,039.2	840,933.3	882,096.7
Pct. Change	1.0	7.9	(2.5)	5.3	1.1	(0.6)	1.7	3.5	4.6	5.1	4.9
Load Factor %	63.4	62.6	62.8	63.8	63.5	66.5	67.2	68.1	68.4	67.7	66.7
Yield per RPM - (¢)	12.32	12.60	12.65	12.35	13.02	12.51	12.79	13.01	13.22	13.47	13.74
Pct. Change	4.4	2.3	0.4	(2.3)	5.4	(3.9)	2.2	1.8	1.6	1.9	2.0
Cost per ASM - (¢)	8.39	9.01	9.14	9.04	9.04	9.03	8.84	8.92	9.08	9.30	9.57
Pct. Change	8.8	7.4	1.4	(1.1)	0.1	(0.2)	(2.1)	0.9	1.7	2.5	2.9
Profit Equation - Percent Change in:											
Yield	4.4	2.3	0.4	(2.3)	5.4	(3.9)	2.2	1.8	1.6	1.9	2.0
RPMs	2.2	6.6	(2.2)	6.9	0.8	4.0	2.8	4.8	5.1	4.0	3.3
Revenue	6.6	8.9	(1.8)	4.5	6.2	0.1	5.0	6.6	6.7	5.9	5.3
Cost / ASM	8.8	7.4	1.4	(1.1)	0.1	(0.2)	(2.1)	0.9	1.7	2.5	2.9
ASMs	1.0	7.9	(2.5)	5.3	1.1	(0.6)	1.7	3.5	4.6	5.1	4.9
Expenses	9.8	15.3	(1.1)	4.2	1.2	(0.7)	(0.4)	4.4	6.3	7.6	7.8
Spread	(3.2)	(6.4)	(0.7)	0.3	5.0	0.8	5.4	2.2	0.3	(1.7)	(2.5)
Company Results & Forecast - Airline Operating Income (millions)											
American	$730.8	$68.0	$17.5	($77.2)	$563.5	$911.6	$1,368.3	$1,646.8	$1,755.3	$1,546.2	$1,132.9
Amer. West	48.1	(31.6)	(104.7)	(74.8)	121.1	146.4	161.0	182.4	197.9	171.8	120.8
Continental	161.0	(241.8)	(269.1)	(194.5)	(46.2)	(86.3)	212.0	329.2	394.7	365.7	276.8
Delta	676.6	(235.1)	(266.4)	(825.5)	(274.9)	(215.1)	1,005.4	1,437.5	1,563.6	1,387.3	1,044.2
Northwest	290.1	(141.7)	(60.1)	(308.8)	330.8	876.5	927.4	1,002.8	993.6	885.6	755.7
Southwest	97.6	81.6	62.0	181.8	281.2	289.9	291.2	389.9	484.2	502.7	443.2
Trans World	24.3	(162.2)	(348.4)	(369.5)	(248.3)	(217.4)	56.3	210.2	262.1	251.4	202.7
United	456.9	(54.3)	(490.6)	(440.2)	295.2	513.0	948.0	1,379.4	1,477.9	1,260.8	918.9
USAir	2.7	(543.2)	(202.1)	(375.5)	(128.7)	(505.1)	88.5	296.9	445.3	358.5	185.9

sheets weak for several years to come, to achieve this fundamental change in management objectives. But that is history. The real question is how long will these objectives dominate policy. No one can know, but it will probably be several years. I remain skeptical enough to believe that, in time, the siren of expansion and market share may become too attractive to resist. In the meantime, should the airlines' resolve weaken too soon, they need only look at their balance sheets to gain renewed courage.

The best will in the world cannot prevent problems from interrupting a positive earnings trend. Many problems may arise in the next several years.

RECESSION

Rarely are we so close to the last one that we do not worry about the next, and so it is today. My response to the question of when is to say that, if a recession occurs in 1996 or 1997, it would probably cause only a modest dip in earnings but no return to the condition of 1990. Why? Because the industry is already being managed in a recession mode. Recessions reduce traffic; and it is almost certain that, in its present state, the industry would quickly cut capacity and lay employees off at the early signs of softness in the market.

Do not forget that it was not the recession of 1990 that caused the industry's massive financial problems. They were more a product of the unbridled expansion going on at that time, together with the disaster of the Gulf War in terms of both increased fuel prices and traffic losses. Actually, an early recession might be welcome. It would cause little real pain and clear the way for a more extended string of good earning years that could stretch into the beginning of the next century. The model I use indicates a recession in 2000, by which time the damage it could do might be much greater.

FUEL PRICES

This is more a political than an economic factor. All we know is that fuel prices have doubled three times in the last 20 years, and it would be foolish to think it cannot happen again. No such increase is in the model I use; but, if it occurred, the greatest damage would be to those airlines with the oldest fleets.

Related to this is the 4.3 cents per gallon tax scheduled to become effective on October 1, 1995. My assumption is that it will be put in place, although strong efforts are being made to postpone it for another three years (This tax increase did go into effect on October 1, 1995 ed.). I also believe it will be largely passed through to the consumer and that its negative effect on costs and earnings will be hard to detect after the fact. The tax represents about a 7-percent increase in fuel price. Since fuel is presently about 11 percent of total operating cost, the result is expected to be a 0.8-percent rise in total expenses. Most analysts agree that a yield increase of this amount will have no negative elastic effect on traffic. It is unlikely that the point can be tested because yields are expected to be up as much more than 1 percent for the rest of 1995 and into early 1996, and these large yield gains will slow traffic growth. Indeed, they already have.

LABOR

Barring a recession, it seems almost certain that 1996 and 1997 will be difficult years in labor negotiations. The airlines will be profitable, but airline management will still be in a stringent cost-control mode. On the other hand, counting the three major employee groups (pilots, flight attendants, and mechanics) at the 10 largest carriers, there are 30 possible labor contracts, 19 of which have expired or will expire between now and 1997. (Some of the other 11 are not unionized groups.) This has all the characteristics of a classic case of employees saying they have suffered enough and it is time to share the fruits of prosperity. Employee groups are likely to be more successful than management would like; and the resulting rise in costs is one reason for projecting that earnings will decline from 1998 on.

NEW LOW-FARE AIRLINES

We are seeing a new wave of startup carriers; but if "startup" is interpreted in its broadest possible sense, startups are less of a factor now than seemed likely just a year ago. Continental Lite was essentially a startup, as was United Express. When those two began operation, it looked as if low-fare domestic service could very soon capture more than a third of the market. If others were driven to copy the formula, it was thought that low-fare carriers might reach a 50-percent market share. This did not happen. Continental Lite folded, and of the truly new carriers only Valujet so far appears to be a real success. Most of the other startups occupy very small niches, and for many their long-term prospects may ultimately depend on linking up with a large airline, as Reno has done with American.

If these airlines do not make a real impact on the business in the next two years, it is unlikely they will do

so at all. Making an impact means causing the large airlines to alter their pricing strategy which, as observed earlier, is largely to ignore rather than match startups' fares. The reason for the two-year window is that by 1997 or 1998 the supply of available aircraft of any type will be sharply reduced and the tightening of noise rules will significantly increase the capital cost of any old airplanes that might be available.

Although Southwest Airlines is obviously not a startup, some mention must be made of the effect that it may have on the air travel market. Southwest's traffic is expected to grow at about four times the industry rate and in the process move from about 6 percent of the domestic market last year to about 10 percent in 1999. There are two things to remember about Southwest, however. One, Southwest will grow. but never at a rate faster than it feels it can comfortably manage. Two, the airline likes to be very profitable. Do not look for Southwest to grow 50 percent in one year, and do not expect them to eat industrywide cost increases such as the proposed fuel tax. In other words, Southwest is prudently managed and not inclined to do dumb things. Its strategy may be different, and the execution usually better, but its objectives are really no different from those of the major carriers. This is why, at least over the five-year period projected here, a wary coexistence is possible between Southwest and the large carriers, with each following the strategy deemed best for itself.

TELECONFERENCING

In recent years few subjects have received more illumination, with less light, than this one. It is really a replay of the Luddite complaint that new technology will destroy our jobs and businesses. The fact that it has never worked out this way does not matter. The same fears arise with each technological innovation. The question is not relevant to the five-year forecast presented here. However, it should be pointed out that much of the same kind of new technology will be used by the airlines to reduce distribution costs, and this *could* have an impact on the near-term prospects. The reduction in travel-agent commissions will be noticeable this year; and the next step must be to simplify, if not eliminate, the ticketing process to reduce costs for both airlines and travel agents.

Others can certainly come up with additional difficulties the airlines might face in the next few years, but in the end it is not the problems that matter, but how industry management responds to them. More often than not the largest problem for major carriers has been themselves. Thus, we end where we began. The key to success is keeping a favorable relationship between the change in yield and the change in unit cost. The key to sustaining that relationship through 1996 (if not 1997) is the will of management in the several airlines to do what is necessary to achieve it. The trial by fire over the past five years has transformed management policies in a way that sets the stage for some very positive earning years. The only real issue is whether early success will erode the will of managers to hold the course they have established.

TELECOMMUNICATION AND FUTURE DEMAND FOR AIR TRAVEL

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INTRODUCTION

About 25 years ago, when I was a budding economist looking for a job, I had an interview for a position at the Office of Telecommunication Policy — a part of some government agency, the name of which I have forgotten or perhaps never knew. At one point the interviewer expressed the opinion that telecommunication would lead to the annihilation of transportation. I did not get the job, but that remark set me to thinking. Could it really be true?

Mulling this over, I recalled reading that about the time in the late 19th century when the telephone was beginning to spread around the world, a number of pundits said that the telephone would be the end of cities. People would stay home and conduct all their business and personal affairs by telephone. Reality, of course, proved to be just the opposite. The telephone facilitated and encouraged communication and therefore stimulated travel. Talking to someone by telephone led to going to see them in person.

There is no doubt that communication and transportation go hand in hand and that new forms of technology are constantly evolving and replacing the existing ways of traveling and conveying information. This is the essence of innovation and technological progress.

Professor William Garrison of the University of California at Berkeley has drawn up a remarkable chart that describes the evolution of transportation in general terms. Arrayed along a horizontal axis of time from 1800 to the present is a series of giant S-curves that trace various modes of transportation through a cycle of invention, introduction, rapid growth, maturity, and then decline. Post roads, canals, railroads, steamships, highways, and aviation march across time — each rising to domination and then giving way to a successor. There is a logic to this sequence. As one dies, the next is born; the new replaces the old.

I have some reservation about this cyclical interpretation of history. Modes of transportation do not always die completely. Some do, but most simply sink to some lower and essentially stable level and find a niche where they can survive. Canals and railroads still exist and provide valuable transportation services, albeit substantially less than when they were in their heyday. But setting this aside, Garrison's chart does pose a question about the future of aviation in the face of the meteoric rise of telecommunication technology. Will telecommunication diminish air travel and do harm to the airline industry?

SUBSTITUTION OF TELECOMMUNICATION FOR AIR TRAVEL

The relationship between communication and personal travel is symbiotic. They are linked, and each feeds on the other. Almost everyone here at this conference today came as a result of a telephone call or a fax; and all made use of some form of transportation (auto, rail, or air) to reach this assembly.

Economists look upon this as a matter of substitution and stimulation. With respect to substitution, the question is whether telecommunication leads people to eliminate or defer trips. Stimulation is the inverse effect: whether telecommunication (be it by telephone, teleconferencing, or interaction on the Internet) leads to more face-to-face communication. The discussion that follows focuses on substitution. It is somewhat easier to analyze and quantify, and it bears directly on the matter of greatest concern to this audience. Will telecommunication adversely affect air travel demand?

Substitution can be examined in two ways. What is the nature of the impact, and on whom does it fall? More specifically, what segments of the air travel market could be diminished or supplanted by telecommunication? It is also necessary to specify what kind of telecommunication are we talking about. Telecommunication is not a single amorphous technology. It has several different forms, each affecting aviation in particular ways and to various degrees. Moreover, the telecommunication market is rapidly changing. New products are being introduced, new applications are being found, performance is improving, and the costs of ownership and use are falling at a startling pace. What is true now may be radically different within a few years.

As a personal example, we had a difficult time in our company about seven years ago in deciding whether we should buy a fax machine. Now we have two and are

TABLE 1 AIR TRAVEL MARKETS

Leisure/Pleasure Travel	Business Travel
Vacation Personal	Group • Conventions • Seminar/Training • Other Transient • Sales • Consulting • Repair/Service • Government/Military • Stopover-in-Route • Other Business • Job Change

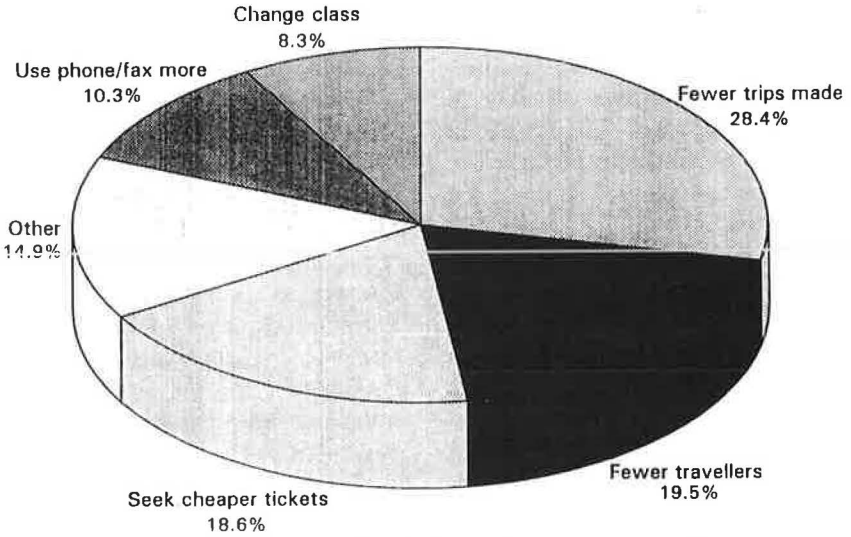

FIGURE 1 Impact of reduced budgets on business air travel.

thinking about a third. In a short time the question has gone from should we spend the money for a fax machine to how can we live without three.

AIR TRAVEL MARKETS

The air travel market is made up of two principal parts — personal and pleasure travel and business travel. At this time it is difficult to see how telecommunication could have much effect on the former, the purpose of which is to visit vacation sites, see family and friends, or carry out other activities that entail going to a location remote from home. (Vacation by virtual reality seems a dim prospect.) The principal effect on commercial aviation, if any, will be in the area of business travel. This market segment, which used to account for the majority of air travel has decreased to about 40 percent over the course of the past several years. Part of this is due to a lingering recession and a general tightening of business travel practices, but it is also due in large measure to a faster rise in travel for pleasure and personal reasons.

Business travelers give many different reason for air travel, but they can be put in two major categories — group travel and transient travel. Group travel involves

TABLE 2 TELECOMMUNICATION INDUSTRY TECHNOLOGICAL TRENDS

Technology	Potential Benefits	Potential Barriers/Disadvantages
Infrastructure		
Electronic Data Interchange	• Enhances responsiveness • Provides cost savings • Improves quality • Links buyer-supplier	• Lack of standards • Proprietary systems • Significant user training
Cordless/Cellular Telephony	• Mobile telephony • Easy expansion of users • Reduced inconvenience	• Higher equipment costs • Varying quality • Out-of-office communications difficult
Wireless and High-Speed Networks	• Faster data transmission • Facilitates real-time desktop videoconferencing	• High investment cost • Still in infancy stage
Information Highway	• High speed, multimedia data network providing universal access	• Requires huge investment • Still in planning stage
Applications		
Videoconferencing	• Interactive collaborations • Improved communications • Cost savings • Increased productivity • Fast response time • Document conferencing	• High cost/price • Poor quality of video • Inadequate compression • Faster connections needed • Few users supported • Lack of applications • Poor industry standards • Cultural hurdles expected
Video Mail	• Improved communications • Fast response time • Uses existing phone lines	• Similar to voice mail • Low productivity gains • Noninteractive
Telecommuting	• Increased flexibility • Cost savings • Increased mobility • Eased traffic congestion • Less pollution	• Uncertain productivity • Possible worker dissatisfaction • Not suited for all workers
Groupware	• Collaborative computing • Document conferencing	• Limited products • Limited achievement of goals

such things as going to a convention, attending a seminar or training session, or taking part in some other such gathering that involves many people. Transient travel involves one person (or perhaps a team of two or three) going somewhere to conduct a specific piece of business — making a sales call, installing or repairing something, providing some professional service, giving a speech, or having a job interview (Table 1). Both these types of business travel are roughly equal in size, and each could be affected by telecommunication.

TABLE 3 POTENTIAL USE OF EMERGING TECHNOLOGIES TO MEET BUSINESS TRAVEL NEEDS

Travel Categories	Technologies			
	Videoconferencing	Video Mail	Collaborative Computing	Telecommuting
GROUP MEETINGS				
Conventions	●	○	●	○
Seminar/Training	●	●	●	○
Others	⊙	⊙	●	⊙
TRANSIENT TRAVEL				
Sales	●	●	○	●
Consulting	●	○	●	●
Repair/Service	●	○	○	●
Government/Military	●	●	●	○
Stopover-In-Route	○	○	○	○
Other Business	⊙	⊙	⊙	⊙
Job Change	●	○	○	○

Key:	●	○	⊙
	Limited	None	Uncertain

CHANGES IN THE BUSINESS TRAVEL MARKET

A number of forces are at work in the business travel market. U.S. firms are adjusting to the demands of competing on a global scale in foreign markets over long distances. Cost is a major concern. Industries, organizations, and government agencies are restructuring and reducing personnel to become more efficient. Executives are becoming more price-sensitive and seeking ways to reduce travel costs, combine trips, and get things done for less money (Figure 1).

Businesses are also becoming more open to advanced technology and new ways of getting things done. Nowhere is this more evident than in the explosive growth of telecommunications. Virtually everyone in this audience depends on fax machines. In two years when we meet again, it seems likely that you will be equally familiar with (and dependent on) e-mail and the Internet. Probably more than half of you are already using these technologies to some extent.

CHANGES IN THE TELECOMMUNICATION INDUSTRY

The telecommunication industry, itself, is an a state of flux. New technologies are being introduced, and new uses of telecommunication devices (and combinations of such devices) are emerging. The interactions within the telecommunications industry and between the industry and its growing numbers of corporate and private users are such that it is difficult to foresee whether the net effect on air travel (especially business air travel) will be positive or negative and of what magnitude. Some sense of future directions and potential impacts can be obtained by looking at technological trends in the telecommunication industry and then by examining more closely those that seem most likely to affect business air travel demand.

