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Description of document:	Reports provided by contractor Washington Consulting Group, Inc. in Delivery Order EXIM14F0006, part of parent contract GS02F0150Y, Evaluation of Structural Oversupply in Global Passenger Airline Industry, 2014-2017
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EXIM
EXPORT-IMPORT BANK
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Reducing Risk. Unleashing Opportunity.

June 24, 2019

Via Electronic Mail

Re: FOIA Request # 201900052F

This is the final response to your Freedom of Information Act (FOIA) request to the Export-Import Bank of the United States (Ex-Im Bank). We received your request in our FOIA Office via the National FOIA Portal on April 1, 2019. You requested "a copy of the reports and presentations provided by contractor Washington Consulting Group, Inc. in Delivery Order EXIM14F0006, part of parent contract GS02F0150Y, including modifications P00003, P00004 and P00005. The work performed by WCG was to provide a study of passenger aircraft oversupply."

We conducted a comprehensive search of the files within the Office of Ethics, FOIA Department for records that would be responsive to your request. This is the component within Ex-Im Bank in which responsive records could reasonably be expected to be found. The search produced the attached records. After carefully reviewing the responsive documents, we have determined they are releasable in their entirety; no deletions or exemptions have been claimed. For your convenience, we are attaching the documents to this message as a PDF file.

For your information, Congress excluded three discrete categories of law enforcement and national security records from the requirements of the FOIA. See 5 U.S.C. §552(c) (2006 & Supp. IV 2010). This response is limited to those records that are subject to the requirements of the FOIA. This is a standard notification that is given to all of our requesters and should not be taken as an indication that excluded records do, or do not, exist.

Ex-Im Bank's FOIA regulations at 12 C.F.R.404.9 (a) state that Ex-Im Bank shall charge fees to recover the full allowable direct cost it incurs in processing request. In this instance, because the cost is below the minimum, there is no charge.

I trust that this information fully satisfies your request. If you need further assistance or would like to discuss any aspect of your request please do not hesitate to contact our FOIA Public Liaison, Ms. Lennell Jackson at (202) 565-3290 or by E-Mail at Lennell.Jackson@exim.gov.

Sincerely,

Lisa V. Terry
Chief FOIA Officer

Attachment: Responsive Documents (1 PDF file)

Export-Import Bank of the United States

"Evaluation of Structural Oversupply in Global Passenger Airline Industry" Final Report

Prepared by Washington Consulting Group

March 31, 2014

Deliverable for
"Economic Impact Analysis for Aircraft Supply"
Contract: EXIM-14-F-0006

Washington Consulting Group
4915 Auburn Avenue, Suite 301
Bethesda, MD 20814

Contents

ABOUT THIS DOCUMENT

This document is the final report for the "Evaluation of Structural Oversupply in Global Passenger Airline Industry". David Gillen and Daniel Brod were the authors of the report for the Washington Consulting Group.

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A. EXECUTIVE SUMMARY

This report examined the issue of structural oversupply in the global market for passenger air services. This market, and especially the long haul intercontinental segments of the market, relies on widebody aircraft to provide the principal service of air passenger travel.

The report is a qualitative assessment that is supported by data analysis and published aviation studies. The judgment and experience of independent academics and professional observers of the industry contributed to the analysis. The general study approach was to characterize conditions of structural oversupply and its consequences (i.e., causes and effects), and to determine whether the empirical evidence supported – or negated – a finding of structural oversupply in the global market for air services.

The report concludes that the global passenger airline industry, while possessing many unique features, is not fundamentally different than many other industries. Structural oversupply results from large and irreversible capital investments, long term capital planning horizons, and the inability or lack of incentive to adjust capacity. The report demonstrates that these are not features of the global market for air services, or have no material impact on the functioning and evolution of the industry.

The principal indicators of the global market for air services show that structural oversupply does not exist. The reasons for this determination are summarized in the following bullets:

- There is continuing robust entry of firms into the market, especially serving the emerging markets of Asia and other regions.
- Profitability, highly variable across markets and carriers, is rising and with less volatility to the business cycle.
- Demand is forecast to grow at an average annual rate of 5.4% (per IATA), increasing passenger from 2.98 billion (2012) to 3.91 billion (2017).
- Demand is sensitive to fares, as evidenced by high demand elasticities with respect to fare for most market segments. With structural oversupply, one would anticipate a state of demand saturation and limited response to fare-based strategies (i.e., inelastic demand)
- Capacity and utilization indicators show airlines are exercising greater "capacity discipline" with fleet adjustment, resulting in improved profitability. In the presence of structural oversupply, a capacity discipline operational strategy would be sub-optimal (i.e., airlines could serve markets with greater frequency and lower load factors for higher profitability.)
- Airlines are shifting towards higher-profit, long haul routes. The net effect of this trend will be to increase disproportionately widebody aircraft demand.
- The shift to longer haul requiring more widebody aircraft will, in some cases, result in the replacement of narrowbody aircraft on longer-range routes. These narrowbody aircraft will be redeployed to shorter haul and regional markets.
- Overall capacity utilization continues to trend upward.

- Multiple capacity adjustment mechanisms (aircraft retirement, redeployment, delivery deferrals, leasing) are widely used throughout the industry for widebody and narrowbody aircraft. The existence and robust functioning of these mechanisms, could not coincide with a state of structural oversupply in the global market for air services.

Non-economic factors (ASA[1]s, fortress hubs[2], other barriers to entry, foreign ownership restrictions) have competition inhibiting effects. However, these effects are seen to be limited (or, gradually eroding) and not contributing to a condition of structural oversupply.

The analysis of the period 2014 to 2016 shows no compelling evidence that structural oversupply will be a concern in the global market for air services.

[1] Air service agreements (bi-lateral agreements governing air transport between countries). ASAs that significantly liberalize scheduled passenger service relative to a previous status quo are often called "open skies" agreements. The U.S. currently has 105 open skies agreements.

[2] "Fortress hubs" refer to hub airports where a single airline, or alliance of airlines, control 70 percent or more of the airport's capacity slots, thus making it nearly impossible for a competing airline to initiate operations from the same airport.

B. ANALYSIS ASSUMPTIONS

The analysis assumptions represent an expert outlook that was derived from the broad consensus of aviation professionals and observers. While the assumptions draw from a number of sources that may not be fully harmonized (e.g., Boeing and Airbus forecasts, IMF and World Bank), the outlook is generally consistent. In cases where there seem to be discrepancies among different sources, care was taken to base conclusions on multiple indicators.

While recognizing that all assumptions and forecasts are uncertain to some extent, the subsequent analysis shows that the industry as a whole is better insulated than in the past to absorb unanticipated shocks in prices and demand. The analysis conclusions should remain robust even if there is significant variance from some of the assumption elements.

The following are the assumptions that guided the report's analysis.

1. Market assumptions
    a. Global and regional market growth forecasts based on IATA, Boeing and Airbus forecasts (where the forecasts diverge, the analysis assumes an average of the forecasts)
    b. Macroeconomic "new normal" – slower long-term growth in developed economies
    c. World Bank and IMF forecasts for economic growth and recovery in developed and developing economies
    d. Moderate GDP-based growth in air passenger markets overall, with stronger growth in Latin American, African and Southeast Asian markets
2. Energy outlook
    a. No significant price shocks anticipated in the next three years but slow steady rise in oil prices into the future
3. Emerging markets assumptions
    a. Volatile GDP growth based on World Bank and IMF forecasts
    b. Stronger GDP growth in Africa (per World Bank forecasts)
    c. India and Brazil will have weaker GDP growth with greater volatility (per World Bank forecasts)
    d. Major growth in China's and Southeast Asia air service markets (based on economic growth and the experience of service establishment following economic activity)
4. Industry trends
    a. Airline consolidation will continue but at a weaker pace. Following the major mergers of recent years, airlines will adjust to the new competitive landscape while possibly acquiring smaller airlines that extend their networks

b. Alliances will exercise capacity discipline in all but trans-Pacific market

c. Legacy U.S. carriers will continue transition to long haul international

d. Low-cost carriers may expand in trans-Atlantic routes with narrow body aircraft

e. Airlines to increase emphasis on the development of new routes over expanding service on existing routes

f. Continued use of fortress hubs by the three alliances

g. Continued development of "metal neutral" joint ventures within established alliances particularly in Pacific region

5. Non-market assumptions

    a. New air service agreements to continue at current pace with emphasis on very liberal Open Skies agreements

    b. Continued liberalization of bi-lateral service agreements with greater liberalization in emerging markets

    c. Governments will not impose significant new taxes on airlines, airline inputs such as fuel, or on passengers

6. Government interventions in infrastructure markets

    a. Terminal and air space constraints will be eased slowly, special levies, etc. – no significant change to status quo

    b. Development of slot controls at select North American airports and slot controls to continue in Europe

    c. Development of slot controls at congested airports in Southeast Asia and Latin America

7. Effects of environmental policies

    a. EU policy on emissions trading will be introduced at a slower pace than previously planned

    b. International agreement on emissions trading will proceed slowly

C. OVERSUPPLY IN THE GLOBAL MARKET FOR PASSENGER AIR SERVICES

C.1. OVERVIEW

This report assesses whether there is currently, or likely to be in the next three years (2014-2016), structural oversupply in the global market for air services.

The report is a qualitative assessment that is supported by data analysis and published aviation studies. The judgment and experience of independent academics and professional observers of the industry contributed to the analysis. The general study approach was to characterize conditions of structural oversupply and its consequences (i.e., causes and effects), and to determine whether the empirical evidence supported – or negated – a finding of structural oversupply in the global market for air services.

The remainder of this overview lists the main sections of the report and describes their content as they relate to the analysis.

- **Structural Oversupply – Conditions and Effects**

This section describes generally the conditions of structural oversupply and its effects. Conditions of structural oversupply refer to a state of chronic excess capacity. The effects of structural oversupply refer to features of industry performance that would be observable with structural oversupply.

- **Conditions of Structural Oversupply**

This section examines the issues of capacity measurement and considers the empirical evidence for excess capacity in the global market for passenger air services. Specifically, it considers the evolution of the global fleet of widebody aircraft, and projected orders and deliveries. These are analyzed in light of trends in the industry and forecast demand to assess generally whether excess capacity and structural oversupply exists. The section also looks at capacity adjustment mechanisms in the airline industry, for widebody and narrowbody aircraft. In markets with robust and well-functioning mechanisms for capacity adjustment oversupply conditions could not persist.

- **Effects of Structural Oversupply**

This section analyses performance indicators of the airline industry to see whether the features associated with structural oversupply are evident in the global market for passenger air services. These features include: few or no firms entering or exiting; low profitability over the business cycle; and little responsiveness to pricing strategies. This section also considers the importance of new market expansion as distinct from the growth of existing markets in the assessment of structural oversupply.

- **Outlook for 2014-2016**

This section summarizes the outlook for the period 2014-2016.

- **Summary and Conclusions**

This section contains the summary and conclusions of the report.

C.2. STRUCTURAL OVERSUPPLY – CONDITIONS AND EFFECTS

This section establishes the distinction between the conditions of structural oversupply and its effects. These conditions and effects are general and not specific to the airline industry. The subsequent sections of the report analyze data from the global market for passenger air services to determine whether they indicate – or negate – conditions and effects of structural oversupply.