Table 2 summarizes eight major areas of telecommunication technology. They can be grouped in two broad categories. One consists of those that facilitate the system and are, in a sense, the infrastructure that makes telecommunication possible — the basic core of things we have to have in order to do other things.

These other things fall in the second category — the applications we make of computers, communication devices, and information networks to conduct our business. It is here that we can find potential substitutions of telecommunication for air travel.

REPLACEMENTS FOR BUSINESS AIR TRAVEL

Table 3 lists four major kinds of telecommunication that could substitute for business air travel. Arrayed along the left of the matrix are various types of group and transient business air travel. Opposite these, in four columns, are estimates of the possible degree of substitution (limited, none, uncertain) within the next 10 years.

Videoconferencing and collaborative computing appear to have the strongest potential to replace air

TABLE 4 DEGREE OF SUBSTITUTION OF BUSINESS AIR TRAVEL WITH NEW TECHNOLOGIES (YEAR 2005)

Business Travel Category	Trip Substitution by New Technologies	
	Low Estimate	High Estimate
Group Meetings		
Conventions	0.2%	2.0%
Seminar/Training	5.0%	20.0%
Other Group Mtg.	1.0%	10.0%
Average	*2.1%*	*10.7%*
Transient Travel		
Sales	1.0%	5.0%
Consulting	1.0%	5.0%
Repair/Service	0.2%	2.0%
Govt./Military	0.5%	5.0%
Stopover-In-Route	0.0%	0.0%
Other Business	1.0%	10.0%
Job Change	10.0%	30.0%
Average	*2.0%*	*8.1%*
Business, Direct Average	**2.0%**	**8.9%**
Business, Weighted Average	**1.7%**	**10.8%**

Source: Apogee Research, Inc.

travel. Video mail and telecommuting are somewhat weaker; but they could have some impact, particularly in the area of transient travel. In no instance, however, are the estimated effects large enough to suggest major inroads into business air travel.

SUMMARY OF IMPACTS

Studies carried out by Apogee and others in the fields of aviation and telecommunication indicate that some substitution will occur over the next decade. Estimates range from 2 to 11 percent penetration of the business air travel market, and virtually none in the pleasure and personal travel market (Table 4). This would amount to replacement of somewhere between 1 and 4 percent of all air travel within the next decade.

To put these figures into perspective, diversion of 1 to 4 percent of business air travel to telecommunications over a period of 10 years is equivalent to about one year of normal secular growth in passenger enplanements. A substitution of this magnitude is scarcely big enough to notice and well within the error of estimate in most aviation forecasts. Certainly, it is no cause for alarm.

Note that only the substitution effect has been quantified. The extent to which telecommunication might stimulate air travel (business or personal) has not been taken into account. At this point any estimate of stimulation is only a guess. We do not know enough about what motivates people to travel and how this might change as telecommunication technology advances and becomes more widespread. It may be that the substitution and stimulation effects will cancel each other out and that the impact on air travel will be nil.

THE AIRPORT IMPROVEMENT PROGRAM

Donna Taylor
Federal Aviation Administration

The Airport Improvement Program (AIP) Division of the Office of the Associate Administrator for Airports is responsible for carrying out FAA' s role in fostering a safe and efficient national airport system. The AIP Division deals with an extensive network of over 3,000 public-use airports that are owned and operated by thousands of local and state agencies. There is considerable tension between two of the Division's principal objectives. We want to keep decision-making authority concentrated at the local level, but we also want the individual airports to mesh together as a national system.

The AIP Division develops design standards and construction specifications, certifies the safety of airports that have considerable commercial activity, and monitors the current and future adequacy of the Nation's airports. The key to FAA's effectiveness in carrying out these activities has been the availability of federal aid to help finance airport improvements that are significant to national transportation. Federal aid has functioned as the proverbial carrot, encouraging local and state agencies to cooperate and conform to the uniform guidelines of a national system.

The current Airport Improvement Program is the latest in a series of federal programs that dates back over 50 years. AIP is financed by monies drawn from a trust fund supported by various user fees, including taxes on passenger tickets, freight waybills, and general aviation fuel. Until recently it was almost taken for granted that the AIP funding level would increase each year to keep pace with the growing needs of air transportation. However, budget concerns and policy considerations have changed the picture, and the AIP appropriation for FY 1995 is set at $1.45 billion, down from a high of $1.9 billion in 1992. The appropriation for FY 1996, which begins on October 1, 1995, is now being considered by Congress. There are differences between the appropriation bills approved by the House and the Senate, and a conference committee is scheduled to meet soon to agree on the 1996 appropriation level. It is anyone's guess what the amount will be, but it appears likely that AIP funding for FY 1996 will be close to the FY 1995 level.

The limited availability of Federal air has caused some concern. While FAA recognized a need for an annual investment of at least $6 billion, it has been able to supply only one quarter of this amount through AIP. Some observers fear that airport development may be held back and the growth of air transportation stifled by inadequate investment in airports. However, the situation is not that simple, and additional factors must be taken into consideration before judging the adequacy of the AIP appropriation.

SOURCES OF FUNDING

Federal aid is only one piece of a complex funding picture. AIP provided about one third of the public capital for U.S. airport improvements when the program was at its highest level. It has now declined to about one quarter. Airport raise the remaining three quarters primarily through revenue bonds, passenger facility charges, rents and charges to airlines, income from concessions, general aviation fees, and other sources.

The decline in AIP funding since 1992 occurred at the same time that a new major source of revenue for airports was being brought on line. Airports are now permitted to collect, with FAA approval, passenger facility charges (PFCs) of up to $3 per enplaning passenger to finance certain types of development. PFCs are being collected at over 230 airports, and the total annual collections are almost $1 billion.

DEPENDENCE ON FEDERAL AID

Second, dependence on federal aid varies. Some airports are in a strong financial condition and can compensate for fluctuation in federal grants with locally generated revenues and rents. The busiest commercial service airports usually have strong and reliable sources of funds that increase as traffic grows. There are obstacles to airport expansion, but they often involve local political issues and the willingness of communities to accommodate growth. That is, the obstacles are of a social or political nature, rather than a financial constraint.

For instance, there may be resistance to construction of a new runway because of concern about aircraft noise.

As a result, runway capacity continues to be limited at the busiest airports, and growth in demand requires a gradual increase in the average size of aircraft.

The overall supply of capital is usually adequate to finance major capacity enhancements at busy airports, once the necessary local, state, and federal approvals are secured.

A possible exception is development of a major new airport. Even if a proposal to build a new large airport were able to resolve environmental issues and overcome community opposition, such a project could expect to receive no more than 15 percent of its total funding from federal grants. The remaining 85 percent would have to be raised locally, largely by issuing revenue bonds. Unless the new airport serves a very strong market, it is difficult to arrange that level of borrowing. Buyers of airport revenue bonds are generally unwilling to accept much risk, nor are they willing to wait for repayment of the debt until traffic develops.

This is a notable limitation to the approach to financing airport development that is used in the United States, an approach that is geared to gradual expansion of existing airports but not well suited to bold projects that require large sums of money and involve considerable risk. On the premise that traditional airport grant programs are not likely to increase for the time being, FAA is studying options for new methods of providing federal financial support of airport development.

For example, there may well be an appropriate federal role in providing debt financing subordinated to financing acquired through the existing capital market as a way to bridge the early years of project development.

The financing question is entirely different for the hundreds of medium and small commercial service airports in the national airport system. These airports rely heavily on AIP funds for capital improvement projects. They have limited sources of income and may not be able to compensate for a reduction in federal aid. Many face a dilemma. Raising fees to add capacity can chase traffic away to busier nearby airports where lower fares are available.

Small general aviation airports have a severe problem. They have very limited revenues, and depend almost entirely on federal aid to pay capital costs and on fixed base operators to assume day-to-day management responsibility. As general aviation airports compete for a portion of a shrinking federal aid program, they do not have easy access to alternative sources of funds. This constrains expansion and upgrading programs and makes it increasingly difficult to fund the periodic rehabilitation of pavements and lighting systems.

The situation could be aggravated in the future by a shortage of fixed base operators (FBOs). More than half of the FBOs in the United States have gone out of business since 1980, and we are reaching the point that some small airports may be obliged to pay public employees to perform tasks that were previously performed by FBOs. The combined effect of reduced federal aid and loss of FBOs could raise the local cost of operating small general aviation airports to critical levels.

In urban areas reliever airports provide the base for more than 25 percent of the Nation's aircraft fleet. Relievers have long been an FAA priority, and they have received a statutory set-aside of 10 percent of AIP funds. Recently the reliever program was criticized by the U.S. General Accounting Office and the Inspector General of the Department of Transportation. As a result, the set-aside was cut in half. This criticism and reduced support reflects an opinion that delays are falling at busy commercial service airports and that there is less urgency in providing alternative facilities for general aviation. FAA has a different perspective. FAA sees a continuing need for specialized systems of airports in urban areas to serve all segments of aviation, and it is working with representatives of the aviation community to review, update, and revitalize the reliever concept.

SURPLUS MILITARY AIRFIELDS

A third factor that affects the adequacy of AIP funding is the surplus of military airfields that are now available for conversion to civil use. A few, such as Bergstrom AFB in Austin, Texas, and El Toro MCAS in Orange County, California, are well located to become major commercial service airports. Many others have the potential to serve as general aviation and reliever airports. With respect to there three types of airports (small general aviation, urban reliever, and surplus military), FAA is currently reviewing their definition and the appropriate federal role in development.

SUMMARY

FAA expects that federal budget concerns will continue to limit funding for AIP in the foreseeable future. The busiest airports should be able to compensate by developing other sources of funds, including PFCs. Medium- and low-activity airports will feel the limitation more sharply because that have few alternative sources of funds. FAA will work with Congress and the Administration to ensure that both the level and

distribution of AIP funds is adequate to meet high-priority needs and to accommodate the continued growth of Air transportation.

The national airport system has been carefully nurtured for decades by a partnership of local, state, and federal government agencies, and there is every reason to expect this cooperation will continue to be effective in the future.

DISCUSSION PANEL REPORTS

In advance of the workshop, FAA circulated a questionnaire to all invited participants. The questionnaire listed the preliminary 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 1996. The TRB workshop panels were asked to review these figures during their deliberations and to offer alternatives and a statement of reasons for each recommended change. The consensus views of each of the eight TRB panels are presented in Attachment A. More extended discussions of the reasons for suggested changes in FAA forecasts are included in several of the individual workshop reports

DOMESTIC AIRLINES

Panel leader:
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Panelists:
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Vicki L. Golich
California State University

Edmund S. Greenslet
ESG Aviation Service

Timothy F. Hannegan
U.S. General Accounting Office

Sam Keiter
Kurth and Company

Richard Mudge
Apogee Research, Inc.

David E. Raphael
Marcar Management Institute

Arnold Schwartz
Federal Aviation Administration

Frank Spencer
Northwestern University

Claire Starry
TDS Economics

Steven Still
USAir, Inc.

Robert Windle
University of Maryland

"Air travelers are always discovers. There are no signposts in the air to show a man has passed that way before," wrote Anne Morrow Lindbergh in 1935. Indeed, six decades after this passage was written, ambiguity pervades the domestic airlines market and concerns about the industry's future abound.

The primary sources of domestic aviation's turbulent character are easily identified: uncertain government policy, aggressive expansion by new entrants, cyclical price cutting, and the changing preferences of business travelers. At present, the industry is coping effectively, and the short-term outlook for profits is favorable. However, vexing issues suggest a more cautious long-range outlook. This is demonstrated by the unfavorable ratings given by the financial community to many airline bonds.

Rethinking the Future

The panel — consisting of airline representatives, consultants, academics, and government officials —

reconsidered long-standing trends affecting domestic aviation. These deliberations occurred at an opportune moment in the post-deregulation era. After several years of devastating losses, major carriers are reporting robust profits. For the first time in several years, several weaker carriers are operating in the black, and new entrants are announcing far-flung expansion plans. This upbeat mood contrasted sharply with that of the TRB workshop two years ago, which found substantial reason for pessimism about the industry's short-term fiscal viability.

The panel believed that the recent surge in profits reflects the success of the industry's lengthy efforts to the eliminate unprofitable hubs, cut costs, and refrain from aggressive nationwide price wars. In addition, the panel concluded that these efforts will allow major carriers and low-cost startups to coexist profitably in many markets for the first time. The inroads against Southwest Airlines being made by the United Airlines Shuttle on the West Coast exemplifies this point.

The profits of the past two years occurred despite unfavorable government policy. The public sympathy toward aviation problems that followed the Commission to Insure a Safe and Competitive Airline Industry's report two years ago has largely vanished.

The panel expected the following:

- Continued increases in fuel taxes, despite earlier calls for tax abatement;
- Sharply diminished funding for airport infrastructure, especially new airports and runway capacity (A backlash against the costly Denver International Airport set the stage for this policy reevaluation.); and
- Aviation fees rising faster than inflation.

Most major airports already levy a $3 airport facility charge, the maximum permitted under federal law. As a result, these airports will be forced to find other sources of new revenue. The aggressive measures taken by the City of Los Angeles, which dramatically raised landing fees, may pave the way for additional increases nationwide.

Contentious labor issues that are likely to manifest themselves after lying dormant for several years will further squeeze profits. The record profits reported by major carriers are weakening their bargaining positions on major labor issues. Vociferous calls for retroactive salary increases are beginning to be heard. Considering that an unusually large number of labor contracts come up for renewal in the next two years, this issue is likely to dominate the attention of major carriers through 1997.

Labor issues will affect virtually all carriers. Only employee-owned United Airlines is in a position to sidestep them. Start-up carriers will likely be pressured to unionize as their financial position improves. Thus, newcomers are likely to have difficulty maintaining their existing rock-bottom fares.

One likely response of major airlines to labor cost increases will be to pursue (or threaten to pursue) opportunities to spin off additional routes to partner carriers. American Airlines' recent deployment of Midway Airlines' flights to cities from Raleigh-Durham illustrates the far-reaching potential of this strategy. (American has also spun off several jet routes, such as Chicago-Columbus, Ohio, to its commuter partner.) To the extent to labor contracts allow, similar strategies will be pursued zealously by others carriers.

Other simultaneous developments will lower airline costs. The next frontier in cost-cutting will be distribution systems. Ticketless travel, which eliminates paper transactions between the carrier and the customer, holds the promise of reducing costs from as much as $8.50 per customer to a mere 50 cents. This innovation also has the potential to boost the efficiency of airport ground-related operations.

PC-based ticketing systems, such as the Internet, will forge a new partnership between airlines and customers. Frequent flyers are becoming highly skilled travel decision makers and want the flexibility to arrange their own schedules. As a result, the panel expected spectacular growth in electronic home-based ticketing. However, several participants urged caution in projecting uninterrupted growth of this new medium, citing the practical limits of the technology. For example, many consumers are unwilling to make costly travel decisions without outside assistance. At a time when fare structures are extremely complex, many could remain unwilling to expose themselves to the travails of this technology.

As this new technology develops, however, airlines will enter new types of marketing agreements with large groups of ticket buyers, such as corporations. Electronic ticketing systems will be especially attractive for major airlines seeking to use their distribution systems as a means of differentiating their product. It will allow them to develop new tools for rebating commissions, offering special fares, and using first-class seating as a reward for brand loyalty.

Amid so much change, the role of the traditional travel agents will sharply diminish. To allow them to achieve the efficiencies necessary to earn a fair profit, small agents will need to exploit economies of scale. Thus, they will face increased pressure to close, sell, or consolidate. Already, many are already focusing their

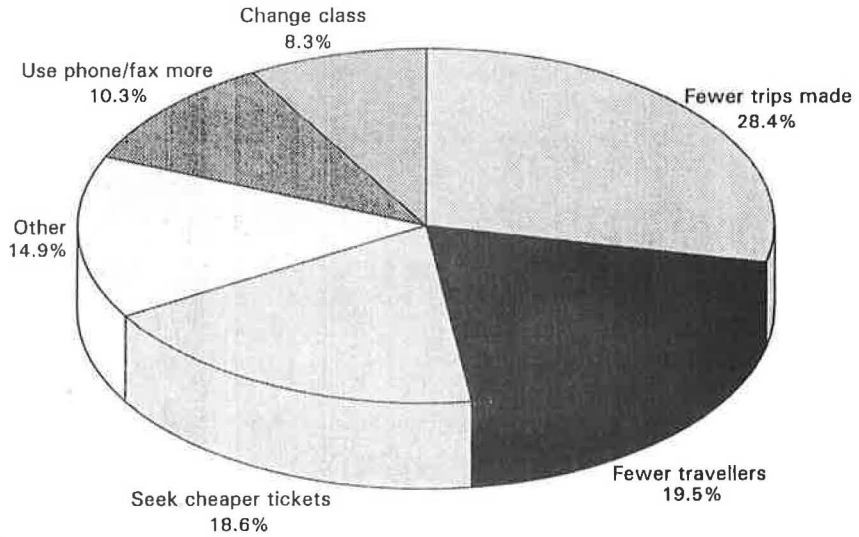

FIGURE 1 Impact of lower budgets on business air travel.

marketing efforts on nonairline products. Within five years, many panelists also expected small agencies to levy a service charge (akin to the fees imposed by entertainment ticket vendors such as Ticketron) on low-cost airline tickets.

Business Travel

Although airlines deserve much credit for cutting costs, they remain extremely vulnerable to changes in the business-travel market. Business travel has grown substantially slower than pleasure travel in most recent years, and the performance of this market segment will remain disappointing in the years ahead.

Three factors have disconcerting implications for business travel:

- Rapidly growing industries, including telecommunications and the high-tech sector, tend to be less travel-intensive than the sectors they are replacing, such as manufacturing and defense contracting.
- Corporations are putting into place innovative policies to minimize business travel costs. This is exerting downward pressure on airline yields (Figure 1).
- Much of the growth of the business market in recent years has been artificially stimulated by a drop in prices rather than by real increase in demand.

Although these issues cast doubt on the growth of business revenues, not all business-related developments are unfavorable. There is mounting evidence that video conference technology, as it exists today, poses little threat to the business-travel market. Similarly, little pervasive evidence suggests that the growth of electronic mail, the Internet, and other computer-based systems will chip away at the volume of business travel. Rather, they may create new business relationships that could generate new business trips.