C.2.1. Conditions

Structural oversupply conditions occur when firms are unable to adjust their stocks of physical capital assets in accordance with market forces. The inability to adjust capital stocks is due to one or more of the following reasons:

- Assets are unmovable
- Assets are not flexible and cannot be adapted to alternative uses ("dedicated and specific capital" in the jargon of economics)
- The cost of selling or adapting assets is uneconomical (and government subsidies for new physical capital assets could be a contributing factor to the disruption of these markets[3])

C.2.2. Effects

An industry with structural oversupply would exhibit the following features reflective of the effects[4] of oversupply:

- Low output prices (relative to costs)
- New firms would be unlikely to enter the market due to low expected profitability
- Firm exit or turnover would be limited because economic losses would be even greater in liquidation
- Pricing strategies would be ineffective because with excess capacity firms would over-produce, pushing prices downwards and resulting in saturated demand that is insensitive to pricing
- Low profitability over the business cycle due to chronic excess capacity in the industry

While an industry with structural oversupply would exhibit these features, the converse is not always true: The presence of these features is not sufficient to conclude the existence of structural oversupply.

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[3] A common cited example of subsidized capital is the case of public transit where in some jurisdictions 50 percent subsidies are paid for 'capital' (new buses or transit vehicles). As a result, the evidence shows transit companies invest in higher quality buses and retire buses prior to completing their useful economic life.

[4] Common examples of industries with structural oversupply that have exhibited these features are the steel industry and the wine industry in Australia.

C.3. CONDITIONS OF STRUCTURAL OVERSUPPLY

This section discusses conceptual issues relating to capacity, utilization and their measurement in the airline industry, which are key to assessing the structural oversupply conditions. It continues with an analysis of capacity adjustment mechanisms in the industry, the robust nature of which refutes the presence of structural oversupply. The section concludes with a discussion of the non-economic factors that influence capacity adjustment.

The section builds on several published studies, expert insights and data analysis are used to address the capacity-related issues.

C.3.1. Capacity and Utilization

Structural oversupply needs to consider aircraft utilization, and not just fleet size or aircraft on order. Aviation often uses engineering measures of capacity utilization such as load factor, the ratio of revenue passenger miles (or kilometers) to available seat miles (or kilometers) and average hourly utilization of an aircraft. These measures have limited economic meaning. It is possible by charging very low fares to have a high load factor, perhaps even 100 percent. Observing such a high load factor, one could erroneously conclude there is too little capacity in the market. On the other hand observing a low load factor could lead an observer to conclude there is too much capacity, which may not be the case[5].

The daily utilization of aircraft is sometimes used as a metric of capacity use and, hence, over capacity. However, it fails to account for the average stage length (the average distance flown on a flight or average time for a flight). For example, when previously domestic-only airlines enter long haul international markets, the average stage length at least doubles and the average daily use goes down simply because it takes longer to turn the aircraft around and scheduling flights becomes more difficult[6]. With structural oversupply one expects low load factors, not rising ones as observed. Low daily utilization (while controlling for stage length) would also be expected with structural oversupply – and the data speak to the contrary. The stage length affects the revenue available from a given aircraft[7].

Capacity can also be measured as number of aircraft or number of seats in a market; number of seats can vary with frequency. Seats per aircraft can also vary as is evident with different carriers configuring their aircraft in different ways. In addition, counting aircraft orders and deliveries fails to account for the ability of carriers to park aircraft when needed or required.

Engineering measures of capacity offer very limited information in assessing the state of structural oversupply in the global market for air services. Reliance on these measures could

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5 The first example is a case of poor pricing and, perhaps, inadequate revenue management. The second case may be the result of strong revenue management; Southwest Airlines has one of the lowest load factors among U.S. carriers yet is consistently the most financially successful carrier.

6 As an example, a typical aircraft on a domestic route can be turned around in as little as 15 minutes, but on average takes about 40 minutes. In international markets with widebody aircraft, the turnaround times are often three hours or more. Generally, widebody aircraft have double the turnaround time of narrowbody aircraft.

7 For example, two airlines could use their aircraft on average 10 hours per day. One airline flies short stage lengths and generates 3 flights per day while the other airline flies longer stage lengths and generates 2 flights per day. Clearly, the amount of revenue and profit produced will differ in each case.

lead observers to erroneously conclude that structural oversupply exists. However, complex measures of capacity reveal a different picture.

Unlike engineering measures, economic capacity is related to production costs[8]. It may be uneconomical to offer additional available seat miles with increasing marginal costs. In such a case, an airline may seem to have idle capacity (like one might expect in a structural oversupply scenario), when, in fact, the airline is deploying its assets for maximum profit. Full utilization of capacity is different from an economic perspective than an engineering one.

Capacity can also be measured in multiple ways: As number of aircraft or number of seats in a market; number of seats can vary with frequency. Seats per aircraft can also vary as is evident with different carriers configuring their aircraft in different ways. For example much is made of Emirates orders for Airbus A380s, yet Emirates has a smaller number of seats per A380 than other airlines. See the following table.

Table 1 Seat Configuration by Airlines for Airbus A380

Airline	Seats per A380 (New Orders)
Lufthansa	526
Air France	516
Thai International	507
Qantas	484
Emirates	489
British Airways	469

Source:CAPA and airline reports

CAPA undertook an analysis for the global airline fleet for the period 1972 to 2012 using a composite measure[9] of capacity utilization for the global airline fleet composed of load factor, flown hours per day (as percent of maximum) and aircraft in use (as a percent of the total fleet)[10]. Their analysis found:

- significant variation in the number of aircraft in use over time,
- growth in the average load factor,

8 Baltagi, B.H., J.M. Griffin and S.R. Vadali, 'Excess capacity: a permanent characteristic of US Airlines?', *Journal of Applied Econometrics*, **13**, 645-657 (1998)

9 CAPA's composite measure of overall capacity utilization (%) for the global airline fleet is the product of load factor, flown hours per day (as a % of the maximum) and aircraft in use (as a % of the total fleet).

10 CAPA is the Center for Asia Pacific Aviation, an independent and highly regarded aviation analysis organization.

- overall capacity utilization trending upward since 1972 – from less than 50 percent in 1972 to 63 percent in 2012.

From 1972 through 2012 the average load factor increased from 55 percent to approximately 78 percent – certainly the introduction of revenue management had an influence here. Average daily aircraft utilization in 1972 was 72 percent, declining to 65 percent in 2012. The aircraft in use as a percentage of the fleet went from 80 percent in 1972 to about 68 percent in 2012.

Fleet expansion is not a harbinger of oversupply because capacity is not measured by number of aircraft, rather, by how they are used, deployed and configured.

Thus it is seen that no single measure of capacity is adequate and that seemingly idle capacity may be economically advantageous to airlines. A composite measure of capacity utilization shows long-term improvement in the global industry's capacity utilization. The review of capacity and its utilization in the global market for air services does not indicate that structural oversupply exists. This finding applies to the entire fleet including narrowbody aircraft.

C.3.2. Capacity Adjustment Mechanisms

Well-functioning capacity adjustment mechanisms allow firms to rapidly adjust capacity and efficiently supply market demand. These are a critical feature of markets that are not burdened by problems of structural oversupply. If capacity is indeed adjustable economically, then conditions of oversupply could not persist for any length of time.

While it is true that aircraft are expensive and represent a long lived asset, markets have developed mechanisms that allow flexibility in buying, selling and renting/leasing capacity. Note also that fuel costs, and labor costs are larger components of cost than the capital-related[11] costs of direct operating costs.

With restrictions in global markets declining, airlines need to be nimble, with the ability to both acquire and shed aircraft quickly. The leasing industry for aircraft emerged in response to the need for rapid capacity adjustment, and to reduce ownership risk and maintain competitiveness. The emergence of the aircraft leasing industry was a key development in responding to airlines' needs and to ensuring that aircraft capacity was sufficiently mobile for sustained profitability. The ability to readily lease aircraft meant airlines were no longer faced with large and irreversible capital investments, or long range planning or an inability to adjust their fleet size or type. Rather, the leasing industry turned a capital investment into an operating cost where aircraft capacity was rented or leased. In 2013, approximately 50 percent of the world's aircraft fleet is owned by leasing companies (including narrow- and widebody aircraft[12]). Examining the Boeing and Airbus data for current widebody orders, a

[11] Capital-related components of direct operating costs include depreciation and amortization of capital assets and leasing charges for capital assets. They do not include the finance charges on borrowing to purchase aircraft or other capital assets.

[12] The share of aircraft delivered to leasing companies never exceeded five percent until 1985, and has grown steadily since. See "Leasing and Secondary Markets: Theory and Evidence from Commercial Aircraft", Alessandro Gavazza, New York University, January 2005.

significant proportion is by leasing firms (37 percent of Airbus' current widebody orders are by leasing companies.)

Besides leasing, airlines also have the ability to shed or increase capacity through other well-functioning market mechanisms. With the highly developed leasing market, it is difficult to see that structural oversupply can exist or persist for a significant period of time (because leasing companies would raise leasing costs so that it would no longer be economical to lease).

Capacity can be adjusted in numerous ways. Airlines redeploy aircraft. Air Berlin is a good example of a carrier that changes its entire route network seasonally where in the cool European winter it flies north-south to the Mediterranean and in summer it flies east-west as international tourists demand access to destinations beyond the big gateway hubs of London, Amsterdam, Frankfurt and Paris.

Airlines are controlling capacity by deferring delivery of aircraft. Recent examples are Qantas' decision to defer deliveries of A380, B787 and A320s. In order to do this, some other carrier must take delivery or the aircraft will be parked. An example of the latter is the number of first generation B787s that are parked engineless at Everett Field (Washington state); Boeing has 11 early model 787s which are heavier than the current production models. Airlines have simply switched their orders to the new generation aircraft.[13]

Airlines are retiring their aircraft after shorter periods of service. Again using Qantas as an example, they will retire both B747 and 767 aircraft earlier than anticipated. All of this results in slower fleet growth. An analysis undertaken by CAPA showed that fleet growth used to oscillate between 2 percent and 6-7 percent, but since 2002 it has remained in a relatively narrow channel of 2.7 to 3.9 percent growth. Fleet growth has also been slowed by an increase in the rate of retirements as a percentage of the fleet to a fairly steady 2 percent, as older, less fuel efficient aircraft have exited; rising fuel cost has contributed to the slowing of fleet growth.

In addition, for the past four years (and in some cases longer) the year-over-year growth in passenger traffic has exceeded the year-over-year growth in passenger capacity. In the below table, demand and supply growth rates are reported for the global aviation industry and, as well, for different regions.

[13] See http://www.bloomberg.com/news/2014-02-25/boeing-said-to-seek-buyers-for-1-1-billion-of-early-787s.html

Table 2 Global Demand and Supply for Air Services 2010-2013 and Projection for 2014

System-Wide Global Commercial Airlines	Traffic (RTK) % Change over Year					Capacity (ATK) % Change over Year				
	2010	2011	2012	2013E	2014F	2010	2011	2012	2013E	2014F
Global	8.0	6.3	5.3	5.2	5.8	4.5	6.6	4.0	4.8	5.5
Regions										
North America	4.5	2.9	1.0	2.2	2.7	2.3	2.8	0.4	1.6	2.0
Europe	4.3	8.4	4.5	4.0	4.7	1.6	8.6	2.8	2.5	4.5
Asia-Pacific	11.8	6.5	6.1	7.2	7.4	6.3	7.0	5.4	7.1	7.0
Middle East	17.8	9.9	14.7	11.9	13.0	13.3	9.8	12.4	11.4	13.0
Latin America	12.3	11.2	9.5	6.5	6.0	6.8	9.3	7.6	4.6	6.5
Africa	12.3	1.6	7.5	5.1	5.8	9.3	3.2	6.4	5.0	6.5

Source: ICAO Data 2009-2010, IATA 2011-2013 Domestic & International, IATA Economic Briefing Financial Forecast March 2013 **Note:** The data source reports RTK (revenue ton kilometers) and ATK (available ton kilometers). These values are inclusive of passenger and cargo traffic carried by commercial airlines

Another factor that has led to capacity adjustment is the aircraft delivery cycle has changed. The aircraft order cycle is correlated with the airline profitability cycle and the delivery cycle followed this order cycle. Therefore, the boom-bust cycle emerged and the claim of excess capacity and cyclical profitability. However, since the early 2000s, the delivery cycle has all but disappeared; deliveries have remained at just above 5 percent of the fleet for the whole of the past decade, by contrast with previous decades, when they rose to peaks of 7-8 percent of the fleet and fell to troughs of 4 percent.