All of these developments, however, render the business traveler more flexible, time-sensitive, and discretionary in making travel plans. Little evidence was found to suggest that airlines will be able to reverse the long-standing decline in the percentage of passengers paying full coach fares.

Industry Structure

As carriers struggle to maintain a profitable niche, they are offering consumers a continuum of price and quality choices. Regardless of the type of service they provide, however, profitability in today's marketplace requires a "critical mass" at a major airport. This sharply contrasts many earlier start-ups, such as Jet America, which emphasized point-to-point route systems. The panel divided carriers into four basic sectors.

Megacarriers

American, Delta, and United have multiple hubs and expansive international route systems, giving them a highly favorable prognosis. Although employing vastly

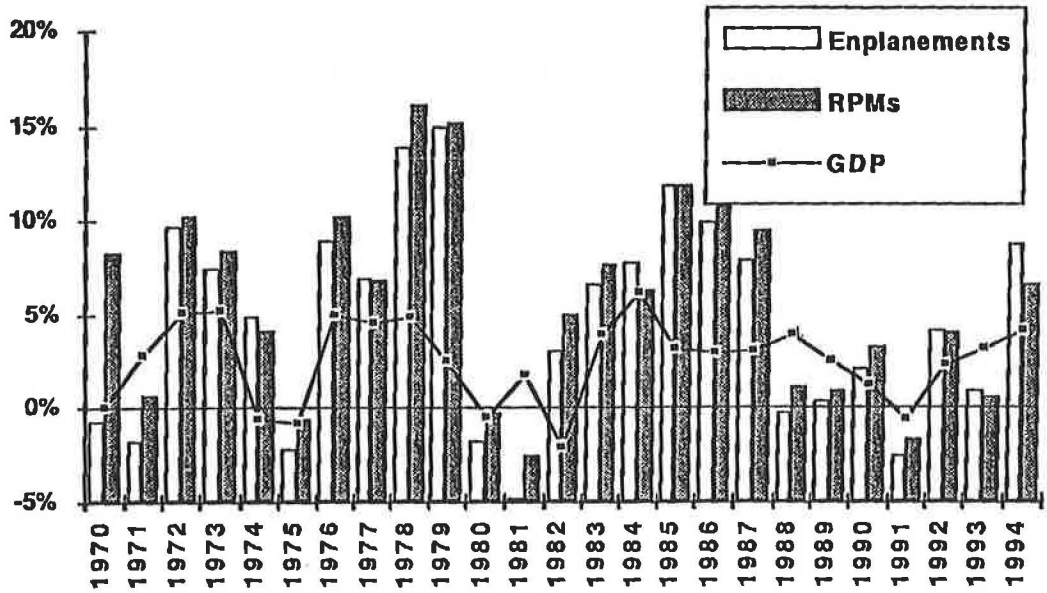

FIGURE 2 Domestic air travel and the macroeconomy.

different strategies, all three will continue to exhibit restraint in the domestic market — a fundamental change in approach they have taken since the mid-1980s.

Second-Tier Carriers

Although carriers such as America West, Continental, Northwest, TWA, and USAir occupy more tenuous niches, each is favorably positioned to survive the onslaught of low-cost competition. Their disadvantages, such as their more narrowly-focused route systems, will be only partially offset by their cost advantage versus megacarriers. The market share of this sector is likely to erode slightly. Consolidation between these carriers (such as the once-discussed merger of USAir and TWA) is unlikely.

High-Frequency Low-Cost Operators

The proven marketing formula of airlines such as Reno and Southwest — low fares and attractive schedule frequencies — will render this the fastest-growing sector. As their traffic expands, other carriers will likely mimic this strategy.

Low-Frequency Low-Cost Startups

Carriers such as Kiwi, ValueJet, and American Trans Air occupy the most tenuous niche. Their survival requires the maintenance of a successful macroeconomy. Unlike earlier startups, these carriers will continue to concentrate their operations at a central hub. Although they will be likely to exit markets upon the entry of Southwest Airlines, they will redeploy their fleet elsewhere. (Southwest's expansion in Florida will accelerate this process.) Also exerting upward pressure on costs is the diminishing market for inexpensive, used aircraft.

The panel anticipated that, with the possible exception of the second-tier group, each will maintain their approximate share of the market over the next three years.

Summary

Overall, the panel expected air travel to continue to grow two to three percentage points faster than the Gross Domestic Product in upcoming years (Figure 2). Indeed, air travel will become more attractive relative to over-the-road travel. Since 1991, for example, airline yields have remained constant at 13.3 cents per mile, while the average cost of operating an automobile has risen by approximately 20 percent. This bodes well for mid-distance airline trips of between 300 and 500 miles, where a large share of the market has historically traveled by car.

As deregulation approaches its third decade, there is ample room for optimism about the short-term outlook for domestic aviation. Although the long-term outlook remains uncertain, the prognosis is improving. After a

tumultuous decade of transition, major airlines are exhibiting an unprecedented ability to cut costs and respond swiftly to the changing times.

INTERNATIONAL AIRLINES

Panel leader:
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Robert L. Bowles
Federal Aviation Administration

Michael Pustay
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Michael Goldman
Bagileo, Silverberg & Goldman, LLP

James Craun
Office of the Secretary of Transportation

Robert Duclos
Transport Canada (ACACA)

Introduction

The panel discussed events that could shape the growth of international airline activity in major market areas affecting the United States. In particular, the panel was concerned about those events that could either alter the forecast growth rates for aviation activity or change the locations at which such activity took place. The panel identified four factors that could cause the growth of the international aviation activity to differ from The level projected by using the normal economic and demographic variables typically considered in aviation activity forecasts:

- The regulatory environment for international air services,
- The structure of the market for international air services,
- Alliances among airlines, and
- Airline strategies such as code sharing.

The above factors are also likely to change at the same time in certain markets. The panel also observed that the financial restructuring of the Federal Aviation Administration (FAA) could affect the level of activity for all segments of aviation including domestic airlines, international airlines, and general aviation. The proposals to shift to full user funding could result in more of FAA's budget being paid for by users in the form of increased aviation taxes or fees for service. The aviation sectors which are asked to bear increased costs will have reduced demand, reduced profitability or both.

The panel was apprised of a difference in what FAA includes in forecasts of international aviation activity and what FAA proposes to measure in the future. Today, FAA forecasts cover only the international activity of U.S. air carriers. In the past, the total FAA workload could be scaled from this measure because it was believed that the mix of activity between U.S. and foreign carriers was relatively stable. However, international airline alliances and code sharing are causing shifts in the share of traffic carried by U.S. and foreign carriers. As such, it is difficult to ignore the activities of foreign airlines carrying passengers to and from the United States. In the future, FAA will measure international airline activity to and from the United States for all carriers. A major purpose of FAA forecasts is to estimate workload for FAA facilities, and the panel believed that the new methods of forecasting activity will provide a better indicator of the growth in demand for FAA services related to international airline activity. In addition, because there is a tax levied on international air passenger departures from the United States, the new measure of international airline activity should improve forecasts of projected tax receipts.

Forecast

The panel discussed how aviation activity might grow and the forces that will shape the demand for these services in four market areas:

- U.S.-Canada,

TABLE 1 NEW U.S. SERVICES PROVIDED BY CANADIAN AIRLINES

Air Canada	Canadian Airlines International
Toronto–Atlanta	Vancouver–Chicago
Toronto–Washington	Toronto–Chicago
Montreal–Boston	Toronto–Fort Lauderdale
Montreal–Fort Lauderdale	Toronto–Orlando
Montreal–Washington	Toronto–St. Petersburg
Ottawa–New York	
Ottawa–Washington	

Source: J. Craun, U.S. DOT.

- U.S.-Atlantic,
- U.S.-Pacific, and
- U.S.-South and Central America.

Of the above, FAA includes the U.S.-Canada market in the domestic traffic forecast. However, air services between the U.S. and Canada are governed by bilateral air service agreements. In the last year, such agreements have been significantly liberalized and are set to move to an open market. It is expected that there will be an increase in the growth rate in this market as it shifts from a highly regulated to deregulated position. James Craun of the Office of Aviation and International Economics made a presentation of current service trends in the U.S.-Canada market and identified how airlines have responded to the opening of the U.S.-Canada air services market. Materials used in his presentation are contained in Appendix B.

U.S.-Canada

Canada and the United States historically had a very restrictive bilateral air services regime with strict controls on capacity, entry, and pricing. The governments agreed to liberalize air services between the two countries effective in February 1995. Both U.S. and Canadian carriers have responded to the liberalization of air services between the two countries. Canadian carriers were afforded essentially open skies and have the ability to enter all U.S.-Canada market pairs. U.S. carriers were allowed open skies entry into all Canadian airports except Montreal, Toronto, and Vancouver. In the case of Montreal and Vancouver, additional services were limited for the first two years, while in the case of Toronto, there is a phased entry program over three years. The adjustment period was allowed so that Canadian carriers could reach a sufficient scale of operation before facing full competition from U.S. airlines. After this phase-in, an open skies air services regime will prevail between the United States and Canada.

Overall, there has been growth of 30 to 40 percent in the number of seats offered in the U.S.-Canada market during the first year under the new agreement. There has been a larger percentage increase in capacity by Canadian carriers. The growth rate in passengers carried has lagged somewhat and is on the order of from 10 to 15 percent on an annual basis. If the difference in growth rate between seats offered and passengers carried remains, the market eventually will have to shake out, with some of the new services being withdrawn. The panel believed that carriers are experimenting with new markets and will remain only in those that allow profitable operations. In fact, there has already been some exit from newly served markets.

Canadian carriers are generally adding service to major U.S. cities and to popular U.S. resort destinations for Canadian tourists (Table 1). An exception is Canadian Airlines International (CAI) which, because of its alliance with American Airlines, is also adding service to American's hubs. The Canadian carriers appear to be shifting existing charter service to scheduled operations, such as Air Canada's and CAI's flights to Florida. Air Canada is adding point-to-point service and serving secondary markets with its Canadian Regional Jet (RJ) aircraft. For operations at the four high density airports in the United States governed by slot rules, Canadian

TABLE 2 NEW SERVICES TO CANADA PROVIDED BY U.S. CARRIERS

American	**Reno-Air**
Chicago-Calgary	Reno-Vancouver
Chicago-Ottawa	
Chicago-Winnipeg	
Dallas-Montreal	**United**
Dallas-Vancouver	Denver-Calgary
Miami-Montreal[1]	San Francisco-Calgary
Miami-Toronto[1]	San Francisco-Vancouver
Continental	**USAir**
Newark-Montreal	Washington-Montreal
Houston-Vancouver[2]	Washington-Toronto
Newark-Vancouver[2]	Pittsburgh-Toronto
Delta	**Midwest Express**
Atlanta-Montreal	Milwaukee-Toronto
Atlanta-Toronto	
	USAir Shuttle
America-West	Boston-Montreal
Phoenix-Vancouver	New York-Montreal
Northwest	**Value Jet**
Detroit-Halifax	Washington-Montreal
Detroit-Ottawa	
Minneapolis-Calgary	
Minneapolis-Montreal	
Minneapolis-Regina	
Minneapolis-Saskatoon	
Minneapolis-Vancouver	

[1]Transferred
[2]Discontinued

carriers will be treated like U.S. carriers as far as slot allocations, the ability to buy and sell slots, and so forth.

Most U.S. carriers appear to be adding spoke flights from their hubs in the United States to points in Canada. For example, as shown in Table 2, American has added service to Canada from its hubs in Chicago, Dallas, and Miami; and Northwest has added service to a number of smaller Canadian cities from Detroit and Minneapolis. While it would technically feasible for a U.S. carrier to serve east to west traffic in Canada over a hub in the northern United States, customs clearance and immigration clearance procedures (as well as prohibitions on cabotage) would not make such service attractive to passengers.

In addition to hub-oriented services by U.S. carriers, American Airlines is also adding flights from the United States to Vancouver because of its code-sharing relationship with CAI. It will serve some transpacific markets from Vancouver by code sharing on CAI flights. The U.S.-Canadian agreement allows unlimited code sharing if a carrier has the underlying traffic rights to third countries.

Both Air Canada and CAI had to undergo a phase of cost reductions prior to Canada entering into an open skies agreement so that these airlines could effectively compete with U.S. carriers. The phase-in of liberal authority for U.S. carriers seeking to serve the largest Canadian markets also provides Air Canada and CAI with a window of opportunity to establish frequent service to some U.S. markets before they must face competition from the full range of U.S. carriers. This provision allows for the smaller size of Canada's airlines in relation to the U.S. megacarriers.

Because of the size of the airline markets in Montreal, Toronto, and Vancouver, the phased entry of U.S. carriers on routes to these cities will stretch out the

adjustment period for increased traffic growth due to the U.S.-Canada agreement. The panel believed that a growth rate of from 10 to 15 percent in enplanements should be the base for each of the following two years. Growth in available seats is expected to be at somewhat higher rates initially as carriers seek to identify profitable new market opportunities. However, once the initial flurry of activity is over, the growth in seats each year should mirror the growth rate of passengers.

In recent years, the growth in enplanements between the U.S. and Canada has been below two percent per year (*Airline Business*, October 1995, 52). The panel believed that the liberalization of air services between the U.S. and Canada has definitely stimulated traffic, and that there will be a one-time increase in growth associated with the liberalized air services regime. After that, growth should return to a more normal annual rate, but higher than that observed under the restricted market. The U.S.-Canada experience points to what can be expected by liberalizing formerly highly restrictive air services regime. That is, there will be a one-time spurt in the rate of traffic growth but these markets also will achieve a greater rate of growth than regulated markets even when the adjustment period is over.

U.S.-Atlantic

Some additional traffic stimulation is expected on the North Atlantic from the continued establishment of alliances between U.S. and European carriers. This would result from either fare reductions, improved service quality, or both. In addition, European carriers are likely to continue attempts to reduce their own costs and by passing this cost reduction on to passengers in the form of lower air fares. While this cost restructuring will principally affect intraeuropean traffic, it may also affect transatlantic traffic as the single European airline market is established in 1997, The particular nature of airline alliances between U.S. and European carriers may lead to a near-term shift away from transatlantic flying by U.S. carriers. When carriers enter into an alliance, they generally reduce overlapping services. It appears that U.S. air carriers are more willing or able to reduce or redeploy their own capacity and, as a result, the European partner continues to fly the long-haul transatlantic segments (Some of the reduction in transatlantic flying has also occurred as carriers, such as Delta, have restructured route networks that they have acquired).

Northern European carriers have been more successful in reducing their costs, and this will put additional pressure on inefficient carriers in Southern Europe. As the airline markets between European countries open up, high-cost carriers will either have to reduce costs or lose market share. In addition, the European Union is trying to eliminate state aid and to provide airport slots to new entrants. Both of these policies should stimulate competition among Europe's airlines and may cause incumbent airlines to lose market share.

Airline alliances between U.S. and European carriers are also changing the shape of transatlantic air services. Delta, which had established a hub in Frankfurt, has now entered into an alliance that includes Sabena, Swissair, and Austrian Airlines. Apparently, Delta will move the locus of some of its European activities from Frankfurt to Brussels and Zurich. Delta recently filed for antitrust immunity for its European alliance, stating it had met the requirement that all participating carriers are from countries that have open skies bilateral agreements with the United States. Delta also stated that this combination of airlines results in a grouping of carriers that would not be viewed as dominant on competitive grounds.

U.S.-Pacific

The panel expected that Asian carriers will continue to focus on the inter-Asia and Asia-Europe markets, because they offer the most profitable opportunities for expansion. The market between North America and Asia is not large or lucrative enough to be a major concern for these carriers. If American Airlines enters into a code-sharing agreement or strategic alliance with Japan Airlines, this would be the most significant alliance to date between a U.S. and Asian carrier. Apparently, All Nippon Airlines (ANA) and Delta have entered into a code-sharing agreement, but this has not yet been approved by the U.S. DOT. As noted above, American Airlines has also entered into a code-sharing agreement with CAI and is now focusing some activities on feeding CAI in Vancouver to connect with long-haul flights to points in Asia.

U.S.-South and Central America

Cyclical patterns of growth in aviation activity are expected between the United States and South and Central America. In some years, growth rates between the United States and South American countries will be high, but they will not be uniformly high across all countries in a single year. A large proportion of the market is still comprised of traffic to the Caribbean

Islands and Mexico. Much of this traffic is served by the American Airlines hubs in San Juan and Miami. American Airlines has established a dominant position as the one network carrier serving South and Central America.

Airline Alliances

With the continued establishment of alliances between airlines throughout the world, the industry is becoming increasingly global in its reach. Carriers are seeking to expand the reach of their networks and alliances. While not cost-reducing per se, this allows economies of density and scope that permit a carrier to increase market share or yields. More carriers are likely to seek the benefits of an international alliance. However, there may be some carriers which may not be attractive as a partner in an alliance. These carriers are likely to have lower growth in international markets. There is an increasing trend towards carriers seeking antitrust immunity in the United States so that they can fully exploit agreements with alliance partners. International airline alliances also may lead to shifts in traffic among airports as U.S. carriers seek to concentrate international service at their hubs.

Airline alliances could lead to increased concentration in some individual markets, particularly those connecting the hub of a U.S. carrier with a major European gateway airport. For example, American Airlines pulled back its Philadelphia service to London in response to the BA-USAir alliance, in spite of reported load factors in the 80-percent range. American indicated that all the high-yield traffic was going to the BA-USAir alliance because of BA's dominant position in London and USAir's dominant hub in Philadelphia. It is possible that the JFK-Brussels market, under Delta's alliance with Swissair, Sabena, Austrian would become a similarly concentrated market. It would be hard for a network carrier to enter a market where the airports are dominated by alliance carriers at both ends. This is not to say that such a market, because it may have high yields, would not be attractive to a low-cost carrier. Moreover, prices in the gateway cities may be disciplined by one-stop services on competing networks. Most network carriers will either fly to or from their hubs, or to or from a major gateway in Europe.

Early indications are that the United-Lufthansa alliance is working well. This alliance should be particularly dominant in the Chicago-Frankfurt market and the Washington-Frankfurt market because the partners dominate the airports at both ends.

More alliances are expected between nonaligned European and U.S. carriers at major gateways in the U.S. and Europe. Some of these alliances could be with regional airlines offering connecting service.

The expected shift of long-haul flying to the low-cost partners in alliances still has not materialized.. The common belief is that U.S. carriers have reduced their unit costs to levels well below those of the European carriers. Yet, in many of the alliances, the European carrier is doing the majority of the long-haul flying. This may be because U.S. carriers have been reluctant to add long-haul equipment while they are repairing their balance sheets after years of losses. There also are poor data on the relative efficiency of U.S. and European carriers. This is a major impediment to developing more detailed forecasts of traffic and market share in international airline markets.