This smoothing of the deliveries curve has been attributed, to some degree, to airlines adjusting to a longer delivery horizon in response to economic and financial uncertainty in different markets. The increase in the backlog is due to the large numbers of orders placed by airlines and leasing companies in 2005 to 2008 and again in 2011 and 2012; the backlog has extended from a traditional 3-4 years to almost 8 years.

C.3.3. Non-Economic Factors that Affect Capacity Adjustment

This section describes the effects of non-economic factors. In general the presence of the factors are competition inhibiting – while actions taken relative to the status quo can either be more restrictive (competition inhibiting – e.g., new fees affecting potential entrants) or less restrictive (competition promoting – e.g., liberalizing air service agreement). The status quo and the emerging trends are not seen to contribute to structural oversupply.

Subsidies, air service agreements, the fortress hubs of the three global alliances and airport congestion all impact the ease with which capacity can be redeployed or reallocated as markets ebb and flow. The effect of subsidies on fares depends on their magnitude and prevalence. If input prices (e.g., fuel or airport services) are subsidized this could result in either lower fares or increased profits to the airlines or both. In competitive markets subsidies would potentially lead to lower fares. However, in many international markets, pricing freedom and flight frequency are all tightly regulated. Consequently, subsidies are more likely to flow directly to the airlines' bottom line. In general, policies for capacity expansion will have little impact on fares.

Air Service Agreements (ASAs) or bi-laterals affect access to markets. The three global alliances (Star, Oneworld, and Skyteam) have evolved to their current state largely due to restrictions on providing same airline service to cities beyond the key gateway hubs (in U.S.: New York, Washington, Los Angeles, San Francisco, Dallas and in EU: London,

Amsterdam, Paris, Frankfurt/Munich, Madrid). Thus, even if an airline has excess capacity it may not be able to access foreign markets. For example, a non-American carrier cannot fly between two U.S. cities nor can an American carrier fly between two cities in China. Also the degree to which they can access markets will depend on the conditions of the ASAs and the number of freedoms permitted. A key impact of restrictive ASAs is to divide markets rather than to grow them. If ASAs, for example, only allow three fights per week between the home country and a foreign country, this is not sufficient for sustained market growth. However, daily service will stimulate the market and result in more traffic for all carriers. The U.S. currently has 105 open skies agreements and is among the countries in the world with highly accessible markets. As ASAs continue the liberalization trend, new gateway airports may emerge with expanded opportunities for new entrants to the air service markets.

Fortress hubs tend to restrict use of capacity through their inhibiting effect on competition. The three global alliances have their key fortress hubs in countries with large markets. It is difficult for non-alliance airlines to gain access to slots at these hubs (at Frankfurt, for example). Non-alliance carriers have relatively little traffic unless it is non-connecting because interlining with the alliance airline increases the fare on the non-alliance carrier considerably. As a result non-alliance carriers will withdraw from the market.

Airport congestion can have countervailing effects on capacity use. On the one hand delays result in a reduction in aircraft use, so more aircraft are needed to offer the same service level in the remaining markets. Therefore, more aircraft are in the fleet but block hours[14] per day go down.

ASAs should continue to reflect the liberalizing trend of the past two decades, and remove restrictions that inhibit competition, and thus reducing any tendency towards conditions of structural oversupply. Fortress hubs are largely a feature of the status quo. In the longer term, new gateway hubs will evolve in key markets. Despite the restrictions they impose, fortress hubs are not seen to create structural oversupply conditions.

C.4. EFFECTS OF STRUCTURAL OVERSUPPLY

This section continues the analysis of structural oversupply by considering the evidence of the effects of structural oversupply, that is, features of airline industry performance that would indicate, or negate, structural oversupply[15].

The analysis relies on the insights of professional observers, independent academic studies and a review of relevant industry data.

C.4.1. Entry and Exit of Firms in the Industry

This section shows that firms continue to enter and exit markets at a robust pace, thus indicting that market forces are influencing the supply and demand in the global market of passenger air services.

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[14] Block hours – a measure of time that an airplane is in revenue service. It is the time between the removal of the blocks from the airplanes' wheels when pushing back from the gate at the start of a flight, until the placement of blocks under its wheels at the end of a flight when parking at the gate for debarking and embarking of passengers.

[15] If effects are present there may be structural oversupply. However, the absence of effects strongly indicates that there is no structural oversupply.

In 2005 there were approximately 2000 airlines providing scheduled and charter passenger services in the world. By 2012 the number of airlines increased to approximately 2300. Some turnover (i.e., exit of firms) has occurred, but the vast majority of airline failures or restructurings have been in domestic markets where barriers to firm entry and exit are limited

In the European Union in the last 20 years there have been a total of 595 airline (scheduled and charter) bankruptcies. However, for airlines that operated widebody services there were 3 bankruptcies and 7 mergers. In the U.S. there have been 188 airline failures since 1979. In the decade of the 1980s, there were 86 (not a surprisingly large number since domestic deregulation took place in 1978, and a significant number of airline failures had been anticipated). In the 1990s there were 47 and from 2000 to 2010 there were 42, since 2010 there have been 11. Of the total (from 1990 to the present), only about 10 percent were national passenger carriers (and the remainder were small regional or cargo carriers). Most large airlines restructured under Chapter 11. The trend of large airlines moving in and out of bankruptcy has slowed as airlines have adopted business models that provide greater insulation from the effects of business cycle fluctuations.

Over 20 low cost carriers have entered the Asian market since 2000 and a number of these airlines are operating widebody equipment and flying international routes. New carriers have entered the U.S. market, including Virgin America, Alligent and Spirit and other carriers that have redesigned their business model, such as Frontier. There has been significant consolidation of U.S. airlines. Now there are 3 major U.S. airlines (United-Continental, Delta-Northwest and American-USAirways) flying domestically and internationally. The consolidation of the veteran airlines through mergers and alliances and the entry of smaller LLCs are reflective of the general trend reshaping the industry landscape: Large alliance airlines with extensive network reach, and smaller LCCs providing service to new or underserved niche markets.

From the perspective of market entry and exit – the global market for air services does not appear to be an industry with structural oversupply.

C.4.2. Revenues, Yield and Profit

This section examines industry revenues, yields[16] and profits under conditions of structural oversupply. With structural oversupply, low yields and low fares would dominate the global market for air services – which is not borne out by the data.

It is important to note that while the global airline industry is composed of a set of airlines that fly in international markets, not all airlines participate in all markets. Also, and most importantly, economic activity, growth and business cycles differ significantly by country and region. Following the 2009 financial crises not all economies fell into recession, and for those that did, the depth of the downturn and the pace of recovery were different on a country-by-country basis.

The reality that the ebb and flow of economic activity varies by time and locale is seemingly missing from claims that structural oversupply causes low fares and profits in the airline industry. Capacity does indeed shift from weak markets to strong markets. Since the strength

[16] Yield is a measure of the average fare paid by all passengers per mile. It is calculated by dividing total passenger revenues by the number of revenue passenger miles.

of economic activity varies by time and locale, yields and revenues should as well. In the EU in 2012, for example, revenue per available seat kilometer (RASK) ranged from 8.6 cents (Ryanair) to 4.3 cents (Lufthansa) to 3.5 cents for (Norwegian). Each of these airlines participates in different markets, and their business models differ.

Average round trip fares worldwide have grown from $425 in 2009 to $500 in 2013 and average yield for U.S. carriers has improved from 12 cents per RPM in 2009 to 16 cents per RPM in 2013.[17]

In summary, there is wide variance in yields and fares across markets, and both have been increasing over the last several years. The general trend is positive and indicates the relative balance of supply and demand, not one of possible structural oversupply.

C.4.3. Pricing Strategy Effectiveness

This section uses industry data and expert insight to show that demand for passenger air services is projected to grow in response to pricing strategies; revenue per passenger is expected to grow; and the overall outlook for profitability is one of continuing improvement. These findings do not support a structural oversupply narrative in the global market for passenger air services.

Growth in passenger demand can occur as a result of economic growth so that demand increases with economic activity. Demand can also increase in response to airline competition through pricing, revenue management and service strategies. Revenue growth is often the result of demand growth, but over the last several years airlines have been modifying their business models to decouple revenues from strict reliance on passenger growth. Airlines are now growing the amount of revenue per passenger by selling ancillary services and pricing other services that in the past had been included in fares, such as baggage fees. International airlines have also been imposing fuel surcharges to protect themselves against large swings in fuel costs.

Demand growth varies significantly across markets. The International Air Transport Association (IATA) recently stated that airlines expect to see a 31 percent increase in passengers between 2012 and 2017; by 2017 total passengers are expected to rise to 3.91 billion, an increase of 930 million passengers from the 2.98 billion carried in 2012.

The IATA airline industry traffic forecast for 2013-2017 noted, "demand is expected to expand by an average of 5.4 percent compound annual growth rate (CAGR) between 2013 and 2017. By comparison, global passenger growth expanded by 4.3 percent CAGR between 2008 and 2012, largely reflecting the negative impact of the 2008 global financial crisis and recession. Of the new passengers, approximately 292 million will be carried on international routes and 638 million on domestic routes."

Boeing's regional and market forecasts for 2012-2032 are contained in the table below. There are a number of features to recognize. First, expected market growth varies significantly across markets as exhibited by the values in the shaded diagonal. Second, inter-regional market growth also differs considerably across regions; the China to Southeast Asia is

[17] RPM is revenue passenger miles.

anticipated to grow annually at 7.5 percent while the Southeast Asia to Europe market is forecast to grown at 7.2 percent., and Europe to Africa is expected to grow at 4.8 percent.