The existing hub and network opportunities, as well as the existing rights of carriers, shape the need for alliances. For example, United and Northwest are trying to maintain dominant positions in the Pacific which have been enhanced by Fifth Freedom Rights obtained by the United States immediately following World War II. Both Delta and All Nippon Airways and American and Canadian Airlines International have entered into alliances affecting the Pacific market area. The U.S. partners are trying to extend the reach of their networks further into Asia even though they do not have the capital to invest in new long-range aircraft, nor do they want to invest a lot of money going head-to-head with United and Northwest, which clearly have superior market positions. It is difficult for a carrier to get sufficient rights on a piecemeal basis and to acquire enough aircraft to develop the scale to compete directly with Northwest and United in the Pacific.

There are still many political impediments to achieving airline alliances in Asia. In the case of the United States, Japan wants to renegotiate the bilateral air services agreement because it believes that unfavorable conditions were imposed on it immediately following World War II. Hong Kong and the Peoples Republic of China are still difficult markets to broach for U.S. carriers because these countries see a value for their home carriers in maintaining the existing restrictions in the bilateral agreement (The U.S. recently reached an agreement for a new bilateral agreement with Hong Kong). Asian carriers seem to be focusing on inter-Asian markets and have less interest in access to the United States because of relatively low yields and strong incumbents such as United and Northwest. Therefore, there is little to offer an Asian country in return for allowing additional U.S. carriers to serve that

country. It is difficult to reach firm conclusions to change the existing forecast for the U.S.-transpacific market because of the crucial role of Japan in this market. If Japan enters into a more open agreement with the United States, these changes could have a large effect on the FAA forecasts because of the size of Japan's airline market and its key geographical location on the routes between Asia and the U.S West Coast.

The United States, on the other hand, is reluctant to give up its advantaged position in the Pacific, and United and Northwest would probably argue to maintain the status quo. Other U.S. carriers such as Delta and American may be more willing to deal in a renegotiating posture with Japan if they thought they would receive more rights to serve the Pacific. Japan believes that its carriers are disadvantaged by its bilateral agreement with the United States because about 70 percent of the travelers in the U.S.-Japan market are Japanese, but JAL and ANA are losing market share to United and Northwest. A new runway in Tokyo, were it to be built, would definitely affect the forecast. No major structural changes in the near term in the Asian market.

With regard to antitrust, both the Department of Justice and Department of Transportation examine a carrier's request for antitrust immunity of an alliance. However, the decision on immunity rests with the DOT. Carriers have to pass a traditional merger analysis at DOT which generally asks the question: If the carriers were operated as a single firm, would they have an untoward effect on prices in the markets? A critical factor in assessing this threshold issue is whether the foreign carrier in an alliance seeking antitrust immunity is from a country which has open skies agreements with the United States. State aids and government ownership of a foreign carrier would be impediments to the United States granting antitrust immunity.

It is likely that additional alliances will apply for antitrust immunity now that the most recent alliance between Delta and Swissair, Sabena, and Austrian Airlines has applied for it. A key issue in antitrust immunity will be defining the relevant market and whether one-stop service or service at competitive airports is viewed as an effective limit on monopoly power of an alliance. If antitrust immunity becomes viewed as a necessary condition for a successful airline alliance, this could spur additional liberalization in Europe. If, for example, United and Lufthansa wish to apply for antitrust immunity, it would require that Germany enter into an open skies agreement with the United States Given that nine smaller countries in Europe have recently signed open skies agreements with the United States. (and that the United States already has an open skies agreement with the Netherlands), the addition of Germany to the group of countries with open skies agreements with the United States could stimulate other countries to request open skies agreements.

The major reason carriers have been seeking immunity from the U.S. antitrust laws is that it allows a combination of sales forces and allows the alliance members to freely discuss pricing. This reduces selling costs and allows the entire network of the alliance to be marketed by the sales force of each of the member carriers. Without antitrust immunity, the two carriers in the alliance must still market independently of one another and cannot discuss systemwide pricing strategies. Basically, the companies want to be able to deal when negotiating with large customers, and business travel is what the alliances appear to be fighting over.

Data Deficiencies

The panel found that existing data on carrier costs and traffic, especially data showing that an airline is actually carrying code-share traffic, are not sufficient to analyze what is happening at a micro level in international markets to and from the United States. For example, in the case of code-sharing or blocked-space agreements such as Delta passengers flying on Virgin Atlantic, these are reported as part of the U.K. carrier market share in T-100 data. Both the DOT's own study of international code sharing and the GAO study of code sharing called for improvements in traffic data filed by U.S. and foreign carriers to understand not only who carried the traffic, but also who sold the particular ticket. This is becoming increasingly unclear with the new airline alliances. For example, DOT obtains data on what is happening vis-a-vis European carriers only when there is a leg flown by a U.S. carrier on a complex itinerary.

Additional Forecast Needs

The panel identified a need for the FAA to begin forecasting international air cargo traffic. FAA indicated that it had ceased forecasting international air cargo immediately following cargo deregulation when data became sparse. The panel believes that, at present, this market is more stable with the principal players being the large integrated carriers such as Federal Express, UPS, as well as the belly cargo and all freight activities of the major airlines. However, the panel did recognize that new entrants such as Atlas Air and Polar Air Cargo are forces to be reckoned with in the international air

cargo market. Currently, these recent start-up airlines are flying wet lease operations for some U.S. and foreign carriers.

Summary

The largest emerging trends in the international airline markets are the gradual shift of growth and traffic from traditional U.S. gateways to carrier hubs. The removal of restrictions overseas would also tend to stimulate the U.S. market for international airline services. In the U.S. domestic market, new entrants are providing price discipline. Even though they may not serve an airport with many flights, they tend to discipline the yields available to other carriers. The panel speculated as to whether new entrants could also provide competitive discipline on yields in the international markets. If so, then the improved service offered by the carriers in an alliance is likely to stimulate additional traffic growth. Finally, the U.S. policy of liberal approval of code shares seems to be a force leading towards more open international markets. The increase in airline alliances may lead to more frequent services with smaller aircraft, a trend that has been recently observed in the international markets. This would tend to result in slightly higher growth rate for aircraft operations than passenger enplanements, as average aircraft size is reduced.

REGIONAL AND COMMUTER AVIATION

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Introduction

The panel or regional and commuter aviation included representatives of two major U.S. regional airlines, a significant European carrier, the Regional Airline Association, the Federal Aviation Administration, and industry consultants.

Over the past two decades the regional airline industry has experienced phenomenal growth and evolution. Traffic has consistently increased at double-digit growth rates. New technology aircraft have opened market opportunities, and the restructuring of the major carriers has redefined the role of the regional airline industry.

The primary questions before the panel were the outlook for continued growth in the regional airline industry and the anticipated structure of the industry.

The panel structured their discussion into six areas:

- Industry definition,
- Market structure,
- Fleet development,
- Cost impact,
- Revenue issues, and
- Emerging trends.

Industry Definition

The Federal Aviation Administration defines regional and commuter aviation as Part 298 air carriers, i.e. operators of aircraft with fewer than 60 seats. The FAA definition is driven by workload measures and staffing requirements and based on operations, not passengers. The current FAA definition excludes operations by larger regional aircraft now in the fleet (such as the ATR72 and ATP/J61) and the new aircraft under development (such as the Fokker 70, Dash 8-400, ATR82, and IPTN N250).

The panel suggested that the current definition no longer accurately describes the industry and proposed an alternative definition: *"Airlines that predominately operate aircraft with fewer than 100 seats and/or have a primary role as an affiliate of another carrier."*

Consideration was given to recommending that all providers of scheduled air service be considered air carriers and that the distinction between classes of carriers be eliminated. The panel decided that there is value in forecasting the regional airline industry separately from the larger air carriers. The FAA workload issues related to regional airline operations continue to be different from those of the larger jet operators. This distinction will become less clear as the new single safety standard is introduced and implemented.

The panel agreed that ultimately it is the mission that defines a regional airline. Thus, an airline that operates under the code, name, and market presence of another carrier is considered a regional airline.

Market Structure

There are three tiers of scheduled airlines:

TABLE 1 FLIGHT SEGMENT VERSUS AVERAGE SEATS PER DEPARTURE

Segment Length	Average Seats per Departure
Less than 400 km	58
401–800 km	105
801–1,600 km	146
1,601–2,400 km	162

- Tier 1 — Major/National (i.e., jet partners for regional airlines).
- Tier 2 — Regional Affiliates (e.g., USAir Express and American Eagle).
- Tier 3A — Subaffiliates (e.g., GPExpress feeding Continental Express).
- Tier3B — Nonaligned (e.g., Sierra Expressway).

With the introduction of regional jets, regional airline markets have expanded to almost 1,000. Traditionally, the regional airline markets were in the turboprop aircraft range of under 300 miles. As turboprops gained speed with the increase in the power of the engines the range expanded out to 400 miles. Now, the large sixty-plus-seat turboprops are designed for speeds up to 380 knots and ranges approaching 1,000 miles. The regional jets with speeds of 460 knots expand the range up to 1,200 miles.

Traditionally, as the flight segments increase, the average seats per departure also increase (Table 1).

The number of nonstop segments in the 401-600 km range served by turboprops has increased from 99 in 1978, to 184 in 1985 and more than double to 495 in 1994 (Figure 1).

Segments over 650 km have increased from only 31 in 1978 and 1985 to 124 in 1994 (Figure 2).

The panel concluded that the regional airline industry role will remain as feeder partners to the major jet carriers and that they will continue to expand into longer route segments and develop less traditional markets.

Fleet Development

There are two major trends in the regional airline fleet: the introduction of large regional aircraft and the diminishing role of the 19-seat aircraft. The U.S. regional airlines are now operating turboprop aircraft with over 60 seats and regional jets up to 100 seats. As the new larger aircraft are introduced into the fleet, the industry ASMs and RPMs will increase faster than enplanements. The 19-seat aircraft are facing significant threats to their economic life. Virtually all Tier 2 Regional Airlines are getting out of 19-seat aircraft. The Tier 3 regional airlines are becoming the primary operators of 19-seat aircraft. The introduction of the larger regional aircraft and the diminishing role of the 19- seat aircraft will drive the average seat size to exceed 30 seats by 2000.

Cost Impact

The three primary drivers of the regional airline cost structure over the next five years will be regulatory/legislative actions, labor, and fuel.

The single safety standard will have a very large cost impact on the regional airline industry. As proposed, the new rule would require by the end of 1996 en route communications, dispatchers, expanded record keeping, and increased initial operating experience of pilots.

The single safety standard will have an especially heavy impact on new-entrant Tier 3 regional airlines that generally begin operation with 19-seat aircraft and on the existing operators of 19- to 30-seat aircraft that will all need to be recertified as Part 121 carriers. Potentially 800 19-seat aircraft and 300 30-seat aircraft will be affected. The new rule will have a major workload impact on FAA.

Other major regulatory/legislative programs that will have an impact on the cost structure of the regional airline industry include:

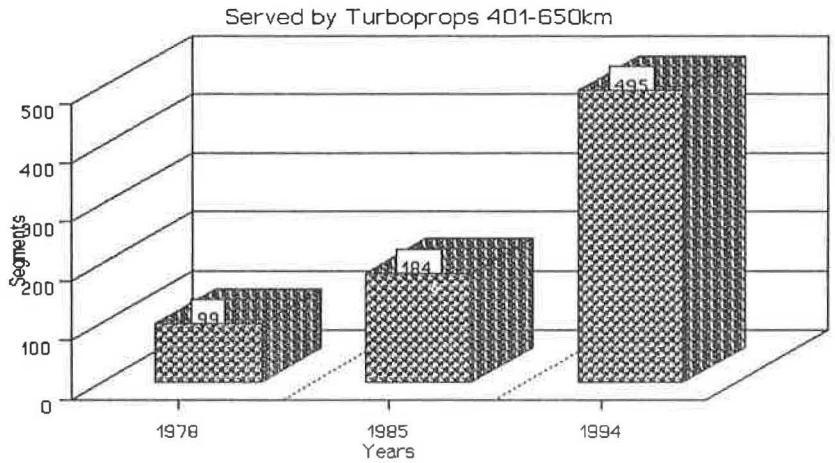

FIGURE 1 Nonstop segments served by turboprops (401–650 km).

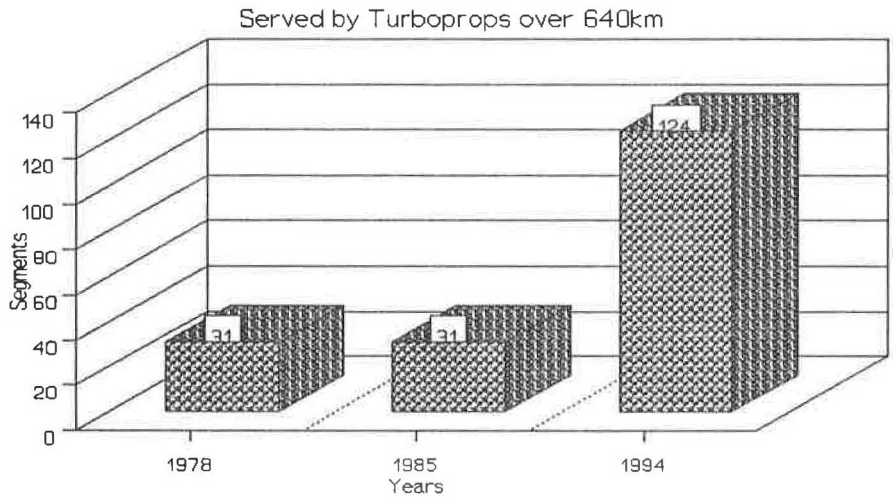

FIGURE 2 Nonstop segments served by turboprops (more than 650 km).

- Pilot training - New training requirements will apply to all Part 135 operators, not just those with aircraft larger than 19 seats.
- Flight and duty time - the proposal will impose duty time limitations and affect labor productivity.
- Essential air service sunset - EAS sunsets in 1998, and the current round of funding is very limited.
- DOT/FAA Budget - Budget constraints will limit FAA's ability to implement new single safety standard.
- FAA Reform - This could bring additional user fees.
- Security - Tighter security requirements in the U.S. domestic market will continue to be a major issue.

Labor issues will cause costs to rise in the regional airline industry. Regional airlines are becoming a career, not just a stepping stone. Thirty of the top 50 regional airlines now have unionized workforces. Seniority is now an issue and will lead to increased cost and potentially more restrictive work rules.

The fuel tax of 4.3 cents per gallon will result in an additional cost of $30 million for the regional airline industry.

There are two major revenue drivers. Elimination of EAS will affect the Tier 3 carriers' revenues and the overall declining yield trends will squeeze industry revenues. Yields decrease with segment length.

Therefore, as regional airline industry routes extend out to 600-1,000 miles, overall yields will fall.

Emerging Trends

Tier 2 regional airlines will continue to serve at the pleasure of the larger jet operators. As the load factors in the major carrier industry increase, the value of feed traffic is diminished. The larger operator has the opportunity to resell seats in local markets and to support the hub. Until capacity is increased by the major and national airlines, they will require less feed from regional affiliates.

The hand off of short-haul routes will continue at a diminishing rate. The need of the jet carriers to reduce overall cost and fleet size will ensure that routes will be transferred to regional partners.

Enplanements will grow somewhat more slowly than the historical rate, with ASMs and RPMs spurting as stage length increases. Load factors will creep up very slowly as the size of aircraft increases. The fleet size will be affected by the diminishing role of 19-seat aircraft and the addition of larger regional turboprop and jet aircraft.

AIRCRAFT AND ENGINE MANUFACTURERS

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The discussions of the manufacturers panel were split into two parts: first, a review and consolidation of the forecasts submitted by each participant in advance of the workshop and, second, consideration of the underlying issues, assumptions, and methodologies employed in making these forecasts.

Forecasts

The panel's consensus was that worldwide passenger traffic would grow at an average annual rate of 4.9 percent over the next 15 years. At this rate, traffic would more than double by 2009. Agreement on this figure was quite close. Discarding the one high and one low extremes, the remaining 19 estimates fell within the narrow range of 4.3 to 5.5 percent (Figure 1).

The average load factor was predicted by the panel to increase from 67 percent today to 69 percent by the end of the period, contributing to increased aircraft productivity and consequently lowering the demand for new aircraft.

The averages of the panelists' 15-year forecasts of deliveries of turboprop and small jet (fewer than 69 seats) aircraft were 4,000 deliveries and 1,800 retirements, a net fleet growth of 2,200 (Figure 2).

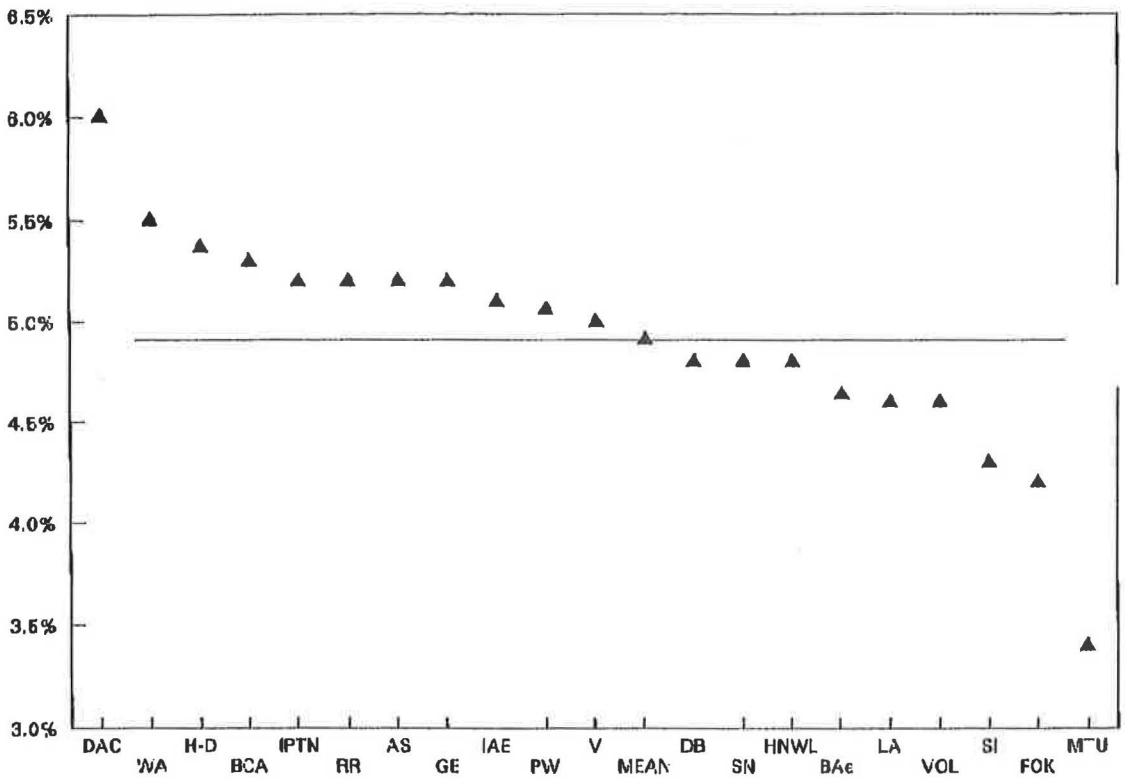

FIGURE 1 Forecasts of 15-year worldwide traffic growth (dispersion around the mean of 4.9%).