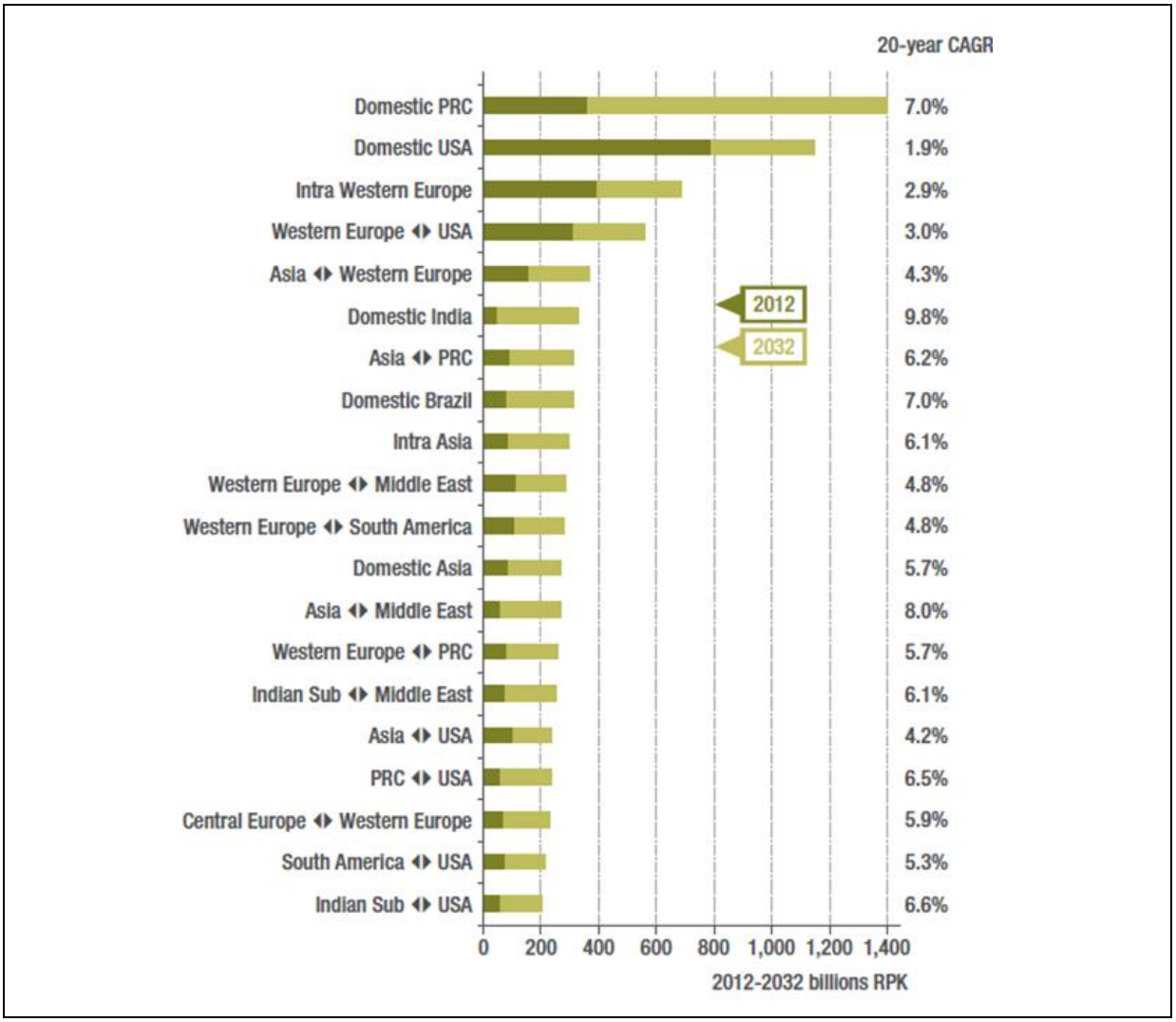
Table 3 Boeing's Forecast of Passenger Growth (2013-2032)

	Africa	Europe	Middle East	North America	Central America	South America	South Asia	Southeast Asia	Northeast Asia	Oceania	China
Africa	6.3	4.8	7.5	5.8				6.7			
Europe		3.6	5.0	3.5	4.5	4.8	7.2	5.0	3.2		6.1
Middle East			5.7	6.4			7.5	6.6			
North America				2.3	4.2	6.1		6.5	2.2	4.2	6.3
CentralAmerica					4.6	6.5					
South America						7.5					
South Asia									4.9		
Southeast Asia								8.4		5.1	7.5
Northeast Asia									2.5	3.5	4.8
Oceania										4.5	6.4
China											6.9

Airbus has a similar set of forecast that also exhibit variability across regions. The Airbus forecast notes that historically, passenger traffic has doubled every 15 years. Their 20-year forecast shows a 4.7 percent compound annual growth rate for 2013-2032. The main drivers of their forecast are: forecast growth in global urbanization and middle class expansion (fourfold expansion over next 20 years).

Airbus also translates the traffic growth forecasts into aircraft demand forecasts. For example, the Asia-Pacific region and its projected growth would account for 48 percent of the demand for widebody aircraft.

Table 4 Airbus' Forecast of Passenger Growth (2013-2032)



Source: Airbus Global Market Forecast 2013-2032 (http://www.airbus.com/company/market/forecast/)

A fundamental message of the Airbus forecasts is that traffic will grow at 4.7 percent annually, while annual widebody deliveries will be 4.2 percent of the widebody fleet. With one-third of the deliveries replacing retiring aircraft, the annual net growth in widebody aircraft is expected to be about 3 percent. Based on these forecasts, oversupply will not be a concern.

It was noted above that airlines benefit not just from general traffic growth but also revenue growth per passenger. The ability to grow revenue per passenger depends on passenger sensitivity to fare differentials (i.e., higher demand elasticity with respect to fares). If passengers are not sensitive to fares then pricing strategies and the pricing of other services would have little impact on demand. Consequently, capacity utilization would remain low and the perception of excess capacity would remain.

Revenue growth per passenger has risen dramatically over time. Data for U.S. carriers show that ancillary revenue as a proportion of total operating revenue has grown from 2 percent in

2006 to over 6 percent in 2012; for all U.S. airlines ancillary revenue grew from $2.4 billion in 2000 to $9.3 billion in 2012, a 300 plus percent increase.

Airline fortunes for revenue and profit are no longer strictly tied to aircraft capacity, utilization and growth driven by economic activity.

C.4.4. Variability of Profitability over the Business Cycle

This section uses industry data and expert reports to discuss how airlines are exercising greater "capacity discipline", with greater focus on profitability and fleet adjustment.

With structural oversupply, some claim, the global industry will realize negative economic profits over the business cycle. The supposed evidence for this is to examine airline profits over a business cycle.

This approach has several flaws, namely:

- It fails to account for business cycle variation across markets. Only if a firm operates in one market (or, in several markets with highly correlated business cycles) will such a test be useful.
- It assumes that there is no shift in a firm's business model, and that sources of revenue are uniform and uniformly affected over the cycle.
- It implicitly assumes that the firm's objective was strictly to maximize profits (as opposed to strategic goals vis-à-vis competing airlines[18]).

A historic strategic shift occurred in the U.S. airline market several years ago with lessons for the global market. In the past, U.S. carriers were narrowly focused on their domestic market, as evidenced by the share of domestic ASMs[19]. The U.S. domestic market has a maximum stage length of 5 hours (approximately), airlines operate hubs that connect in all directions, and most passenger trips are 1-2 days. Frequency in a market or on a route, therefore, was the key strategic variable. Airlines chased market share in an attempt to obtain the larger share of business passengers who are higher yield. However, low utilization and excess capacity was the result.

IATA and CAPA have referred to the shift by many carriers to focus on long haul markets as a structural improvement in profitability, which coincides with the operational strategy of capacity discipline. IATA forecasts profit improvements due to capacity discipline and both organizations note the significant variation in profitability across regions and markets. The shift (in the U.S. market, and by extension to the global market) was precipitated by four trends. Fuel costs increased and became more volatile, LCCs[20] grew and evolved to take upwards of 35-40 percent market share of domestic markets, carrier consolidation/merger took place to reduce the number of carriers and increase concentration and U.S. carriers refocused their attention on long haul international markets that provided an opportunity to

[18] For example, an airline may fly a route with greater frequency than required from a short-term profitability vantage in order to deter a competitor from entering the market.

[19] ASM, available seat miles (or kilometers) is a measure of airline output.

[20] LCC are low cost carriers, the iconic one is Southwest. Other low cost carriers are Jet Blue, Frontier and Virgin America. Ultra LCC are Alligent and Spirit.

increase profits. Carriers have refocused on profits and are not chasing market share through over-serving particular markets with high frequency. Frequency is less important in international markets, network coverage (the number of destinations served) is of far greater importance.

With Airbus and Boeing expanding production capacity and with the projected deliveries over the next few years, are overcapacity and lower profits to be expected?

Both *Aviation Strategy* and *IATA* forecasts assume that the deliveries would run at the rate of 1500-1600 aircraft in the next three years to build to 6.8 percent of the global fleet by 2015. This renewal rate is above the long range average. However, the chronic difficulty in these forecasts is anticipating the retirement rate; the industry is re-evaluating effective economic lives of older equipment in the face of oil prices exceeding $100 per barrel. Industry observers believe that retirement rates will increase, and that forecast demand actually outstrips the growth in capacity. As a result, overcapacity and lower profits are not expected to occur.

C.4.5. Growth in City-Pair Markets Served

This section, drawing from aviation studies and expert insights, discusses the importance of new markets relative to the growth of existing markets.

On the demand side, in long haul international markets frequency is less important while network reach, number of destinations served, is more important. Traffic growth will respond to the growth in city pairs rather than the growth in number of flights in established markets. Therefore, traffic growth is forecast to increase by more than seat capacity because aircraft are being deployed into new markets; this is the principle role of both the 787, A350 and B777 aircraft – opening new routes and markets. Looking at OAG data, it is seen that the number of directional city pairs with at least 365 departures per year (single daily service) grew by 18.1 percent from 2004 to 2013; single daily service would be a high level of service for use of widebody aircraft, if the growth of city pair markets that had 3 times weekly service is calculated, the growth over the period is near 30 percent. With the growth in the number of new markets served this can lead to a further growth in traffic, traffic which is not considered by those simply looking at fleet comparison with traffic growth.

When factoring new market expansion along with the higher retirement rates of aircraft, a picture of the industry emerges of demand growth overtaking supply growth and no indication of structural oversupply.

C.5. OUTLOOK FOR 2014 – 2016

There are currently a number of principal trends that minimize the concern of structural oversupply in the outlook years. These trends are summarized in the following sections.

C.5.1. Continuing Effects of Capacity Discipline

Capacity discipline, which has emerged as an industry trend in recent years, is expected to continue and have far-reaching effects on fleet size adjustments.

Wittman (2013)[21] and Swelbar (2013).have shown that U.S. carriers have adopted a strategy of capacity discipline. This has resulted in higher fares and improved financial performance for U.S. carriers.

C.5.2. Stability in fuel prices

Fuel prices are rising, but without the large variance that characterized the 2007-2011 period. A fuel price that is steadily increasing at a modest rate can be expected, which allows carriers to plan and consider acceleration of aircraft retirements and other fleet adjustments.

C.5.3. Growth in City-Pair Markets Should Continue

New air services will be introduced in the emerging market countries, and increased service will follow in the international gateway hubs. The analysis indicates that there is little risk of supply outstripping demand in the outlook period (as evidenced by forecast growth of the widebody fleet with the projected growth in demand).

C.5.4. Competition will continue to Grow Market Size

The best evidence indicates that passengers, particularly in long haul international markets, are fare sensitive, and lower fares do indeed stimulate traffic[22].

C.5.5. Decoupling of Demand from GDP

The analysis shows that air travel demand is less dependent on GDP growth, which together with capacity discipline measures means that airline profitability will fluctuate less with the business cycle. The dampening of these fluctuations will reduce the likelihood of an unwarranted capacity build-up and lessen the probability of structural oversupply developing in the outlook period.

C.5.6. Other Major Trends

The other major trends affecting the global airline industry are the increasing dominance of the major alliances; so-called "metal neutral" joint ventures between airlines; and a trend towards increasing consolidation of the industry (i.e., greater concentration – larger share of regional traffic handled by a smaller number of airlines).

The net effect of these other major trends will be to further reduce the probability of structural oversupply in the outlook period.

C.6. SUMMARY AND CONCLUSIONS

This report addresses the question: "Is there structural oversupply in the global market for passenger air services?" It examines the current state of the global market and the outlook for the period 2014-2016. The report concludes that structural oversupply does not exist; neither at present nor in the outlook period.