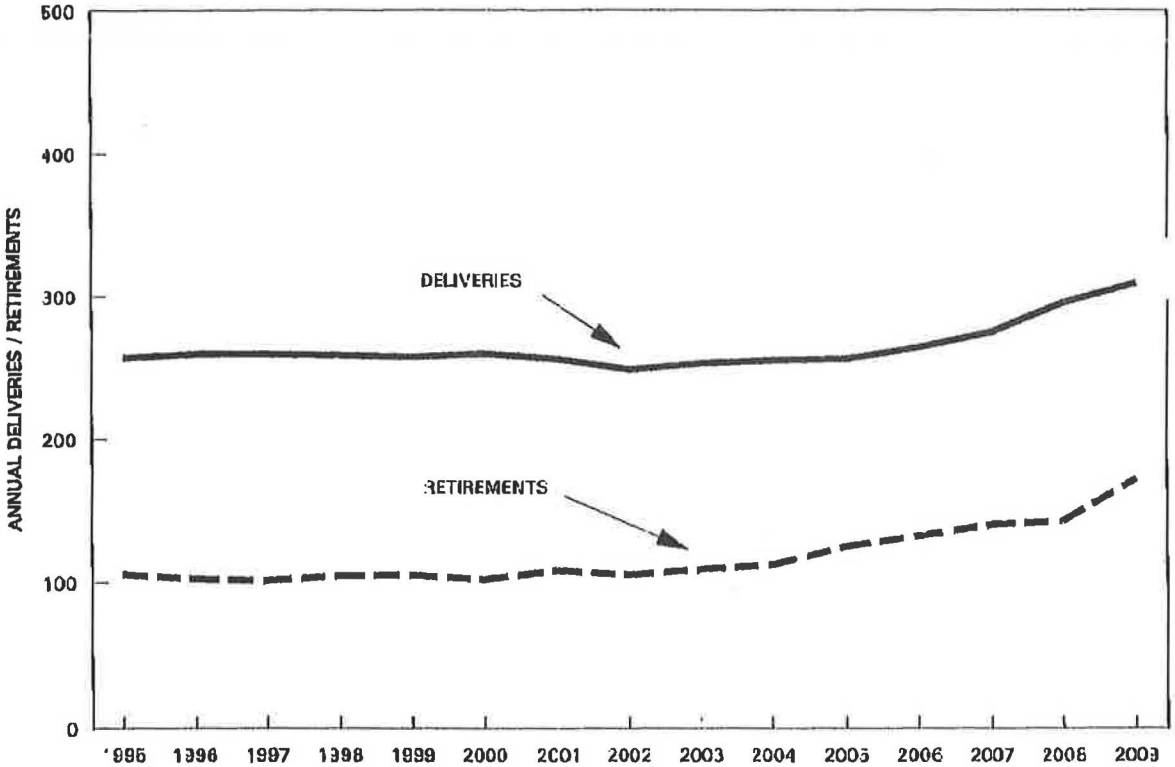

FIGURE 2 Turboprop and 50- to 69-seat jet passenger aircraft (average of delivery and retirement forecasts).

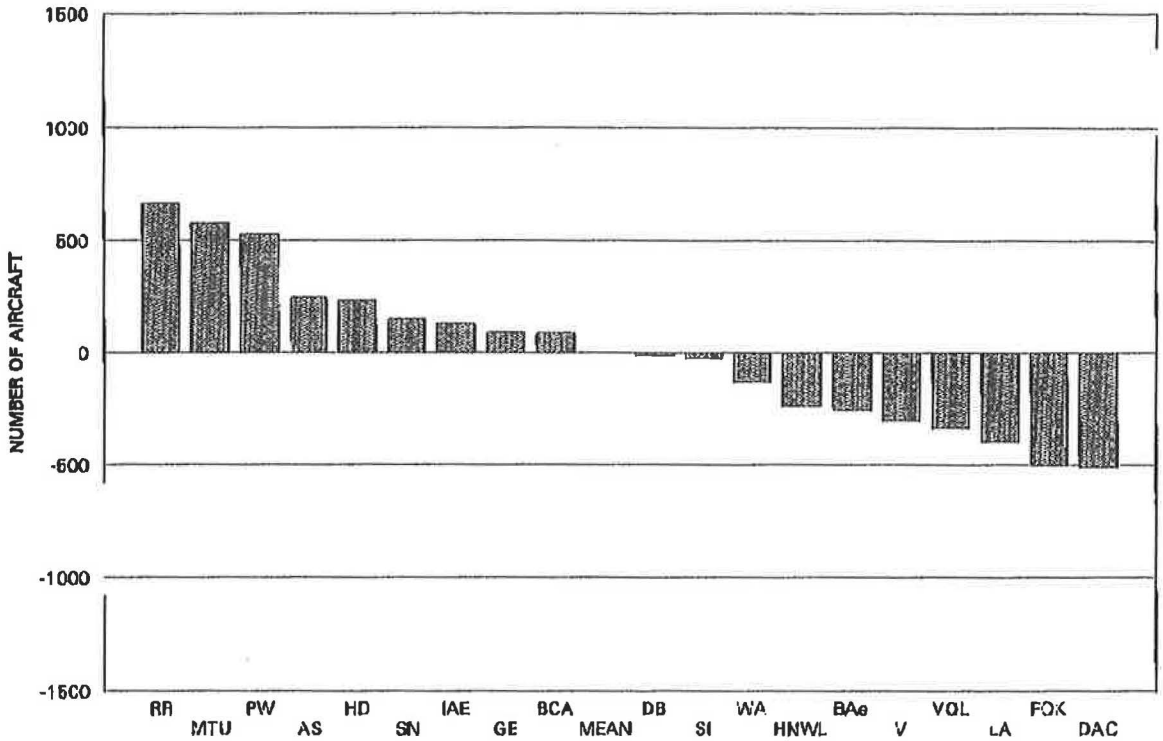

FIGURE 3 Retirement forecasts of passenger jet transports with more than 70 seats (dispersion around the mean 15-year total of 3,700).

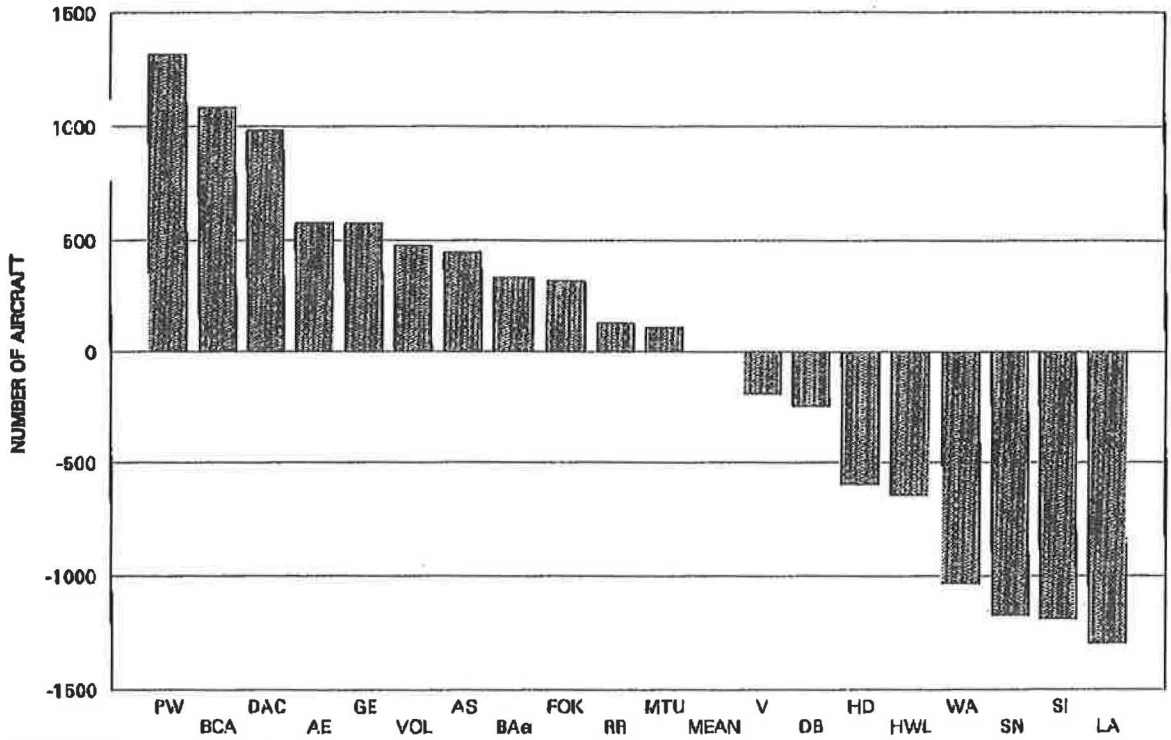

FIGURE 4 Delivery forecasts of passenger jet transports with more than 70 seats (dispersion around the mean 15-year total of 8,450).

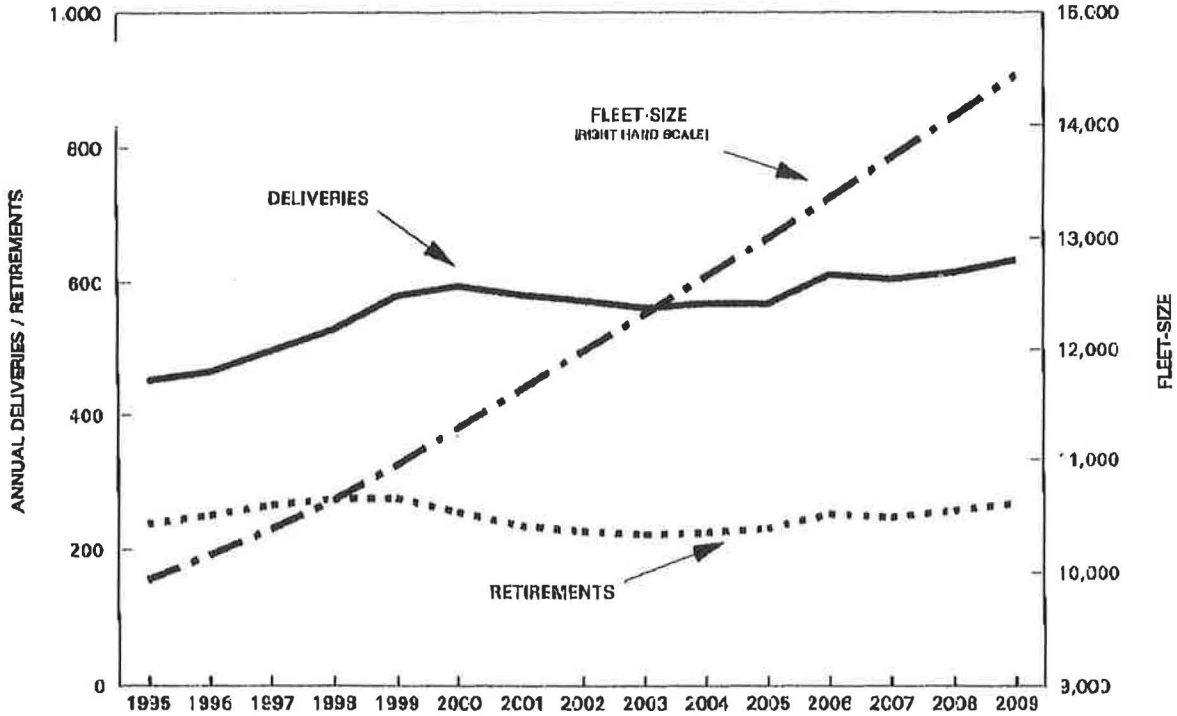

FIGURE 5 Average deliveries, retirements, and fleet sizes of passenger jet transports with more than 70 seats.

The passenger jet fleet was predicted to grow by 4,800 (reaching a fleet total of 15,000 aircraft) with consensus forecasts of 8,500 deliveries and 3,700 retirements (Figures 3, 4, and 5).

Over a 15-year period this equates to some 560 aircraft deliveries per year, an increase of 12 percent compared to the average delivery rate of the past 15 years (notwithstanding the record levels recorded in the early 1990s).

As noted in the 1993 TRB Future of Aviation Workshop report, the aircraft retirements forecast is the component in which forecasters generally have the least confidence due to the shortage of historical data. Most analyses are age-related, with life-extension options (such as hush-kitting and reengining) superimposed to adjust the accuracy of the profile While this approach seems logical, actual events have proved to be somewhat illogical in many instances. This leads to the problem of how to treat the large number of aircraft which should (logically) have been retired but are still operating or parked ready to reenter the active fleet if and when required. It will be interesting to see what actually transpires because this will no doubt form the basis for calculations by panelists at future biennial TRB aviation forecast workshops.

Qualitative Issues

While providing a consensus view of predicted fleet dynamics, numbers are only part of the story. The assumptions and expectations used to calculate individual forecasts were varied, and the panel spent most of its time exploring qualitative issues. Although historical data and correlations are important pointers to the future, the panel also had to consider the likelihood of change. For instance, how much longer will the assumed relationship between GNP and traffic demand, which is based on experience, remain valid? The starting point proposed to panelists before the workshop began was to identify the most influential issues in the short and long term, including an indication of the difficulty of assessing their impact. Table 1 and 2 display the results of rating these issues. Not surprisingly, the most important issues were often considered the most difficult to deal with.

Economic Growth and New Technology

Economic growth (together with its impact on air travel demand) and the technologies to enable legislative

TABLE 1 IMPORTANT ISSUES DETERMINING FUTURE AIRCRAFT DELIVERIES

1ST FIVE YEARS

	RAW	WEIGHTED
• Economic Recovery and Growth : Linkage to Traffic Demand	13	53
• Re-Engining and Hush-Kitting	14	37
• Availability and / or Affordability of Capital	13	36
• Order Cancellations / Delivery Deferrals	9	26
• Environmental Legislation - Noise and Emissions	7	25

LAST TEN YEARS

	RAW	WEIGHTED
• Economic Recovery and Growth : Linkage to Traffic Demand	13	55
• Congestion as a Growth Constraint	14	36
• Eastern Europe, C.I.S, P.R.C.	14	36
• Availability and/or Affordability of Capital	9	30
• Hub and Spoke versus Point to Point	8	27

TABLE 2 DIFFICULT ISSUES TO FORECAST

1ST FIVE YEARS

	RAW	WEIGHTED
• Eastern Europe, C.I.S., P.R.C.	13	43
• Economic Recovery and Growth : Linkage to Traffic Demand	10	43
• Yield Management / Pricing Policies	11	35
• Order Cancellations / Delivery Deferrals	8	28
• Availability and/or Affordability of Capital	8	22

LAST TEN YEARS

	RAW	WEIGHTED
• Eastern Europe, C.I.S., P.R.C.	15	56
• Congestion as a Growth Constraint	11	36
• Economic Recovery and Growth : Linkage to Traffic Demand	8	28
• Globalisation of Airlines	9	25
• Hub and Spoke versus Point to Point	9	25

deadlines relating to noise, air pollution, and safety were judged to be the most important issues in the short term.

Congestion

Over the longer term, the panel's major concern was congestion, which could limit aircraft movements, add cost, and induce frustrated travelers to seek alternative modes of transportation and communication. The effects of congestion can already be seen in the trend of major carriers to transfer routes to affiliates, thereby stimulating demand for small aircraft. Witness the emergence of the regional-jet market and the consequent increase of flight frequencies both in and out of hubs and on point-to-point routes between smaller centers of population. Clearly, congestion could influence the small-jet and turboprop aircraft segments.

Emerging Markets

Uncertainty about the future development of commercial aviation systems in Eastern Europe, the CIS, and

mainland China ranked high as an issue because of its influence on the demand for aircraft. Views on rates of demand growth, the mix of indigenous vs. western equipment (particularly in the CIS), geopolitical stability, and so on are not easy to formulate, let alone meld into a consensus. The panel felt this will become a major influence on demand after the turn of the century, by which time some of the doubts and questions may be easier to answer.

Environmental Concerns

The subject of the environment received a great deal of attention. The panel was concerned that the aviation industry may have failed to communicate effectively how much progress has been made over the past few years and consequently be leaving itself open to criticism. Environmental legislation, even stricter than that already in place or in the pipeline, may be just around the corner, waiting to ambush the industry. The bottom line is the effect that compliance with environmental regulations will have on cost, which would translate into increased fares, thus depressing travel demand and reducing the need for new aircraft products. Moreover, the uncertainty and risk of future legislative or regulatory actions diminishes the attractiveness of an aircraft as an asset, and hence it financeability.

Fragmentation

The panel highlighted fragmentation on long-range routes as a significant phenomenon affecting aircraft size. A prime example is the supplanting of B747s by B767s on transatlantic routes. The opening of new long-haul routes using smaller aircraft suggests that a degree of fragmentation might occur, but it is difficult to assess how large it might be.

Purpose of Travel

The changing balance of business and leisure travel will have an effect on yield. Analysis indicates that yield on the London-New York route is falling about one percent per year due to rise in the share of leisure travel. In the United States twenty years ago the split was 80 percent business, 20 percent leisure. Today it is 50:50.

Final Comment

The view of the manufacturers' panel was positive with respect to overall growth in the demand for travel and new aircraft, with the latter being boosted by hitherto unseen levels of aircraft retirements. The panel recognized that the impacts of the trends cited here are not easy to assess until we have the benefit of hindsight. Some things never change.

INFRASTRUCTURE

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The infrastructure panel focused its discussion on seven issues:

- Capital,
- Technology,
- Institutions,
- Economics,
- Industry,
- Environmental impacts, and
- Infrastructure.

Capital

The availability of capital for airport rehabilitation and expansion is likely to be a function of airport size. For the largest 100 to 150 airports in the Nation, access to capital will generally not be a problem, except for very large projects. Midsize commercial service airports are likely to face serious capital shortages, and the smallest commercial service airports (nonprimary airports) will face very severe economic and financial difficulties. The availability of capital for the all but the largest sites will depend, in part on the future of the Airport Improvement Program (AIP).

Other factors influencing access to capital are the role and effects of tax exempt bonds. These bonds, while creating a pool of capital, perversely drive out all forms of private investment which do not have the ability to compete with these instruments. The overall effect may be to impede access to markets.

For the air navigation system, access to capital is already a problem. Failures of aging equipment are causing short-term capacity reductions, and constraints on capital are slowing needed capacity enhancements. Lower than needed investments over a long period mean that a major program of investment is needed. This investment is being slowed by the lack of progress on institutional change.

Technology

Four types of technology were discussed:

- New air navigation systems (ANS),
- New large aircraft,
- Common-use terminal facilities, and
- Intermodal transportation systems.

With respect to new ANS technologies, particularly GPS, many capacity-enhancing technologies are ready for application but delayed in implementation by institutional and capital constraints. Human factors will also be a constraint on the capacity of the ANS system,

particularly in the transition from a labor-intensive to a computer-based system. Some technologies originally promoted for their capacity enhancement potential have, after implementation, been shown to provide gains in safety as well.

New large aircraft may provide capacity gains in a limited number of very large markets, but they are also likely to create a new set of traffic peaking and landside capacity problems.

Common-use airline terminal facilities and ticketing equipment can provide capacity increases, but the use of these facilities and equipment is constrained by airline competition, traditions, and the nature of airline-airport contracts. Common-use ticketing equipment has been used at several international airports with success.

Although the benefit of linking other intercity transportation modes has been demonstrated in Europe, large investments would be required to achieve multimodal integration in most U.S. markets.

Institutions

Institutional change is the key to improving capacity. Institutional change is defined as fundamental changes to organization structure, ownership or financing. Without institutional change, the benefits of technology enhancements will not be fully realized. The changes needed include changes in ANS organization and procedures, greater access to capital, and revision of the tax treatment of airport investment to create a level playing field between public and private capital.

The maturity of aviation in the North American market suggests that price and cost pressures will continue, and there may be a need to revise airport marketing strategies, including market differentiation between airports in multi-airport regions.

Economics

The need for improved, market-focused economic mechanisms to enable better use of existing airport infrastructure is a recurring theme whenever a cross-section of the aviation community gathers. The conundrum is that there are two roles for market pricing mechanisms: 1) to allocate scarce resources, and 2) to provide signals on where and how much to expand. While the first role is valid for airports, the second is not. Environmental and land-use constraints will limit growth even in the face of strong market indications of the need for new facilities.

Governments frequently exacerbate capacity problems by acting contrary to need. There is a tendency to scatter a little money around to everyone, sustaining airports of limited value while not promoting sufficient capacity where it is needed.

Aviation Industry

Aviation industry trends have an impact on demand in several ways. Dehubbing through the spread of direct services on long, thin routes will dampen growth at hubs, stimulate growth in smaller markets, and cause localized capacity problems (gates primarily) in some smaller markets. Business aviation will continue to grow but at a slow rate. Personal and light general aviation will likely continue to decline. Overall, general aviation growth will be negligible. Congestion at urban general aviation airports, already a problem in some places, is likely to worsen.

Environmental Impacts

Although the industry as a whole has made significant environmental gains, continued public pressure for noise abatement will mean that further reduction in aircraft noise levels will be necessary. Public perceptions that technology can go substantially farther in reducing noise and emissions is becoming a problem in itself as absolute technological boundaries are neared. Air quality at airports is a significant public issue that is likely to become an even larger problem in the future.

Overall, environmental issues will continue to be a constraint for large airport projects and for airports experiencing major changes in activity levels.

Infrastructure

The interplay of the factors enumerated above has major implications for aviation infrastructure. Increasing gate space and terminal building capacity at airports requires that existing terminal space be better used through common-use systems and ticketless travel. More effective security systems must be incorporated in airport terminal design. Until they are, any attempt to increase the level of security with the facilities and equipment now in use will dramatically reduce airport capacity.

The current trend to expand airport concession areas does not inherently decrease capacity, but it may improve passenger flow by better distribution of demand

within terminal buildings. While multiple uses of airport terminals are desirable, there are limits to which the efficiency of movement can be improved.

Summary

The key points emerging from the deliberations of the infrastructure panel deliberations were:

- In the short term, airport capacity will not be a constraint to growth except at a few high-density airports.
- ANS capacity is already a constraint and likely to be more so in the future.
- Institutional factors are limiting capacity enhancement in the ANS and at airports.
- Airports and airlines will become more specialized in today's maturing market.

With the issues identified in this paper, the Infrastructure Panel proposed its own set of forecasts as summarized in Appendix A.

Comparison of the Panel numbers with the FAA draft forecasts indicates that:

- The panel was more conservative for domestic and international enplanement growth;
- The panel felt that growth in commercial operations would more closely follow growth in enplanements than the FAA forecasts (i.e., that there would not be such a dramatic change in average load as implied in the FAA forecasts); and
- For noncommercial operations, short-term declines will be less than the FAA indicates and long-term growth will also be less.

BUSINESS AVIATION

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In addition to the panel of aviation forecasters, the business aviation portion of the workshop included a specially invited group of prominent leaders in the business aviation industry. This group met in a half-day executive session to share their views on the future direction and well-being of business aviation. This approach provided mutual benefits for industry executives, the Federal Aviation Administration, and the forecast panel. The executives gained by participating in an extended and meaningful exchange with their peers. FAA benefitted by receiving a real-world perspective on the business aviation sector and a high-level review of its forecasts. The panel members obtained insights and a high-level view of trends upon which they could base their market projections.

Themes

In the executive session and the panel deliberations certain recurring themes relating to the future of business aviation emerged.

Trends

Timesharing, or fractional ownership of aircraft, has been drawing increasing interest. The industry will continue to grow, spreading to more parts of the world and covering all classes of business aircraft. While providing an adjunct to airframe manufacturers' business, timesharing was not seen as a program that would significantly boost new aircraft sales.

Teleconferencing was not seen as a threat to business travel. In fact, it may prove to be a benefit. By facilitating and expanding long-distance communication, this technology will not replace, but may actually increase, the need for face-to-face personal contact.

The availability of used aircraft will always have an effect on new aircraft sales. However, most participants tended to the view that people who buy used aircraft will always buy used aircraft. This, coupled with a shrinking fleet of good-quality used aircraft, will help negate the effect on new sales.

Advertising and promotion will come under increased scrutiny. The benefits of direct mail campaigns, third-world air show participation, and nontrade print media are no longer clear. Nothing takes the place of personal contact with customers and providing them with hands-on product experience.

Customers

Business aviation is still relatively young. It was moved rapidly away from the "cowboy entrepreneur" who would pay any price for what was once a new, scarce commodity. Today, customers have as much or more overall product knowledge as the manufacturers. They recognize value and will buy only products that provide the best price-value relationship and predictability of costs.

Manufacturing

To provide value, manufacturers must drive costs down. Factories must be further automated, new processes established, and new materials developed. Vendor relationships have evolved to a point where there is more risk sharing. In exchange for being made a sole source, vendors must make significant concessions. They no longer provide bits and pieces of aircraft but complete subsystems.

Products

There is nothing expected in the near future that would cause explosive sales growth. Instead, engine, avionics, and airframe builders will employ new technology only when it provides the customer more value at a reduced cost. Still, incremental improvements will be made with each successive new product offering.

Government

Nothing now causes more concern than pending legislation that would levy various user fees on business aircraft operators. Any increase on development, manufacturing, or operating costs will have a negative effect on demand.

Conclusion

The business aviation industry, after a painful period in the early 1990s is poised for growth on the heels of a strengthening economy. Success especially awaits those companies that continually turn out new products offering more value.

As a group, the forecast panel and the industry executives who met in the special session were optimistic about the future of business aviation. Barring any surprises in the form of user fees, the industry will continue to flourish and play an integral role in the world economy.

VERTICAL FLIGHT

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David S. Lawrence
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The report that follows was generated in two steps. Initially the report was put together by panel members attending the Future of Aviation workshop. Because of schedule conflicts and last-minute withdrawals, several of the invited participants were unable to attend. To better reflect the consensus of the industry, the report generated by the panel was subsequently circulated to all the original invitees for their comment (Comments were received after the workshop from Andy Aastad, Aastad Company; Barry Desfor, HeliValue$; Pierre Heron, Pratt & Whitney Canada; and Frank Robinson, Robinson Helicopters). This report contains the views of the panel, modified and affirmed by other industry executives who could not take part in the workshop.

Overview

The panel assembled and the subsequent experts queried predicted that the U.S.turbine-powered helicopter fleet would have no growth over the next five years, with new units equaling attrition. Flight hours were expected to increase to an average of 675 hours per year per helicopter by 2000 due to cost and management demands. No forecast was made of helicopter pilot growth or of the size and hours flown in the piston-engine fleet. All statements in this report apply to the U.S. market, except where specifically noted.

Forecast

In contrast to the approach taken at previous Future of Aviation workshops, the panel focused on the supply of helicopters rather than on the demand for helicopter services in developing forecasts for the period 1996-2000. The panel identified three major drivers of supply: fleet utilization, attrition from the fleet, and new units entering the fleet. Forecasts were made on the basis of the impacts these drivers would have on flight hours and fleet size.

Fleet Utilization

Utilization of helicopters in the fleet continues to increase. The cost of owning a helicopter that is not optimally utilized, coupled with increasing professionalism in the management of commercial helicopter operations, impels operators to put their units to fullest use.

The effect of aging units on the utilization rate was not considered an important factor. Studies by industry experts have found that usage does not vary significantly with age. Confirmation of this was received from the FAA's operator survey for 1995, which showed an increase in overall utilization beyond that associated with new units added to the fleet. Because helicopters in commercial use are often on a preventive maintenance schedule and life-limited parts are continually replaced, a given unit will remain active and show little or no drop in utilization as it ages.

Overall, the panel and the experts queried later felt that the trend toward increased utilization would continue. They forecast utilization of the turbine fleet increasing to approximately 675 hours per year per helicopter over the coming five-year period.

Fleet Attrition

The panel forecasted an annual attrition rate of one to two percent in the turbine-powered helicopter fleet as a result of export of older units and retirements. This

amounts to approximately 30 to 50 units leaving the active U.S. fleet each year. Three factors account for this low attrition rate.

1. Because of the rise in manufacturers' prices, it is currently less expensive to rebuild a damaged helicopter than to purchase a new unit.
2. Longer overhaul intervals and retirement schedules, coupled with the trend toward "on condition" replacement cycles and improved maintenance procedures, have made it more economical to keep aircraft active longer.
3. Better safety, maintenance, and operating practices have led to fewer accidents resulting in damaged aircraft being declared a total loss.

A wild card in this forecast is how the problem of bogus parts will be handled. Both the helicopter industry and FAA are concerned about the infiltration of substandard and improperly remanufactured components in maintenance inventories, not only because these bogus part are unserviceable but also because they are a safety hazard. Two approaches are being considered to deal with the problem. One is to pull from service all surplus parts currently held by operators and maintenance facilities. The other (and less drastic) approach is to have parts inventories inspected by the original equipment manufacturers (OEM) and returned to service if they are found to meet specifications.

If the first approach is adopted, it would induce some operators to upgrade to new equipment since the cost of repairing older units would rise to a point where it becomes uneconomical. If the second approach is taken, older units now in operation would remain active. The opinion of the panel, based on the expectation that the more economical solution of having OEMs inspect all parts inventories will be adopted, was that there will be a minimal effect on the fleet attrition rate.

New Units

The panel concluded that new turbine-powered units added to the fleet in the next five years will remain at the same level as in the prior five years. This means that approximately 60-90 units would be added to the fleet each year. This is based on the expectation that total worldwide shipments will total approximately 300 units each year, with 20 to 30 percent of them entering the U.S. fleet. Another source of "new" units over the next several years will also be the surplus military units transferred to the civil fleet.

The impact of the JAA/FAA harmonization work has been predicted to reduce the delivery of single-engine turbine helicopters. Rulemaking in Europe is projected to limit the use of single-engine helicopters over some densely populated cities. The panel again concluded that similar restrictions are unlikely in the United States. This prognostication appears to be confirmed by the manufacturers of helicopters themselves. In the past several years, a large number of new single-engine models have been announced, indicating that OEMs are anticipating a continued role for single-engine helicopters in the fleet.

Panel Comments on FAA Forecasts

The FAA preliminary forecast for the turbine-powered rotorcraft fleet projects growth of 3.3 percent in 1996, 3.2 percent in 1997, and 3.1 percent in 2000. The panel felt that growth would be much slower: 1 percent in 1996, 0.75 percent in 1997, and 0.5 percent in 2000.

The panel did not expect that the hours flown by turbine-powered helicopters would increase in 1996 and 1997. There could be slight upward movement in subsequent years, possibly reaching an annual growth rate of 2 percent by 2000.

The panel made no forecast of the size of the piston-powered helicopter fleet and hours flown because there were no representatives of this segment of the industry in attendance. The general expectation was that over the coming five years the number of piston-powered helicopters in service would increase at about the same rate as in the past five years. Between 1990 and 1994 an average of 343 units were produced by the three major manufacturers (Robinson, Schweizer, and Enstrom). Of these, approximately two thirds were exported. This resulted in a net increase of 115 new units per year in the U.S. fleet. Because no data on attrition are available, the panel could make no forecast of the future size of the piston fleet.

Data Needed from FAA

The panel suggested that FAA review the form used for the annual owners survey. It appears that the survey is complex and that the layout could be modified. Recognizing that various constituencies of FAA have different data requirements, the panel offered to work with the FAA Forecast Branch to modify the form. One member of the panel offered to have the current form vetted by his company's survey group to see if it could be simplified. The Chairman of the TRB Helicopter Subcommittee suggested organizing a task force of various people who use the output of this survey to ensure that relevant categories of information are included and that no longer relevant items be dropped.

In particular, the helicopter industry would like to receive more information on the types of missions that helicopters are flying. This would increase the accuracy of the forecasts developed annually by the TRB Helicopter Subcommittee.

Summary

The overall feeling of the panel was that the turbine-powered rotorcraft fleet would have only minor growth over the next five years, but that hours flown by the fleet would increase. This may not, however, translate into an increased utilization of FAA flight services since many of the traditional helicopter operators are not users of these services. The panel also suggested modification of the FAA helicopter forecasts and identified additional data needed to improve the accuracy and utility of future forecasts.

General Aviation Group Session

The three workshop panels concerned with general aviation — Business Aviation, Vertical Flight, and Personal and Light General Aviation — met in a combined session on the first day of the workshop to discuss issues of common interest.

Impact of Telecommunications

One of the speakers at the opening plenary session of the workshop speculated on the impacts that burgeoning telecommunication technology might have on civil aviation. The consensus of the members of the three general aviation panels was that the effects on the general aviation sector would be minor, if any. While telecommunication may have some impact on commercial aviation, the people served by general aviation will not change their travel patterns and preferences in the foreseeable future. It was noted that the same topic has been discussed at previous Future of Aviation workshops but that little more than broad estimates have been given and no proof of impact has been substantiated.

Reliever Airports

The group received an informal report on the Reliever Airport Workshop recently sponsored by the Transportation Research Board. While there was some concern that the changes in the designation of reliever airports may adversely affect funding, no conclusion was reached on the effect this would have on general aviation.

Results of Previous TRB Future of Aviation Workshops

Members of the group who had attended previous workshops expressed concern that no feedback has been received from the FAA on precisely how and where the forecasts and recommendations have been used. While FAA appears to use some of the workshop results data in making its annual GA forecast and distributes the TRB report of the workshop at the General Aviation Forecast Conference held in the Spring, it does not directly respond to the recommendations. One solution might be to have more representation from the FAA Forecast Branch at these TRB Future of Aviation Workshops. Another might be for FAA to review the output of the prior workshop before the next and present a status report on recommendations that have been adopted or rejected and on actions that have been taken.

FAA Data

FAA recently changed the data format of the U.S. Aircraft Registry. While the change was regarded as positive by the attendees, several would liked to have had more advance notice. Firms that use this database in their forecasting efforts, had to rewrite computer programs to accommodate this change. Regular subscribers to the Registry database should be notified before format changes are instituted.

The group also discussed on-line access to FAA data. Each of the three industry groups were asked to prioritize the data requirements so that a schedule can be developed for putting the data on line in a manner that serves industry needs.

LIGHT GENERAL AND PERSONAL AVIATION

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Ronald Green
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Steven R. Hines
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Don Johnson
Aircraft Owners and Pilots Association

Richard Koenig
Flying Magazine

Al Lange
Green Tree Financial Corp.

Ernie Murray
Raytheon Aircraft Company

Ralph Nelson
Experimental Aircraft Association

James Veatch
Federal Aviation Administration

Mike Wolf
Textron Lycoming

U.S. Student and Private Pilot Populations

Assumptions

A major assumption in developing the panel's consensus forecast was that the regulatory environment for general aviation will not be fundamentally or substantially changed over the next 10 years.

The panel was particularly concerned about the possibility that a new system of user fees might be levied on private aircraft owners and operators. If such a system is adopted, these forecasts will be inaccurate. The opinion of the panel was that a user-fee system would have a highly damaging impact on general aviation. Since the piston-powered airplane segment is particularly price-sensitive, user fees could degrade safety, reduce activity levels, and drive down the size of the pilot population.

Forecasts

Two forecasts of airmen were developed by the panel for the 1966-2000 time period: one for the active student pilot population and the other for the private pilot population.

Student Pilots

The active student pilot population in the United States is expected to decline 1.3 percent in 1995 and 0.4 percent in 1996. Thereafter the student pilot population will begin to rebound and grow by 1.9 percent per year in 1997-2000 (Figure 1). The number of student pilots will decline from 96,250 in 1995 to 94,600 in 1997 and then rise to 100,100 by the turn of the century.