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[21] See Michael Wittman, *New Horizons in U.S. Airline Capacity Management: From Rationalization to "Capacity Discipline*, MIT International Center for Air Transportation, November 5, 2013

[22] The route between the U.S. and Australia is an excellent example. Prior to 2009, the Sydney-Los Angeles market was restricted to two firms, Qantas and United. Fares were high, but in 2009 Virgin Australia was permitted to enter the market. Fares fell, and after a year Delta entered the market and competition drove fares even lower. Non-stop passenger traffic between the U.S. and Australia expanded by over 50 percent between 2006 (pre-recession peak) and 2012.

Structural oversupply results in the production of too much output for a market. Excess supply leads to lower prices and lower profits. The report shows that, in fact, average fares have been rising. Moreover, the profits of air carriers in the U.S. and elsewhere have been positive and increasing as the world economies recover from the financial crisis of 2008. It also shows that the profitability of the airline industry is buoyed by:

- growth in passenger traffic, new market growth, and per passenger revenue growth;
- airline consolidation through mergers, or integration in one of the three global airline alliances;
- continuing liberalization of the global market for passenger air services (through ASAs and the loosening of restrictive practices).

The report examined excess capacity in the global airline industry. It considered issues relating to capacity measurement and showed that meaningful capacity measures do not indicate any persistent excess capacity in the global market for passenger air services.

Airlines are able to adjust the size and composition of their fleet with relative ease since there is a well-developed aircraft leasing industry. The leasing industry facilitates the movement of aircraft across airlines and regions to meet demand. International airlines also operate in many different markets and can redeploy aircraft from markets with weak demand to those with strong demand. This applies to narrowbody aircraft as well as to widebody aircraft.

The report further describes the evolution of the U.S. and global passenger air services market and, with it, the new business strategies of airlines and their alliances that are reflective of the changes in markets. Excess capacity, the report notes, was one of the consequences of historic airline regulation. The flexibility of capacity adjustment was a consequence of deregulation in the U.S. market, and this feature is evident in the global air services market as countries continue to deregulate air services.

The report presents the forecasts of traffic growth made by IATA, Boeing and Airbus. It shows that comparing fleet growth to demand growth is by itself not informative. Rather, one has to examine the growth in the number of city-pair markets. Ignoring this growth is a major contributor to the erroneous claim of too much capacity. Growth in the number of markets – not simply market growth – is shaping the future of the airline industry.

The conclusions of the report are clear. The global market for passenger air services, like most markets, is evolving with new revenue and network strategies and new business models. Key features of the new revenue strategies are growing revenue per passenger through pricing ancillary services, and managing fares and revenue with increasingly sophisticated systems. The global industry is consolidating through integration in global alliances. “Capacity discipline” is the new operational guideline for airlines, and it has contributed to rising average fares and increasing airline profits.

The growth in passenger traffic is forecast to be robust in most markets in the outlook period (2014-2016). Regional traffic shows significant growth and variability across regions, reflecting uneven economic growth. The forecast 20-year compound average annual growth in global traffic of 4.7 percent outpaces the projected net growth of the widebody fleet of approximately 3 percent. If these forecasts prove true, it is more likely in the longer term that there will be undercapacity than overcapacity.

Export-Import Bank of the United States

"Evaluation of the Global Passenger Airline Industry: Does Structural Oversupply Exist?"

Final Report

Prepared by Washington Consulting Group

March 31, 2015

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Contents

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ABOUT THIS DOCUMENT

This document is the second draft report for the "Evaluation of Structural Oversupply in Global Passenger Airline Industry". David Gillen and Daniel Brod were the authors of the report for the Washington Consulting Group.

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A. EXECUTIVE SUMMARY

This report examined the issue of structural oversupply in the global market for passenger airline services. This market, and especially the long haul intercontinental segments of the market, relies on widebody aircraft to provide the principal service of air passenger travel.

The report is a qualitative assessment that is supported by data analysis and published aviation studies. The judgment and experience of independent academics and professional observers of the industry contributed to the analysis. The general study approach was to characterize conditions of structural oversupply and its consequences (i.e., causes and effects), and to determine whether the empirical evidence supported – or negated – a finding of structural oversupply in the global market for air services.

The report concludes that the global passenger airline industry, while possessing many unique features, is not fundamentally different than many other industries. Structural oversupply results from large and irreversible capital investments, long term capital planning horizons, and the inability or lack of incentive to adjust capacity. The report demonstrates that these are not features of the global market for air services, or have no material impact on the functioning and evolution of the industry. The report finds that the trends identified in the 2014 report are reconfirmed if not strengthened.

The principal indicators of the global market for air services show that structural oversupply does not exist. The reasons for this determination are summarized in the following bullets:

- There is continuing robust entry of firms into the market, especially serving the emerging markets of Asia and other regions.
- Profitability, highly variable across markets and carriers, is rising and with less volatility to the business cycle. This trend has strengthened in the past year.
- Demand is forecast to grow at an average annual rate of 5.4% (per IATA), increasing passengers from 2.98 billion (2012) to 3.91 billion (2017)[1].
- Demand is sensitive to fares, as evidenced by high demand elasticities with respect to fare for most market segments[2]. A recent study (see footnote 33) confirms the high elasticity finding.
- Capacity and utilization indicators show airlines are exercising greater "capacity discipline" with fleet adjustment, resulting in improved profitability. In the presence of structural oversupply, a capacity discipline operational strategy would be sub-optimal (i.e., airlines could serve markets with greater frequency and lower load factors for higher profitability.) Data of the past year reconfirm this trend.

[1] Note that these values are unchanged from last year's report because IATA has not yet published its 2015 update of its forecast.

[2] With structural oversupply, one would anticipate a state of demand saturation and limited response to fare-based strategies (i.e., inelastic demand).

- Airlines are shifting towards higher-profit, long haul routes. The net effect of this trend will be to increase disproportionately widebody aircraft demand. This trend is reconfirmed by recent data.
- The shift to longer haul requiring more widebody aircraft will, in some cases, result in the replacement of narrowbody aircraft on longer-range routes. These narrowbody aircraft will be redeployed to shorter haul and regional markets.
- Overall capacity utilization continues to trend upward, and recent data reconfirm the trend.
- Multiple capacity adjustment mechanisms (aircraft retirement, redeployment, delivery deferrals, leasing) are widely used throughout the industry for widebody and narrowbody aircraft. The existence and robust functioning of these mechanisms, could not coincide with a state of structural oversupply in the global market for air services.

Non-economic factors (fortress hubs[3], other barriers to entry, foreign ownership restrictions) have some competition inhibiting effects. However, these effects are seen to be limited (or, gradually eroding) and not contributing to a condition of structural oversupply.

ASAs[4] define the restrictions by which foreign carriers must abide in a county's home market. These agreements are moving to more liberalized regimes with fewer restrictions regarding "freedoms of the air"[5], flight frequency and other factors. Greater liberalization of ASAs enhances competition.

The analysis of the period 2015 to 2017 shows no compelling evidence that structural oversupply will be a concern in the global market for air services.

[3] "Fortress hubs" refer to hub airports where a single airline, or alliance of airlines, control 70 percent or more of the airport's capacity slots, thus making it nearly impossible for a competing airline to initiate operations from the same airport.

[4] Air service agreements (bi-lateral agreements governing air transport between countries). ASAs that significantly liberalize scheduled passenger service relative to a previous status quo are often called "open skies" agreements. The U.S. currently has 105 open skies agreements.

[5] http://en.wikipedia.org/wiki/Freedoms_of_the_air

B. ANALYSIS ASSUMPTIONS

The analysis assumptions represent an expert outlook that was derived from the broad consensus of aviation professionals and observers. While the assumptions draw from a number of sources that may not be fully harmonized (e.g., Boeing and Airbus forecasts, IMF and World Bank), the outlook is generally consistent. In cases where there seem to be discrepancies among different sources, care was taken to base conclusions on multiple indicators.

While recognizing that all assumptions and forecasts are uncertain to some extent, the subsequent analysis shows that the industry as a whole is better insulated than in the past to absorb unanticipated shocks in prices and demand. The analysis conclusions should remain robust even if there is significant variance from some of the assumption elements.

The following are the assumptions that guided the report's analysis.

1. Market assumptions
    a. Global and regional market growth forecasts based on IATA, Boeing and Airbus forecasts (where the forecasts diverge, the analysis assumes an average of the forecasts)
    b. Macroeconomic "new normal" – slower long-term growth in developed economies (with a return to faster growth in the U.S.).
    c. World Bank and IMF forecasts for economic growth and recovery in developed and developing economies
    d. Moderate GDP-based growth in air passenger markets overall, with stronger growth in Latin American, African and Southeast Asian markets
2. Energy outlook
    a. Following the price collapse of the energy markets in recent months, the analysis assumes a gradual return in 2015 to oil prices of around $50-$60 per barrel, and relative stability thereafter
3. Emerging markets assumptions
    a. Volatile GDP growth based on World Bank and IMF forecasts
    b. Stronger GDP growth in Africa (per World Bank forecasts)
    c. India and Brazil will have weaker GDP growth with greater volatility (per World Bank forecasts)
    d. Continued major growth in China's and Southeast Asia air service markets (based on economic growth and the experience of service establishment following economic activity)
4. Industry trends
    a. Airline consolidation will continue but at a weaker pace. Following the major mergers of recent years, airlines will adjust to the new competitive landscape

while possibly acquiring smaller airlines that extend their networks. Since 2010 there have been few mergers of major airlines in the U.S. and globally.

b. Alliances will exercise capacity discipline in all but trans-Pacific market

c. Legacy U.S. carriers will continue to transition to long haul international

d. Low-cost carriers may expand in trans-Atlantic routes with narrow body aircraft

e. Airlines to increase emphasis on the development of new routes over expanding service on existing routes

f. Continued use of fortress hubs by the three alliances

g. Continued development of "metal neutral" joint ventures within established alliances particularly in Pacific region

5. Non-market assumptions

   a. New air service agreements (ASAs) to continue at a slower pace than in recent year with emphasis on very liberal Open Skies agreements[6]

   b. Continued liberalization of bi-lateral service agreements with greater liberalization in emerging markets

   c. Governments will not impose significant new taxes on airlines, airline inputs such as fuel, or on passengers

6. Government interventions in infrastructure markets

   a. Terminal and air space constraints will be eased slowly, special levies, etc. – no significant change to status quo

   b. Development of slot controls at select North American airports and slot controls to continue in Europe

   c. Development of slot controls at congested airports in Southeast Asia and Latin America

7. Effects of environmental policies

   a. EU policy on emissions trading will be introduced at a slower pace than previously planned

   b. International agreement on emissions trading will proceed at a moderate pace

[6] So-called liberal ASAs, or "Open Skies" agreements, include the granting, at least partially, of sixth to ninth freedoms of the air to foreign carriers. Essentially, these freedoms open the domestic market to foreign carriers for certain types of flights. They also specify the frequency of flights permitted, and other factors governing the operations of foreign carriers.

C. OVERSUPPLY IN THE GLOBAL MARKET FOR PASSENGER AIRLINE SERVICES

C.1. OVERVIEW

This report builds on an earlier report prepared in 2014, which examined the issue of structural oversupply in the global market for commercial passenger airline services. This report draws on new information and analysis to provide an opinion as to whether there is currently in 2015, or likely to be in the next three years (2015-2017), structural oversupply in the global market for air services.