Private Pilots

The story is basically the same, with only minor variations, for the active private pilot population, which is expected to decrease by 1.3 percent in 1995 and 0.8 percent in 1996 and then increase by an average annual rate of 1.1 percent from 1997 to 2000. The total active pilot population will drop from 284,250 in 1995 to 278,350 in 1996 before turning around and reaching 287,600 by 2000 (Figure 2).

Near-Term Forecast Considerations

The driving factors influencing the decline and then growth of the airman population are similar. A major

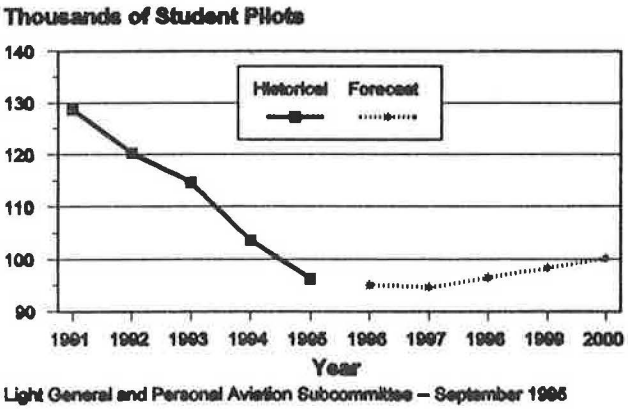

FIGURE 1 Active student pilot population, 1991–2000.

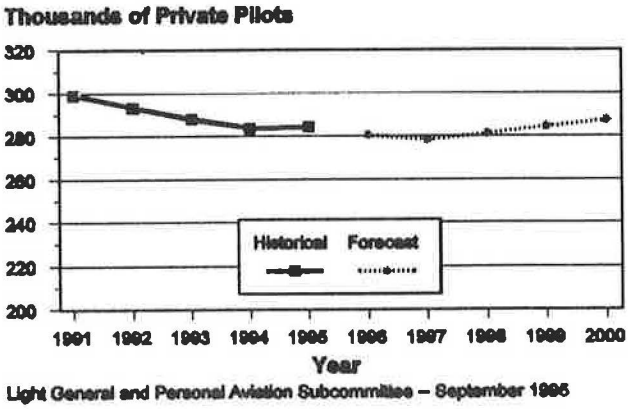

FIGURE 2 Active private pilot population, 1991–2000.

factor in the near term is the deteriorating flight instructor and flight training infrastructure in this country. Over the years the number of flight schools has declined substantially. Fewer fixed base operators (FBO) offer flight training programs. The physical facilities of many FBOs and flight schools are not in the best condition, due at least partially to the economic strain that most FBOs are experiencing. Compounding the problem is the shortage of training aircraft. No new training aircraft are being produced in this country, and only a few are being imported.

After passage of the General Aviation Revitalization Act of 1994, U.S. manufacturers began increasing production and constructing new plants to manufacture piston-powered aircraft. In fact, piston airplane shipments rose by over 10 percent in the first half of 1995 alone. But even at the maximum anticipated production rate, many more new aircraft will have to enter the fleet before the age of the piston-powered fleet begins to drop from today's average of 27 years. Consequently many of the aircraft now used by flight schools are old and deteriorating.

The industry needs to do a better job of promotion and marketing. The available aircraft are old and not very "sexy" by today's standards. There are more fences around general aviation airports, large and small. FBOs are often not skilled in attracting and retaining new customers. Financing programs are lacking for aircraft purchase and flight training.

FBOs and flight schools need to project a more professional image and provide better value for the dollar. By improving training programs and increasing the use of simulators, training and proficiency maintenance programs could become more time-efficient, attracting more customers. By establishing improved training standards and regulations and reducing the unnecessary regulatory burden, FAA could play a key role in revitalizing general aviation. The industry has focused on these problems, and significant efforts are under way.

The economy plays a major role in the growth or decline of the pilot population, as does the aging of the U.S. population. During the 1995-2000 forecast period, the outlook for the national economy is generally positive and will likely help, rather than hinder, the growth of general aviation. However, there are proportionally fewer young people today than at anytime in the past, and most have less disposable income than previous generations at a comparable age. These factors could reduce the potential number of people wanting to learn to fly.

The number of individuals learning to fly must be increased if there is to be any real growth in the pilot population. Reducing the number of active pilots who drop out of aviation due to the time and cost of operating an aircraft and maintaining proficiency would help sustain the pilot population, but the most significant factor is new student pilot starts. Nothing is more fundamental to new aircraft purchases than a growing pilot population.

There is also a generational effect that can be used to stimulate the pilot population. In order to get today's young people involved in aviation, the industry plans to nurture them more. The keys to this are providing a better perceived value for the dollar and communicating the benefits of general aviation more widely.

Airspace restrictions, air traffic control requirements, capacity problems, procurement reform, and the inability to develop a new ATC system that is more efficient in terms of time and money have also hindered the growth of the pilot population. These factors will probably continue to dampen growth unless significant changes take place through FAA and Congressional action.

Over the near term, the major factors affecting the student and private pilot population in this country include the industry's ability to market its product (positive or negative, depending on how it is done), the aging pilot population (generally negative), the aging and limited aviation training infrastructure (negative), the depressed number of student starts (negative), and limited flexibility in training and aircraft financing programs.

Long-Term Forecast Considerations

There are a number of bright spots on the horizon which drive the increases expected in the pilot population between 1997 and 2000. These include renewed optimism in the pilot community, aircraft manufacturers, and the industry as a whole that can be attributed to passage of product liability reform legislation in 1994. This renewed optimism is stimulating enthusiasm and new products throughout the general aviation sector. However, much more can and should be done with respect to product liability reform to help the industry in the future. In some respects the industry — especially the insurance portion — is still holding its breath until the newly enacted statute of repose has been fully tested in the courts.

Another reason for optimism is awakening interest of aircraft manufacturers in new products. Cessna, for example, has already committed to reentering the single-engine piston-powered aircraft market at about the time the forecast starts to turn around. Piper is emerging from Chapter 11 and has already begun increasing production. Other aircraft manufacturers are also increasing future production schedules to match anticipated new demand.

Another positive sign for the future is NASA's Advance General Aviation Transport Experiment (AGATE) program, which combines new and already available advanced technologies into a new type of aircraft that will make flying more practical and enjoyable and less expensive. By incorporating user-friendly technology, AGATE also hopes to reduce training requirements and improve efficiency. Many feel that improved technology will stimulate demand for piston-powered aircraft and increase the pilot population.

New programs, such as the AOPA Project Pilot Program (both Phase I and Phase II), the NATA Learn to Fly Program, and GAMA's Piston Engine Revitalization Program, will also be up and running and paying dividends in a couple of years. It is likely that Cessna and others, as part of marketing for new aircraft, will also develop improved training programs centered around computer-based training.

Many in the industry believe training programs using computer simulation could significantly reduce training costs and at the same time improve safety. The panel anticipated that FAA will encourage increased use of PC-based simulators for training, thereby stimulating the industry while improving safety.

Over the longer haul, the factors affecting the student and private pilot populations include the industry's marketing capability (a positive factor in the future if new market targets are identified and better recruitment messages and nurturing programs are developed), new product introductions (positive because of Cessna reentering the marketplace and the NASA AGATE program), ATC system modernization (positive if done right, but a backbreaker if done incorrectly), and new training programs (positive, especially if PC-based simulation programs are expanded).

Observations

The panel was concerned about the precision of some FAA data, such as certain portions of the General Aviation and Activity Survey and FAA airmen and aircraft registry data in Oklahoma City. If the annual activity survey and the data collection methods of the two registries were improved, the FAA and the industry could produce more accurate and reliable forecasts for piston-powered aircraft and pilots. Perhaps better communication between those responsible for the registries and those who use the information would help. At the very least, it would improve FAA's forecasting ability and data collection process.

Flight Activity

Assumptions

Many factors have caused the decline of general aviation, and many are influencing recovery. Programs and initiatives that reduce the cost of flying or improve the flying experience (such as the new technology to come from the NASA AGATE Program) will have a very positive long-term effect on the industry.

The panel assumed no increases in fuel taxes or aviation system user fees. If there should occur, the activity forecasts would be significantly lower than presented here.

TABLE 1 GROWTH RATE OF PISTON-POWERED AIRCRAFT FLEET

	1995–1996	1996–1997	1995–2000
Average Annual Growth (percent)	-2.7	-1.8	0

Forecasts

Because all the factors that will help increase flight activity will not be in place until 1997-1998, flight activity will continue to decrease in 1996. The industry's initial positive steps toward recovery will only check the decline, not reverse it. Flight activity will decline by approximately 2 percent from 1995 to 1996. It will then stabilize at a 0.9 Percent decline for 1997 (compared to 1996). In the latter half of the 1990s, however, there will be a significant upturn, with activity increasing at an average annual growth rate of 0.5 percent for the six years from 1995 to 2000.

As the factors needed to reverse the decline are falling into place, the panel was cautiously optimistic about the latter half of the decade. The overall 1995-2000 forecast is close to being flat, and the panel did not foresee significant growth.

The following factors were considered in generating the panel's consensus forecast of flight activity.

- Tort reform was passed in 1994.
- Restart of piston airplane production by Cessna has been announced, but the impact will primarily come in 1997 and beyond.
- Other piston airplane manufacturers are also increasing production.
- If programs to promote more student starts are successful, there will be a rise in flight hours for training purposes.
- Recent increases in overall industry optimism will help offset the long-term downward trend.
- Fleet size has not yet stabilized.
- The pilot population and student starts were down in 1994 and 1995. Downward pressure on activity must be overcome.
- Aircraft utilization (hours per aircraft) has declined for 15 years.
- The current piston-powered fleet can provide additional flight hours, even without additional aircraft.
- New technology, increase in fleet size and aircraft production, and student pilot starts will generate additional activity, but the effects will take three to five years to surface.
- Pilots fly more discretionary hours when the economy is good.
- Additional promotion of student starts and aircraft utilization will generate more flight hours.
- To provide easier access to airfield facilities and to increase student starts, it is important to retain and add FBOs.
- If the air traffic control system becomes more difficult to use, complex, or congested, it could adversely affect general aviation flying.

The Piston-Powered Aircraft Fleet

Assumptions

Panelists assumed a "government neutral" basis for fleet forecasts, i.e., they assumed no change from the status quo in government policy regarding taxation, user fees, FAA regulations, or policy on promotion of general aviation. If user fees are imposed, they would have a negative impact on the forecast according to the types of activity upon which they are imposed.

Forecasts

The consensus was that the current downward trend in the size of the fixed-wing piston-powered fleet will continue, but at a decreasing rate, through 1997-1998. After that time, the fleet will increase in size until it returns to the 1995 level by 2000 (Table 1).

The primary factors affecting this forecast were:

- Trends in fleet size over the last few years,
- Magnitudes of different flows of aircraft in and out of the fleet, and
- Factors that tend to increase or decrease the number of aircraft entering or leaving the fleet.

TABLE 2 FACTORS INFLUENCING U.S. DOMESTIC SHIPMENTS AND FLEET ATTRITION

POSITIVE FACTORS	NEGATIVE FACTORS
Product liability legislation, both the 1994 Repose Act and the broader tort reform legislation now pending in Congress	Noise and emission regulations add to operating and maintenance costs and increase retirements
The NASA AGATE program to facilitate development of affordable small aircraft with new technology and capabilities	Potential new user fees on operations and FAA services, such as new aircraft certifications, STCs, pilot certificates, and other negative regulatory actions
New marketing efforts by pilot groups (AOPA Project Pilot and EEA Young Eagles) and manufacturers (GAMA) and NBAA No Plane/No Gain Program	Increased attrition due to increasing age of the fleet and consequent increased maintenance costs
New production increases forecast by current type-certified manufacturers	Increased fuel and operating costs
Affordable long-term financing	Pilot population, which is forecast to decline through 1997 and then increase

The trend in fleet size in recent years has been consistently negative. Over the period 1989-1994 the fixed-wing piston-powered fleet declined from 180,000 to 144,000 aircraft, an average drop of four percent per year. The year-to-year declines ranged from a high of nine percent to a low of zero.

The panel began by assuming four percent per year as the current rate of decline. Estimates of future growth or decline made from this trend line were based on several factors that influence U.S. domestic shipments and attrition in the piston aircraft fleet (Table 2).

There are other factors which are difficult to predict and could have either a positive or negative effect:

- The general economy and personal disposable income in the United States and worldwide,
- Net exports, which are strongly influenced by economic conditions and currency exchange rates in other countries, and
- Certification rules, which may be either more or less in line with industry engineering practices.

Some of the factors listed in Table 2 will have a stronger effect in the short term (the next three years), others in the long term. In general, positive factors, such as AGATE, new product liability rules, and new marketing efforts, will not have a significant effect on fleet size until the end of the five-year forecast period.

U.S. Department of Commerce figures for 1994 indicate 337 net exports of single- and multi-engine airplanes under 4,400 pounds gross weight (120 new and 217 used). This amounted to 0.2 percent of the fleet and about three percent of the fleet attrition in 1994. Because of the relatively small size of net exports and their unpredictability, the panel assumed that net exports would continue at their present rate and have little effect on total fleet size.

Experimental Aircraft

The number of amateur built experimental (ABE) aircraft in the fleet has consistently increased over the last 25 years, from a total of 2,100 registrations in 1970 to 21,505 in 1993. FAA estimates about one half of these aircraft are active.

The increasing popularity of ABE aircraft appears to the result of several factors, chiefly affordability and performance.

Affordability

ABE aircraft are substantially less expensive than any new production aircraft (aircraft produced under a type and production certificate). This is primarily because of

the large amount of labor that the builder provides. The builder generally does not attribute a cost to his or her labor, on the grounds that the time spent in construction would otherwise be spent on less rewarding pursuits. Additional savings can be had if the builder qualifies for a repairman's certificate (based on intimate familiarity with that particular airplane) and obtains authorization to perform annual inspection of aircraft condition.

Performance

Many ABE aircraft have superior speed, maneuverability, fuel economy, or handling characteristics compared to light production aircraft. Some have stall speeds under 30 knots; other cruise at over 300 knots. In many cases these performance benefits are due to the incorporation of advanced features and technology not available on used, or even most new, production airplanes that were designed and produced decades ago. Among these improved performance features are:

- New-technology engines, including high-efficiency, high-output certificated engines and experimental engines with advanced electronic ignition and fuel injection systems;
- Low-drag, natural laminar flow wings and carefully contoured fuselage aerodynamics, NASA-developed spin-resistant airfoils, and unconventional planforms, such as canards and three lifting surfaces; and
- Complex contours and very smooth surfaces held to high tolerances, crafted from advanced composites, such as fiberglass, high-performance oven-cured carbon, or stretch-formed aluminum.

ABE Registrations

In the past two years the growth rate of ABE registrations has increased substantially. This is believed to be caused by three factors:

- A rise in sales of kit aircraft in the 1990s (from 1,180 in 1990 to an estimated 3,800 in 1994) due to improved designs and increased availability of models with acceptable cross-country performance;
- Increased kit completion and faster completion due to a greater number of "fast build" kits and various volunteer and commercial builder-assistance mechanisms, and
- An increase in the proportion of ABE aircraft that are registered as active aircraft due to improved designs that provide greater utility and better flying qualities.

However, ABE aircraft are still a small part of the fleet; and increases in ABE registrations are overwhelmed by decreases in the production aircraft fleet. For example, in 1992-1993 the percentage of ABE registrations rose 15 percent while registration of production airplanes fell 4.5 percent. In number, however, the increase in ABE aircraft was 2,829 units and the decrease in production airplanes was 8,428 — a net decline of 5,599 in new registrations.

APPENDIX A DISCUSSION PANEL COMMENTS ON FAA FORECASTS

DOMESTIC AVIATION

1. Passenger Enplanements

Enplanements (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
472.0	530.0	560.4	625.5
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
4.2	5.8	5.7	4.5
Your Projection	5.5	5.5	4.5

Reasons for Changes:

2. Passenger Yield in 1994 Dollars

Passenger Yield in U.S. Dollars			
Actual	FAA Forecast		
1994	1996	1997	2000
13.31	13.31	12.14	11.73
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-3.1	-3.2	-3.0	-1.9
Your Projection	-3.0	-2.8	-2.0

Reasons for Changes:

3. Passenger Load Factor

Load Factor (Percent)			
Actual	FAA Forecast		
1994	1996	1997	2000
64.3	65.5	66.0	65.0
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-3.1	-3.2	-3.0	-1.9
Your Projection	-3.0	-2.8	-2.0

Reasons for Changes:

INTERNATIONAL AVIATION

1. Passenger Enplanements — Transborder Canada

Enplanements (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
Your Projection			

Reasons for Changes:

No forecasts provided, but expect higher than normal growth rates due to open skies.

2. Passenger Enplanements — Atlantic Region

Enplanements (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
16.5	18.5	19.7	23.2
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
5.0	6.3	6.1	6.3
Your Projection			

Reasons for Changes:

No reason to disagree with FAA forecasts, but there will be some shifts from traditional U.S. airports to airline hubs.

3. Passenger Enplanements — Pacific Region

Enplanements (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
13.4	14.7	15.6	18.9
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
11.3	5.8	6.1	6.3
Your Projection			

Reasons for Changes:

No disagreement with FAA forecasts, but potential for lower growth in the short term.

4. Passenger Enplanements — Latin America

Enplanements (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
16.4	18.4	19.6	23.6
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
7.2	6.4	6.5	6.4
Your Projection			

Reasons for Changes:

No disagreement with FAA forecasts, yet rate will vary depending on economic conditions in each country. There will be some shifts within regions.

REGIONAL AVIATION

1. Passenger Enplanements

Enplanements (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
53.6	62.6	67.0	81.5
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
8.5	7.2	7.0	6.9
Your Projection	4.8	5.8	5.6

Reasons for Changes:

Will slow as route transfers from major carriers are completed. The real issue will be RPMs as regional jets enter the fleet.

2. Passenger Load Factor

Load Factor (Percent)			
Actual	FAA Forecast		
1994	1996	1997	2000
50.4	51.0	51.2	51.7
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
0.4	0.3	0.2	0.2
Your Projection	0.3	0.2	0.2

Reasons for Changes:

Will increase very slowly due to the increasing size of aircraft.

3. Regional/Commuter Fleet (fewer than 60 seats)

Regional/Commuter Fleet			
Actual	FAA Forecast		
1994	1996	1997	2000
2,179	2,396	2,496	2,782
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
4.6	4.3	4.2	4.0
Your Projection	4.3	4.2	4.0

Reasons for Changes:

Retirement of 19-seat aircraft will slow fleet growth.

4. Average Aircraft Size — Regional/Commuter Fleet

Average Aircraft Size (Seats/Aircraft)			
Actual	FAA Forecast		
1994	1996	1997	2000
23.7	25.4	26.3	29.3
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
0.5	1.3	0.9	1.0
Your Projection	1.3	1.8	1.5

Reasons for Changes:

Average fleet size will increase as the 19-seat aircraft drop out and the larger regional aircraft with 50 or more seats enter.

AIRCRAFT AND ENGINE MANUFACTURERS

1. Air Carrier Fleet (60 seats or more)

Air Carrier Fleet			
Actual	FAA Forecast		
1994	1996	1997	2000
4,426	4,582	4,725	5,196
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
5.0	2.2	2.2	2.9
Your Projection	2.3	2.1	2.6

Reasons for Changes:

Minor variation.

2. Average Aircraft Size — Air Carrier Fleet

Average Aircraft Size (Seats/Aircraft)			
Actual	FAA Forecast		
1994	1996	1997	2000
162.9	181.9	163.1	168.8
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-0.4	-0.8	1.2	1.3
Your Projection	0.4	1.1	0.7

Reasons for Changes:

Minor variation.

3. Regional/Commuter Fleet (fewer than 60 seats)

Regional/Commuter Fleet			
Actual	FAA Forecast		
1994	1996	1997	2000
2,179	2,396	2,496	2,782
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
4.6	4.3	4.2	4.0
Your Projection	4.3	4.2	4.0

Reasons for Changes:

4. Average Aircraft Size — Regional/Commuter Fleet

Average Aircraft Size (Seats/Aircraft)			
Actual	FAA Forecast		
1994	1996	1997	2000
23.7	25.4	26.3	29.3
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
0.5	1.3	0.9	1.0
Your Projection	0.5*	0.4	0.3

Reasons for Changes:

*As essentially history, figure adjusted upward.

AVIATION INFRASTRUCTURE

1. Domestic Passenger Enplanements — U.S. Carriers Only

Domestic Enplanements (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
472.0	530.3	560.4	625.5
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
4.2	5.8	5.7	4.5
Your Projection	4.8	4.6	4.3

Reasons for Changes:

2. International Passenger Enplanements — U.S. Carriers Only

International Enplanements (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
46.3	51.6	54.9	65.7
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-7.3	-6.2	6.4	6.2
Your Projection	5.7	5.9	6.1

Reasons for Changes:

3. Commercial Operations at FAA Facilities — Air Carrier/Commuter

Commercial Operations (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
22.7	24.1	24.8	26.6
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
2.9	2.6	2.9	2.5
Your Projection	3.3	3.4	3.1

Reasons for Changes:

Growth in commercial operations will follow enplanements more closely (i.e., there will not be as dramatic a change in average load as implied in FAA forecasts).

4. Noncommercial Operations at FAA Facilities — General Aviation/Military

Noncommercial Operations (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
34.1	34.3	34.7	36.2
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-0.5	-2.3	1.2	0.6
Your Projection	-1.5	0.3	0.3

Reasons for Changes:

Short-term declines will be less than FAA forecasts, but growth from 1995 to 2000 also will be less.

BUSINESS AVIATION

1. Fixed Wing Turboprop and Turbojet Aircraft Fleet

Fleet (in Thousands)			
Actual	FAA Forecast		
1994	1996	1997	2000
8.3	8.9	9.3	9.9
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-1.2	4.7	4.5	3.1
Your Projection	1.0	1.5	1.5

Reasons for Changes:

FAA forecast does not track traditional fleet growth patterns.

NOTE: Any user fees that drive up costs will reduce demand even further than shown.

2. Fixed Wing Turboprop and Turbojet Aircraft Hours Flown

Hours Flown (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
2.4	2.7	2.9	3.3
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-1.2	-4.7	4.5	3.1
Your Projection	0.8	1.3	1.3

Reasons for Changes:

See note for Item 1 above.

3. Commercial Pilots

Commercial Pilots (in Thousands)			
Actual	FAA Forecast		
1994	1996	1997	2000
143.0	145.9	147.4	151.8
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-1.2	1.0	1.0	1.0
Your Projection	-1.0	-1.0	0.5

Reasons for Changes:

Recent history shows negative growth. The increase by 2000 will be a result of new single-engine piston-powered aircraft hitting the market.

4. Instrument Rated Pilots

Instrument Rated Pilots (in Thousands)			
Actual	FAA Forecast		
1994	1996	1997	2000
305.5	311.7	315.7	329.8
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
1.9	1.0	1.3	1.3
Your Projection	0.5	1.0	1.0

Reasons for Changes:

FAA projections do not track recent patterns.

VERTICAL FLIGHT

1. Piston Rotorcraft Fleet

Piston Fleet (in Thousands)			
Actual	FAA Forecast		
1994	1996	1997	2000
1.6	1.6	1.5	1.5
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-4.4	0.0	-6.3	-1.3
Your Projection			

Reasons for Changes:

No disagreement with FAA forecasts, but probably slight increase.

2. Turbine Rotorcraft Fleet

Turbine Fleet (in Thousands)			
Actual	FAA Forecast		
1994	1996	1997	2000
2.9	3.1	3.2	3.5
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-3.2	3.3	3.2	3.1
Your Projection	1.0	0.75	0.5

Reasons for Changes:

Attrition will be in the 1 to 2 percent range, and new units (newly manufactured and military surplus conversions) will be about 3 percent annually.

3. Piston Rotorcraft Hours Flown

Hours Flown (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
0.4	0.4	0.4	0.4
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-4.0	0.0	0.0	0.0
Your Projection			

Reasons for Changes:

No data, but probably a slight increase.

4. Turbine Rotorcraft Hours Flown

Hours Flown (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
1.5	1.7	1.7	2.0
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-2.3	6.3	0.0	4.6
Your Projection	0.0	0.0	2.0

Reasons for Changes:

Many helicopter operations do not rely on FAA facilities en route or in departure/destination areas.

5. Helicopter Pilots

Helicopter Pilots (in Thousands)			
Actual	FAA Forecast		
1994	1996	1997	2000
9.2	9.3	9.4	9.6
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
2.5	1.1	1.1	0.9
Your Projection			

Reasons for Changes:

The data only include pilots holding a helicopter license only. About two-thirds of helicopter pilots also hold fixed wing ratings.

There may be some increase in helicopter pilots due to increasing shipments of piston helicopters used for training.

LIGHT GENERAL AVIATION

1. Fixed Wing Piston Fleet

Piston Fleet (in Thousands)			
Actual	FAA Forecast		
1994	1996	1997	2000
147.1	141.4	139.4	138.0
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-2.6	-2.0	-1.4	-0.9
Your Projection	-2.7	-0.8	0.0

Reasons for Changes:

2. Fixed Wing Piston Hours Flown

Hours Flown (in Millions)			
Actual	FAA Forecast		
1994	1996	1997	2000
18.7	18.7	18.8	19.0
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-4.3	0.0	0.5	0.3
Your Projection	-2.0	-0.9	0.5

Reasons for Changes:

3. Private Pilots

Private Pilots (in Thousands)			
Actual	FAA Forecast		
1994	1996	1997	2000
283.7	285.4	286.3	288.8
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-1.2	0.3	0.3	0.3
Your Projection	-1.3	-0.8	1.1

Reasons for Changes:

4. Student Pilots

Student Pilots (in Thousands)			
Actual	FAA Forecast		
1994	1996	1997	2000
103.6	104.9	106.0	109.7
Actual Annual Growth Rate (%)			
1984–94	1995–96	1996–97	1995–2000
-3.5	1.0	1.0	1.1
Your Projection	-1.3	-0.4	1.9

Reasons for Changes:

APPENDIX B U.S.–CANADA AVIATION MARKET: INITIAL IMPACT OF NEW BILATERAL AS MEASURED BY CHANGES IN MARKETS SERVED, FLIGHTS, AND PASSENGERS

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TABLE 1 CHANGES IN UNITED STATES-CANADA MARKET SERVICE PATTERNS (1995 VERSUS 1994, AS OF JUNE 1995)

CARRIER	NEW SERVICE	DELETED SERVICE	TRANSFERRED SERVICE	COMMENTS
AMERICAN	CHICAGO–CALGARY	NASHVILLE–TORONTO	MIAMI–MONTREAL	MIA NEW AA SERVICE
	CHICAGO–OTTAWA		MIAMI–TORONTO	MIA NEW AA SERVICE
	CHICAGO–WINNIPEG			
	DALLAS–MONTREAL			
	DALLAS–VANCOUVER			
CONTINENTAL	NEWARK–MONTREAL			CO ONCE SERVED CANADA, THEN DROPPED
	HOUSTON–VANCOUVER			SERVICE DISCONTINUED SINCE
	NEWARK–VANCOUVER			SERVICE DISCONTINUED SINCE
DELTA	ATLANTA–MONTREAL	TAMPA–TORONTO	MIAMI–MONTREAL	MIA OLD DL SERVICE
	ATLANTA–TORONTO		MIAMI–TORONTO	MIA OLD DL SERVICE
AM WEST	PHOENIX–VANCOUVER			ONCE SERVED LAS–YYC/YEG, THEN DROPPED
NORTHWEST	DETROIT–HALIFAX			
	DETROIT–OTTAWA			
	MINNEAPOLIS–CALGARY			
	MINNEAPOLIS–MONTREAL			
	MINNEAPOLIS–REGINA			
	MINNEAPOLIS–SASKATOON			
	MINNEAPOLIS–VANCOUVER			
RENO AIR	RENO–VANCOUVER			
UNITED	DENVER–CALGARY			
	SAN FRANCISCO–CALGARY			
	SAN FRANCISCO–VANCOUVER			
US AIR	WASHINGTON–MONTREAL	BALTIMORE–MONTREAL		
	WASHINGTON–TORONTO	CLEVELAND–TORONTO		
	PITTSBURGH–TORONTO			
MIDWEST EXP	MILWAUKEE–TORONTO			
US AIR SHUTTLE	BOSTON–MONTREAL			
	NEW YORK–MONTREAL			
VALUEJET	WASHINGTON–MONTREAL			SERVICE DISCONTINUED SINCE
AIR CANADA	ATLANTA–TORONTO			
	BOSTON–MONTREAL			
	FT. LAUDERDALE–MONTREAL			HISTORICALLY LARGE CHARTER MARKET
	NEW YORK–OTTAWA			
	WASHINGTON–MONTREAL			
	WASHINGTON–OTTAWA			
	WASHINGTON–TORONTO			
CANADIAN INTL	CHICAGO–VANCOUVER	(HONOLULU–CALGARY)		HNL–YYC DELETED PRIOR TO AGREEMENT
	CHICAGO–TORONTO			ONCE SERVED, THEN DROPPED, NOW ADDED
	FT. LAUDERDALE–TORONTO			HISTORICALLY LARGE CHARTER MARKET
	ORLANDO–TORONTO			HISTORICALLY LARGE CHARTER MARKET
	ST. PETERSBURG–TORONTO			HISTORICALLY LARGE CHARTER MARKET

TABLE 2 UNITED STATES–CANADA AVIATION MARKET: CITY PAIRS SERVED NONSTOP BY LARGE AIRCRAFT BY CANADIAN GATEWAY (JUNE 1995)

CALGARY		
CHICAGO	AA	AC
DENVER	DL	UA
DALLAS	AA	
LOS ANGELES	DL	AC
MINNEAPOLIS	NW	
NEW YORK	AC	
SALT LAKE CITY	DL	
SAN FRANCISCO	UA	AC

MONTREAL				
ATLANTA	DL			
BOSTON	DL	TB	AC	
CHICAGO	AA	AC		
DALLAS	AA			
DETROIT	NW			
FT. LAUDERDALE	AC			
LOS ANGELES	AC			
MIAMI	AA	AC		
MINNEAPOLIS	NW			
NEW YORK	CO	DL	TB	AC
PHILADELPHIA	US			
PITTSBURGH	US			
TAMPA	AC			
WASHINGTON	US	J7	AC	

VANCOUVER			
CHICAGO	UA	CP	
DALLAS	AA		
HONOLULU	CP		
HOUSTON	CO		
LOS ANGELES	DL	CP	
MINNEAPOLIS	NW		
NEW YORK	CO		
PHOENIX	HP		
PORTLAND	DL		
RENO	QQ		
SAN FRANCISCO	DL	UA	CP
SAN JOSE	AA		
SEATTLE	UA		
SPOKANE	NW		

TORONTO				
ATLANTA	DL	AC		
BOSTON	US	AC		
CHICAGO	AA	UA	AC	CP
DALLAS	AA			
DETROIT	NW			
FT. LAUDERDALE	CP			
HONOLULU	CP			
HOUSTON	AC			
LOS ANGELES	AC			
MIAMI	AA	AC		
MILWAUKEE	YX			
NEW YORK	AA	AC		
ORLANDO	CP			
PHILADELPHIA	US	UA		
PITTSBURGH	DL	US		
ROCHESTER	US			
SAN FRANCISCO	UA	AC		
ST. PETERSBURG	CP			
TAMPA	AC			

EDMONTON	
SALT LAKE CITY	DL

HALIFAX	
BOSTON	AC
DETROIT	NW
NEW YORK	QK

OTTAWA	
BALTIMORE	US
CHICAGO	AA
DETROIT	NW
NEW YORK	AC
PITTSBURGH	US
WASHINGTON	AC

WINNIPEG		
CHICAGO	AA	AC
MINNEAPOLIS	NW	

REGINA		
MINNEAPOLIS	KI	NW

SASKATOON	
MINNEAPOLIS	NW

CARRIER DECODING

AA AMERICAN
AC AIR CANADA
CO CONTINENTAL
DL DELTA
HP AMERICAN WEST
J7 VALUJET
KI TIME AIR
NW NORTHWEST
QK AIR NOVA
QQ RENO AIR
TB USAIR SHUTTLE
UA UNITED
US USAIR
YX MIDWEST EXPRESS

NOTES

--NEW SERVICE UNDERLINED.

--LARGE AIRCRAFT ARE AIRCRAFT WITH 60 SEATS OR MORE.

--AIR CANADA'S OPERATIONS WITH THE 50-SEAT REGIONAL JET ARE INCLUDED.

--TIME AIR AND AIR NOVA ARE SHOWN ON THIS TABLE, BUT NONE OF THE SUBSEQUENT TABLES SINCE THEIR TRAFFIC WAS NOT AVAILABLE FOR ALL OF THE 1995 MONTHS.

--THE US CARRIER, HORIZON, HAS ACQUIRED LARGE AIRCRAFT AND PRESUMABLY WILL BE WITH THEM IN THE CANADIAN MARKET IN THE FUTURE.

--SINCE JUNE, VALUJET HAS CEASED ITS CANADIAN SERVICE AND CO HAS DISCONTINUED ITS VANCOUVER SERVICE.

--AA HAS APPLIED FOR TAMPA-TORONTO AUTHORITY. DELTA FORMERLY SERVED THE ROUTE.

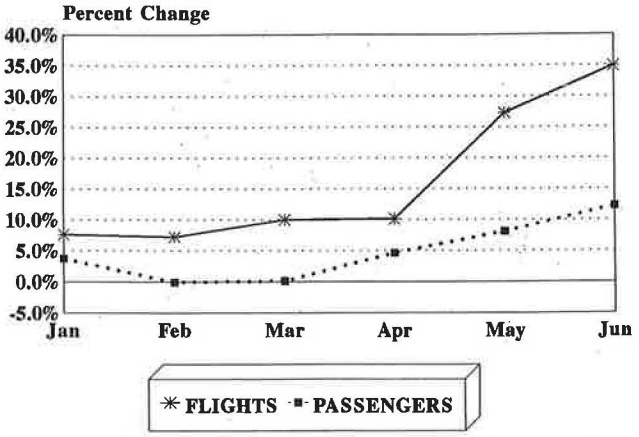

FIGURE 1 United States-Canada aviation market: percent of change in bilateral carriers' flights and passengers (January–June 1995 vs. January–June 1994).

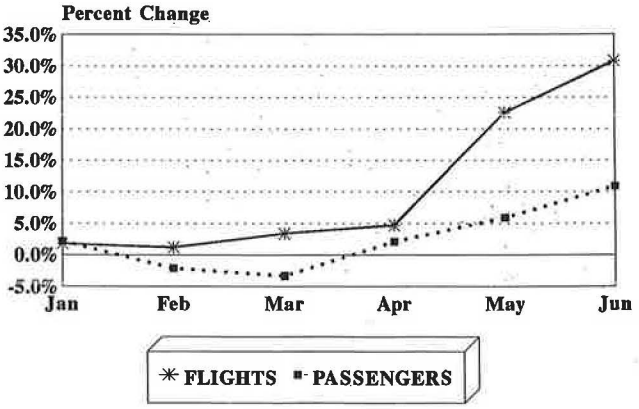

FIGURE 2 United States-Canada aviation market: percent of change in U.S. flag carriers' flights and passengers (January–June 1995 vs. January–June 1994).

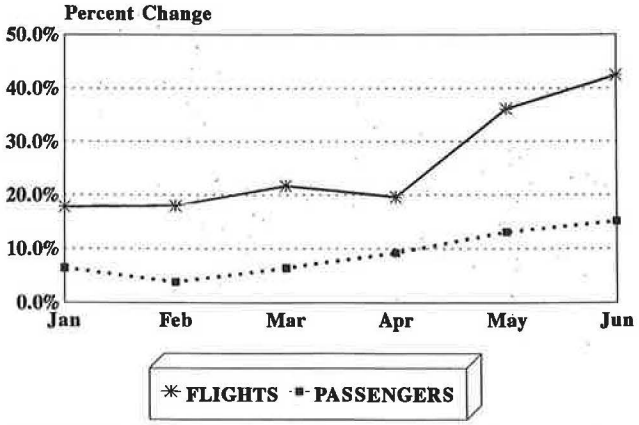

FIGURE 3 United States-Canada aviation market: percent of change in Canadian flag carriers' flights and passengers (January–June 1995 vs. January–June 1994).

APPENDIX C PARTICIPANTS

Participant Key

DAV - Domestic Aviation
INT - International Aviation
REG - Regional Aviation
INF - Aviation Infrastructure
MFG - Aircraft & Engine Manufacturers
GEN - Light General & Personal Aviation
VFL - Vertical Flight
BUS - Business Aviation
CHR - Chairperson
SPK - Speaker
M - Panel Moderator
SPL - Special Guest

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