The report is a qualitative assessment that is supported by data analysis and published aviation studies; data included in the analysis were drawn from IATA[7], U.S. Department of Transportation, Boeing and ICAO[8]. The judgment and experience of independent academics, the quantitative analysis of airline economists and the assessments of professional observers of the industry contributed to the analysis. The general study approach is to set out the conditions that would characterize structural oversupply and its consequences (i.e., causes and effects), and to determine whether the empirical evidence supported or refutes a finding of structural oversupply in the global market for commercial passenger airline services.

The remainder of this overview lists the main sections of the report and describes their content as they relate to the analysis.

- **Structural Oversupply – Conditions and Effects**

This section describes generally the conditions of structural oversupply and its effects. Conditions of structural oversupply refer to a state of chronic excess capacity. The effects of structural oversupply refer to features of industry performance that would be observable with structural oversupply.

- **Conditions of Structural Oversupply**

This section examines the issues of capacity measurement and considers the empirical evidence for excess seat capacity in the global market for passenger air services. Specifically, it examines the evolution of the global fleet of widebody aircraft with particular focus on those supplied by the two manufacturers Boeing Company and Airbus, in consideration of projected orders and deliveries and their distribution among types of buyers. The evolution of the fleet is analyzed in light of strategic capacity management trends in the industry and forecast demand to assess generally whether excess capacity and structural oversupply exists. The section also examines capacity adjustment mechanisms in the airline industry, for widebody and narrowbody aircraft. In markets with robust and well-functioning mechanisms for capacity adjustment, oversupply conditions could not persist.

[7] International Air Transport Association

[8] International Civil Aviation Organization

- **Effects of Structural Oversupply**

This section analyzes a number of financial and operational performance indicators of the airline industry to see whether the features associated with structural oversupply are evident in the global market for passenger airline services. These features include: the entry and exit of airlines in international markets; profitability over the business cycle; and pricing/revenue strategies. This section also considers the importance of new market expansion as distinct from the growth of existing markets in the assessment of structural oversupply.

- **Outlook for 2015-2017**

This section summarizes the outlook for the period 2015-2017.

- **Summary and Conclusions**

This section contains the summary and conclusions of the report.

C.2. STRUCTURAL OVERSUPPLY – CONDITIONS AND EFFECTS

This section establishes the distinction between the conditions of structural oversupply and its effects for a global industry. These conditions and effects are general and are not specific to the airline industry. It is important to distinguish causes and effects since some outcomes that could arise from structural oversupply can also occur for other reasons as well. The subsequent sections of the report analyze data from a variety of sources for the global market for passenger air services to determine whether they indicate or refute conditions and effects of structural oversupply.

C.2.1. Conditions

Structural oversupply conditions occur when firms are unable to adjust through sale, exit, or redeployment their stocks of physical capital assets in accordance with market forces. The inability to adjust capital stocks is due to one or more of the following reasons:

- Assets are unmovable and cannot be redeployed to other markets
- Assets, and implicitly the imbedded technology, are not flexible and cannot be adapted to alternative uses ("dedicated and specific capital" in the jargon of economics)
- The cost of selling or adapting assets is uneconomical (and government subsidies for new physical capital assets could be a contributing factor to the disruption of these markets[9])

C.2.2. Effects

An industry with structural oversupply would exhibit the following features reflective of the effects[10] of oversupply:

[9] A common cited example of subsidized capital is the case of public transit where in some jurisdictions 50 percent subsidies are paid for 'capital' (new buses or transit vehicles). As a result, the evidence shows transit companies invest in higher quality buses and retire buses prior to completing their useful economic life.

[10] Common examples of industries with structural oversupply that have exhibited these features are the steel industry and the wine industry in Australia.

- Low output prices (relative to costs) over an extended period of time
- New firms would be unlikely to enter the market due to low expected profitability
- Firm exit or turnover would be limited because economic losses would be even greater in liquidation
- Pricing strategies would be ineffective because with excess capacity firms would over-produce, pushing prices downwards and resulting in saturated demand that is insensitive to pricing
- Low profitability over the business cycle

While an industry with structural oversupply would exhibit these features, it does not follow that the presence of some or all of these traits is a sufficient condition to conclude structural oversupply. Markets for some agricultural goods exhibit these features yet there does not exist structural oversupply.

C.3. CONDITIONS OF STRUCTURAL OVERSUPPLY

This section discusses conceptual issues relating to capacity, utilization, and their measurement in the airline industry, which are key to assessing the structural oversupply conditions. It continues with an analysis of capacity adjustment mechanisms in the industry, the robust nature of which refutes the presence of structural oversupply. The section concludes with a discussion of the non-economic factors that influence capacity adjustment.

The section builds on several published studies, expert insights and data analysis are used to address the capacity-related issues.

C.3.1. Capacity and Utilization

An analysis of structural oversupply needs to consider aircraft utilization, and not just fleet size or aircraft on order. Aviation often uses engineering measures of capacity utilization such as load factor, the ratio of revenue passenger miles (or kilometers) to available seat miles (or kilometers) and average hourly utilization of an aircraft. These measures have limited economic meaning. It is possible by charging very low fares to have a high load factor, perhaps even 100 percent. Observing such a high load factor, one could erroneously conclude there is too little capacity in the market. On the other hand observing a low load factor could lead an observer to conclude there is too much capacity, which may not be the case[11].

The daily utilization of aircraft is sometimes used as a metric of capacity use and, hence, over capacity. However, such a metric fails to account for the average stage length (the average distance flown on a flight or average time for a flight). For example, when previously domestic-only airlines enter long haul international markets, the average stage length at least doubles and the average daily use goes down simply because it takes longer to turn the

[11] The first example is a case of poor pricing and, perhaps, inadequate revenue management. The second case may be the result of strong revenue management; Southwest Airlines has one of the lowest load factors among U.S. carriers yet is consistently the most financially successful carrier.

aircraft around and scheduling flights becomes more difficult.[12] The Operations Management literature on aircraft utilization and turn times shows that a shift from 500 to 1000 miles stage length reduces the number of annual trips per aircraft from 2800 to 1800. A further increase to a 1500 miles stage length further reduces annual trips to 1000. This same literature also shows, empirically, that hub-and-spoke carriers (carriers that operate wide-body aircraft) have significantly lower aircraft utilization than point-to-point carriers. Due to having longer stage lengths and slower turn-times, carriers operating wide body aircraft will need more aircraft.

Load factors and profits are rising, which would seem to refute a condition of structural oversupply. Longer average stage lengths and revenue management tools strengthen these trends[13].

IATA reported in late 2014 that:

- Passenger load factor had increased from 79.7 to 80.4 percent,
- Breakeven load factor fell from 64.2 percent to 63.4 percent, and
- Aircraft fleet in use went from 25,268 to 25,851 between 2013 and 2014 for a 2.3 percent increase; however simply counting aircraft is not a measure of capacity.[14].

Capacity can also be measured as number of aircraft or number of seats in a market; number of seats can vary with frequency. Seats per aircraft can also vary as is evident with different carriers configuring their aircraft in different ways. In addition, counting aircraft orders and deliveries fails to account for the ability of carriers to park aircraft when needed or required.

Engineering measures of capacity offer very limited information in assessing the state of structural oversupply in the global market for air services. Reliance on these measures could lead observers to erroneously conclude that structural oversupply exists. However, complex measures of capacity reveal a different picture.

Unlike engineering measures, economic capacity is related to production costs[15]. It may be uneconomical to offer additional available seat miles with increasing marginal costs. In such

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[12] As an example, a typical aircraft on a domestic route can be turned around in as little as 15 minutes, but on average takes about 40 minutes. In international markets with widebody aircraft, the turnaround times are often three hours or more. Generally, widebody aircraft have double the turnaround time of narrowbody aircraft.

[13] For example, two airlines could use their aircraft on average 10 hours per day. One airline flies short stage lengths and generates 3 flights per day while the other airline flies longer stage lengths and generates 2 flights per day. Clearly, the amount of revenue and profit produced will differ in each case.

[14] CAPA (Center for Asia Pacific Aviation) undertook an analysis for the global airline fleet for the period 1972 to 2012 using a composite measure of capacity utilization for the global airline fleet composed of load factor, flown hours per day (as percent of maximum) and aircraft in use (as a percent of the total fleet); CAPA's composite measure of overall capacity utilization (%) for the global airline fleet is the product of load factor, flown hours per day (as a % of the maximum) and aircraft in use (as a % of the total fleet). Their analysis found: significant variation in the number of aircraft in use over time; growth in the average load factor; and overall capacity utilization trending upward since 1972 – from less than 50 percent in 1972 to 63 percent in 2012. From 1972 through 2012 the average load factor increased from 55 percent to approximately 78 percent – certainly the introduction of revenue management had an influence here. Average daily aircraft utilization in 1972 was 72 percent, declining to 65 percent in 2012. The aircraft in use as a percentage of the fleet went from 80 percent in 1972 to about 68 percent in 2012.

a case, an airline may seem to have idle capacity (like one might expect in a structural oversupply scenario), when, in fact, the airline is deploying its assets for maximum profit. Full utilization of capacity is different from an economic perspective than from an engineering one.

Capacity can also be measured in multiple ways: As number of aircraft or number of seats in a market; number of seats can vary with frequency. Seats per aircraft can also vary as is evident with different carriers configuring their aircraft in different ways. For example seating densities on the Boeing 777-300ER vary considerably across airlines, as shown in the following Table 1.

Table 1 Seating Configurations for Boeing 777-300ER by Airline

Airline	Total Seats
Air Canada	458
Air France	383
American	310
Cathy Pacific	398
Emirates	360/427

Sources: Boeing, Airline websites, Seatguru.com

Fleet expansion is not a harbinger of oversupply because capacity is not measured by number of aircraft, rather, by how they are used, deployed and configured.

No single measure of capacity, number of aircraft, daily use or load factor, is adequate to define or describe capacity and that seemingly idle capacity may be economically advantageous to airlines. A composite measure[16] of capacity utilization shows long-term improvement in the global industry's capacity utilization. More recent evidence from IATA analysis confirms these trends to be continuing. The review of capacity and its utilization in the global market for air services does not indicate that structural oversupply exists. This finding applies to the entire fleet including narrowbody aircraft.

C.3.2. Capacity Adjustment Mechanisms

Well-functioning capacity adjustment mechanisms allow firms to rapidly adjust capacity and efficiently supply market demand. These are a critical feature of markets that are not burdened by problems of structural oversupply. If capacity is indeed adjustable economically, then conditions of oversupply could not persist for any length of time in the global marketplace, although there may be periods of temporary disequilibrium due to the entry of new airlines or the introduction of new routes by established airlines.

While it is true that aircraft are expensive and represent a long-lived asset, markets have developed mechanisms that allow flexibility in buying, selling and renting/leasing capacity.

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[15] Baltagi, B.H., J.M. Griffin and S.R. Vadali, 'Excess capacity: a permanent characteristic of US Airlines?', *Journal of Applied Econometrics*, **13**, 645-657 (1998)

[16] See footnote 14.

Note also that fuel costs and labor costs are larger components of cost than the capital-related[17] costs of direct operating costs.

With restrictions in global markets declining, airlines need to be nimble, with the ability to both acquire and shed aircraft quickly. The leasing industry for aircraft emerged in response to the need for rapid capacity adjustment, and to reduce ownership risk and maintain competitiveness. The emergence of the aircraft leasing industry was a key development in responding to airlines' needs and to ensuring that aircraft capacity was sufficiently mobile for sustained profitability. The existence of a leasing industry also meant that it was easier to enter a market, route or to start up a new airline. The ability to readily lease aircraft meant airlines were no longer faced with large and irreversible capital investments, or long range planning or an inability to adjust their fleet size or type. Rather, the leasing industry turned a capital investment into an operating cost where aircraft capacity was rented or leased[18]. In 2013, approximately 50 percent of the world's aircraft fleet is owned by leasing companies (including narrow- and widebody aircraft). Examining the Boeing and Airbus data for current widebody orders, a significant proportion is by leasing firms (37 percent of Airbus' current widebody on order are by leasing companies.) For Boeing deliveries of wide body aircraft after 2014, leasing companies are taking 21 percent and for Airbus 14 percent of widebodies delivered on order are going to leasing companies.

Besides leasing, airlines also have the ability to shed or increase capacity through other well-functioning market mechanisms. With the highly developed leasing market, it is difficult to see that structural oversupply can exist or persist for a significant period of time because price adjustments in the leasing and other secondary markets would result in the absorption of the excess capacity.

Airlines can adjust capacity in numerous ways. One of these ways is through aircraft redeployment. Air Berlin is a good example of a carrier that changes its entire route network seasonally, where in the cool European winter it flies north-south to the Mediterranean and in summer it flies east-west as international tourists demand access to destinations beyond the big gateway hubs of London, Amsterdam, Frankfurt and Paris.

Airlines are controlling capacity by deferring delivery of aircraft. A recent example is Qantas' decision to defer deliveries of A380, B787 and A320s. In order to do this, some other carrier must take delivery or the aircraft will be parked. An example of the latter is the number of first generation B787s that are parked engineless at Everett Field (Washington State); Boeing has 11 early model 787s which are heavier than the current production models. Airlines have simply switched their orders to the new generation aircraft.[19]

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[17] Capital-related components of direct operating costs include depreciation and amortization of capital assets and leasing charges for capital assets. They do not include the finance charges on borrowing to purchase aircraft or other capital assets.

[18] The share of aircraft delivered to leasing companies never exceeded five percent until 1985, and has grown steadily since. See "Leasing and Secondary Markets: Theory and Evidence from Commercial Aircraft", Alessandro Gavazza, New York University, January 2005.

[19] See http://www.bloomberg.com/news/2014-02-25/boeing-said-to-seek-buyers-for-1-1-billion-of-early-787s.html

Airlines are retiring their aircraft after shorter periods of service. Again using Qantas as an example, they will retire both B747 and 767 aircraft earlier than anticipated. All of this results in slower fleet growth. An analysis undertaken by CAPA showed that fleet growth used to oscillate between 2 percent and 6-7 percent, but since 2002 it has remained in a relatively narrow channel of 2.7 to 3.9 percent growth. Fleet growth has also been slowed by an increase in the rate of retirements as a percentage of the fleet to a fairly steady 2 percent, as older, less fuel efficient aircraft have exited. Previous periods of rising fuel cost have contributed to the slowing of fleet growth.

Additionally, in the period 2010-2014 year-over-year growth in passenger traffic has exceeded the year-over-year growth in passenger capacity. The result is that load factor has increased in each year. In Table 2, demand and supply growth rates are reported for the world and by region. In the 2015 forecast, capacity expansion will marginally exceed projected growth in passengers, but the projected load factor in 2015 is expected to be 79.6 – down 0.3 from 2014. Yet – at the same time – profits, profit margin and net profit per passenger are all expected to grow in 2015 (see Table 3 below).

Table 2 Global Demand and Supply for Air Services 2010-2014 and Projection for 2015

System-Wide Global Commercial Airlines	Passenger Traffic (RPK) % Change over Year						Passenger Capacity (ASK) % Change over Year					
	2010	2011	2012	2013	2014	2015F	2010	2011	2012	2013	2014	2015F
Global	7.9	6.3	5.1	5.4	5.7	7.0	4.5	6.6	4.0	4.8	5.5	7.3
Regions												
North America	4.5	2.9	1.0	2.6	2.7	3.1	2.3	2.8	0.4	1.6	2.0	3.5
Europe	4.3	8.4	4.6	4.1	5.4	5.5	1.6	8.6	2.8	2.5	4.5	5.8
Asia-Pacific	11.8	6.6	6.1	7.2	7.0	7.7	6.3	7.0	5.4	7.1	7.0	8.5
Middle East	17.6	10.0	14.7	11.9	12.9	13.9	13.3	9.8	12.4	11.4	13.0	15.6
Latin America	12.4	11.3	9.4	6.6	5.5	6.0	6.8	9.3	7.6	4.6	6.5	6.5
Africa	12.3	1.6	7.5	4.8	1.5	5.1	9.3	3.2	6.4	5.0	6.5	5.5

Source: IATA 2011-2015 Domestic & International, IATA Economic Briefing Financial Forecast December 2014
RPK is revenue passenger-kilometers. ASK is available seat-kilometers.

Table 3 Global Financial and Operational Indicators

Year	ROIC[a]	Pax LF[b]	Capacity Growth ATK[c]	Flights[d]	Profit Margin[e]	Operating Profit /Pax[f]
2004	2.9	73.5	10.10	23.8	0.9	-2.7
2005	3.0	74.9	5.70	24.9	1.1	-1.9
2006	4.6	76	4.80	25.5	3.2	2.1
2007	5.5	77	6.60	26.7	3.9	5.8
2008	1.4	76	2.70	26.5	-0.2	-10.1
2009	2.0	76	-4.20	25.9	0.4	-1.9
2010	6.3	78.5	3.70	27.8	4.9	6.5
2011	4.7	78.4	6.00	30.1	3.1	2.9
2012	4.3	79.4	3.00	31.2	2.0	2.1
2013	4.9	79.7	3.60	32.0	3.5	3.4
2014	6.1	79.9	4.90	33.4	5.1	6.0
2015	7.0	79.6	6.80	35.4	6.0	7.1

Source: IATA, Domestic and International Traffic, Economic Performance of the Airline Industry, 2014 Mid-Year Report, IATA Economics.

a) ROIC - Return on invested capital (percent)
b) PAX LF - Passenger load factor (percent revenue passengers per available seats)
c) Capacity Growth ATK – percent increase in available ton-kilometers
d) Flights (millions)
e) Profit Margin – Operating profit as percent of revenues
f) Operating Profit / Pax – Dollars operating profit per departing passenger

Another factor that has led to capacity adjustment is reduced fluctuation in the rate of delivery relative to the size of the fleet. In the early 2000s, the delivery cycle had all but disappeared; deliveries have remained at just above 5 percent of the fleet for the whole of the past decade, in contrast with previous decades, when they rose to peaks of 7-8 percent of the fleet and fell to troughs of 4 percent.[20]

This smoothing of the deliveries curve has been attributed, to some degree, to airlines adjusting to a longer delivery horizon in response to economic and financial uncertainty in different markets. The increase in the backlog is due to the large numbers of orders placed by airlines and leasing companies in 2005 to 2008 and again in 2011 and 2012 and continuing into 2014; the backlog has extended from a traditional 3-4 years to almost 8 years or more as the proportion of widebody aircraft in the total has increased. Tables 4 and 5 report the order backlog for Boeing and Airbus, respectively. Clearly, Boeing has more widebody aircraft on order than Airbus; 1419 versus 1040. In Boeing's case, the average production is 100 wide body aircraft per year (averaged across B777, B787 and B747-8). It will take 12 years to clear the current order backlog.

[20] The aircraft order cycle is correlated with the airline profitability cycle, and the delivery cycle followed this order cycle. A boom-bust cycle emerged that was cited to indicate oversupply.

Table 4 Boeing Widebody Aircraft on Order

	Widebody	Percent Widebody of Total Aircraft for Category
US Airline	115	8
Leasing CO	300	21
Foreign Airline not Member of Alliance	453	32
Foreign Airline Alliance member	551	39
Total Widebody Aircraft	1419	100

Total aircraft on order: 5789

Table 5 Airbus Widebody Aircraft on Order

Owner	Number	Percent of Total Widebody
Leasing	150	14
North America	126	12
Rest of Word	764	74
Total	1040	100

C.3.3. Non-Economic Factors that Affect Capacity Adjustment

This section describes the effects of non-economic factors. In general, the presence of the factors are competition inhibiting – while actions taken relative to the status quo can either be more restrictive (competition inhibiting – e.g., new fees affecting potential entrants) or less restrictive (competition promoting – e.g., liberalizing air service agreement). The status quo and the emerging trends are not seen to contribute to structural oversupply.

Subsidies, air service agreements, the fortress hubs of the three global alliances and airport congestion all impact the ease with which capacity can be redeployed or reallocated as markets ebb and flow. The effect of subsidies depends on the magnitude and the incidence on fares. If input prices (e.g., fuel or airport services) are subsidized this could result in either lower fares or increased profits to the airlines or both. In competitive markets subsidies would potentially lead to lower fares. However, in many international markets, pricing freedom and flight frequency are all tightly regulated. Consequently, subsidies are more likely to flow directly to the airlines' bottom line. Policies for capacity expansion will, in general, have little impact.

Air Service Agreements (ASAs), or bi-laterals[21], affect access to markets. The three airline global alliances (Star, Oneworld, and Skyteam) have evolved to their current state largely

[21] ASAs determine the extent to which the parties to an agreement enjoy so-called "Freedoms of the Air" in the aviation markets of the foreign country. The agreements may also determine frequency of access, affected airports, affected carriers and aircraft gauge (wide- or narrowbody) serving the respective countries.

due to restrictions on providing same airline service to cities beyond the key gateway hubs (in the U.S.: New York, Washington, Los Angeles, San Francisco, Dallas and in the EU: London, Amsterdam, Paris, Frankfurt/Munich, Madrid). Thus, even if an airline has excess capacity it may not be able to access foreign markets. For example, a non-American carrier cannot fly between two U.S. cities nor can an American carrier fly between two cities in a foreign domestic market (China, for example). The degree to which they can access markets will depend on the conditions of the ASAs and the number of freedoms permitted. A key impact of restrictive ASAs is to divide markets rather than to grow them. If ASAs, for example, only allow three flights per week between the home country and a foreign country, this is not sufficient for sustained market growth. However, daily service will stimulate the market and result in more traffic for all carriers.

The U.S. air policy in place for the last decade or more is to negotiate open skies agreements with other countries. An open skies agreement removes all economic and operational governmental restrictions on air carriers including pricing, capacity and routes. Such agreements allow unlimited access to US and partners markets and the right to fly to any intermediate and beyond points. This latter feature means air carriers of partner countries to an open skies agreement can fly passengers from the home country to the partner country and pick up passengers and fly them to a 3rd country (called 5th Freedom Rights- e.g. NY-Paris-Deli by a US carrier)) and can pick up passengers in a foreign country and to fly passengers between two foreign countries via the home country (6th Freedom Right- e.g. London-Washington-Mexico City by a US carrier). Open skies agreements provide maximum operational flexibility for airlines and airline alliances. The U.S. currently has 111 open skies agreements and is among the countries in the world with highly accessible markets. As ASAs continue the liberalization trend, new gateway airports may emerge with expanded opportunities for new entrants to the air service markets.

ASAs should continue to reflect the liberalizing trend of the past two decades, and remove restrictions that inhibit competition. In the longer term, new gateway hubs will evolve in key markets.

C.3.3.1. Claims of Unfair Competition

A recent White Paper[22] developed by a subset of U.S. full service network carriers has focused on the issue of claimed subsidization of foreign competition, specifically the three Gulf carriers Emirates, Etihad and Qatar. Without describing the paper in detail, the central thesis is that their respective governments heavily subsidize long haul Gulf carriers, and this constitutes unfair competition for U.S. carriers. A significant share of these subsidies, according to the White Paper, are through underpricing of airport access (landing charges) and airport services as well as through favorable tax treatment and less than market priced factor inputs such as labor and fuel.

This report notes that the fairness issue of the foreign subsidies should not lead to conditions of oversupply (as described below). Moreover, countries, according to most trade

[22] *Restoring Open Skies: The Need to Address Subsidized Competition from State-Owned Airlines in Qatar and the UAE*, January 28, 2015. It is the authors understanding that this document was developed for Delta Airlines and American Airlines.

agreements[23], may take countervailing measures only upon affirmative determination of dumping (i.e., selling of imported products at less than their cost of production) and demonstrated injury. Existence of subsidies and impacts on competitiveness, *per se*, is not a cause for a countervailing measure in the form of subsidies to a domestic industry (or withholding a subsidy to a foreign entity).

The presence of foreign subsidies may be due to a range of issues unrelated to predation (i.e., unfair targeting another country's markets). For example: market segmentation; fluctuations in demand; shifts in supply or a different distribution of costs. A reasonable case can be made that subsidies to the Gulf carriers have benefited U.S. carriers by opening new routes. This type of indirect consequence is one of the reasons it has been argued that from an economic point of view the best response to unfair subsidization of a foreign competitor is to send a "Thank You" note[24].

The White Paper claims that Gulf carriers divert passengers from U.S. carriers because of their easy access to U.S. cities due to open skies agreements. These agreements allow Gulf carriers to route passengers through their home hubs and onto destinations in India, Asia and Australasia. The White Paper fails to note that these very same conditions have existed in other jurisdictions for years; e.g., Singapore has vertically integrated airline and airport systems, KLM receives favorable treatment from the Dutch government as do South African Airways, Alitalia, Air France, and SAS from their respective governments, just to name a few.

This report makes some key observations relating to the White Paper's claims. First, the routes from the U.S. developed by Gulf carriers are new routes; only in one case, New York (JFK) to Milan, Italy is the market currently served. Second, additional aircraft capacity is constrained by airport capacity. In effect, additional capacity on a route can exist only if there is excess airport capacity. Third, access to markets is governed by international ASAs, which governs the number of widebody aircraft serving international routes. Fourth, despite claims in the White Paper, the addition of Gulf carriers' capacity has stimulated demand and built the markets. Fifth, the development of routes builds on the geographic advantages of Middle Eastern hubs, and Gulf carriers are offering a different travel experience (i.e., a differentiated product) by moving passengers through their hubs (just as Singapore Airlines does at Changi Airport).

The substantial widebody capacity growth in world markets will ultimately serve routes that bring the highest return on these assets. A large segment of the added capacity will be in the Indian and Asian markets where a growing urban middle class of near 1 billion in China and slightly less in India will feed a market that is projected to grow to 5 times the size of the current U.S. market.

This report concludes that subsidization of the Gulf carriers has not contributed to conditions of structural oversupply, and is very unlikely to have an appreciable effect in the forecast period.

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[23] See, for example, the anti-dumping code in Article VI of GATT

[24] See J. Bhagwati, "*Protectionism"*, (Cambridge, MIT Press, 1988), 43-59

C.3.3.2. Growth of New Markets

Urbanization and a growing middle class have resulted in structural demand shifts. The number of mega city gateways in the world is forecast to grow from 42 in 2013 to 91 in 2033. The new gateways will develop in cities with more than 20,000 daily long haul passengers. A growing middle class has a significant impact on demand. In 2013, North America had 1.6 commercial air passenger trips per capita with Europe having about 1 trip per capita. China, on the other hand logged 0.25 trips per capita and India, 0.06 trips per capita. Over the next 10 years the number of trips per capita are expected to grow to 0.13 in India and 0.37 in China. In 2013, 22 percent of the population took an air trip; in 2023 this will grow to 44 percent as the middle class increases in both countries.

C.4. EFFECTS OF STRUCTURAL OVERSUPPLY

This section continues the analysis of structural oversupply by considering the evidence of its effects. That is, what are the features of airline industry performance that would indicate (without sufficiency), or refute (with sufficiency), structural oversupply[25]?

The analysis relies on the insights of professional observers, independent academic studies and a review of relevant industry data.

C.4.1. Entry and Exit of Firms in the Industry

This section shows that firms continue to enter and exit markets at a robust pace, thus indicating that market forces are influencing the supply and demand in the global market of air passenger services.

The 2014 report noted that from 2005 through to 2012 the number of airlines increased from 2000 to 2300. Some turnover (i.e., exit of firms) has occurred, but the vast majority of airline failures, particularly of LCCs or restructurings have been in domestic markets where barriers to firm entry and exit are limited.

In the European Union in the last 20 years there have been a total of 595 airline (scheduled and charter) bankruptcies. However, for airlines that operated widebody services there were 3 bankruptcies and 7 mergers. In the U.S. there have been 188 airline failures since 1979. In the decade of the 1980s, there were 86 (not a surprisingly large number since domestic deregulation took place in 1978, and a significant number of airline failures had been anticipated). In the 1990s there were 47 and from 2000 to 2010 there were 42, since 2010 there have been 11. Of the total (from 1990 to the present), only about 10 percent were national passenger carriers (and the remainder were small regional or cargo carriers). Most large airlines restructured under Chapter 11. The trend of large airlines moving in and out of bankruptcy has slowed as airlines have adopted business models that provide greater insulation from the effects of business cycle fluctuations.

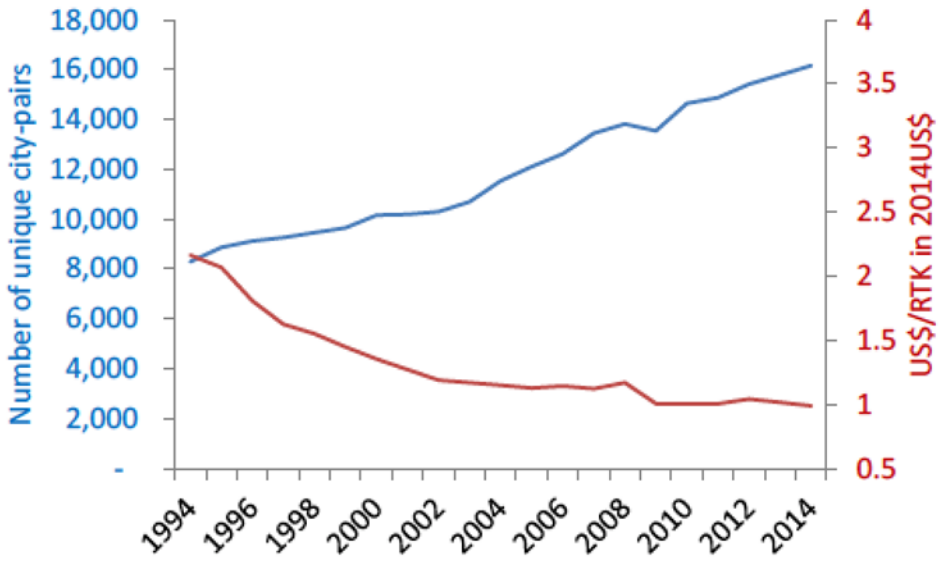
Over 20 low cost carriers have entered the Asian market since 2000 and a number of these airlines are operating widebody equipment and flying international routes. New carriers have entered the U.S. market, including Virgin America, Alligent and Spirit and other carriers that have redesigned their business model, such as Frontier. There has been significant

[25] If effects are present there may be structural oversupply. However, the absence of effects strongly indicates that there is no structural oversupply.

consolidation of U.S. airlines. Now there are 3 major U.S. airlines (United-Continental, Delta-Northwest and American-USAirways) flying domestically and internationally. The consolidation of the veteran airlines through mergers and alliances and the entry of smaller LLCs are reflective of the general trend reshaping the industry landscape: Large alliance airlines with extensive network reach, and smaller LCCs providing service to new or underserved niche markets.

IATA reports the growth in unique city-pair markets has been dramatic, moving from 15,782 in 2013 to 16,161 in 2014. Figure 1 shows the growth in unique city pairs and the change in real transport costs over time. These two trends illustrate the forces and airline strategies that are in place to ensure long term market growth. Real costs are falling, as airlines become more efficient. New technology in aircraft, such as the B787, allows firms to develop new markets. As connectivity improves, there is an increase in global trade and this in turn translated into passenger growth from globalized supply chains.

Figure 1 Unique City-Pairs and Real Transport Costs



Source: IATA

From the perspective of market and route entry and exit – the global market for air services does not appear to be an industry with structural oversupply.

C.4.2. Revenues, Yield and Profit

This section examines industry revenues, yields[26] and profits under conditions of structural oversupply. The presence of low yields and low fares would dominate the global market for air services – which is not borne out by the data.

It is important to note that while the global airline industry is composed of a set of airlines that fly in international markets, not all airlines participate in all markets. More importantly, economic activity, growth, and business cycles differ significantly by country and region.

[26] Yield is a measure of the average fare paid by all passengers per mile. It is calculated by dividing total passenger revenues by the number of revenue passenger miles.

Following the 2008 financial crises not all economies fell into recession, and for those that did, the depth of the downturn and the pace of recovery were different on a country-by-country basis. The recovery has taken considerable time in the EU, for example, while emerging markets have recovered more quickly and their growth is a significant factor in the demand for air passenger services. Table 6 displays the most recent World Bank real GDP growth forecasts from January 2015. Over the four year period, 2014-2017, real GDP is forecast to increase in every region. Most notably, growth will be highest in the developing regions. As both Boeing and Airbus point out in their market forecasts, the combination of emerging market growth and increased urbanization will drive passenger growth.

Table 6 Real GDP Growth Forecast

	2012	2013	2014e	2015f	2016f	2017f
World	2.4	2.5	2.6	3.0	3.3	3.2
High Income (US, EU, Japan, UK, Russia)	1.4	1.4	1.8	2.2	2.4	2.2
Developing countries (East Asia, China, Indonesia, Thailand)	4.8	4.9	4.4	4.8	5.3	5.4
Europe and Central Asia	1.9	3.7	2.4	3.0	3.6	4.0
Latin American and the Carribean (Brazil, Mexico, Argentina)	2.6	2.5	0.8	1.7	2.9	3.3
Middle East and North Africa (Egypt, Iran, Algeria)	1.4	0.5	1.2	2.5	3.0	3.5
South Asia (India, Pakistan, Bangladesh)	5.0	4.9	5.5	6.1	6.6	6.8
Sub-Saharan Africa (South Africa, Nigeria, Angola)	4.0	4.2	4.5	4.6	4.9	5.1

Source: World Bank

Those claiming structural oversupply causes low fares and profits in the airline industry seem to ignore that fluctuations in economic activity vary by time and locale. Capacity does indeed shift from weak markets to strong markets. Since the strength of economic activity varies by time and locale, yields and revenues should as well. Most recently, U.S. carriers exhibit a growing shift of interest from domestic to international markets; U.S. carriers have ordered 8 percent of Boeing wide-body orders and 12 percent of Airbus wide-body orders (see Table 4 and Table 5).

IATA has also provided estimates of system wide global growth in margin and net profit for 2015, these are reported in Table 7. Globally EBIT is forecast to grow from 5.1 percent in 2014 to 6 percent in 2015 and net profit to grow from $19.9 to $25.0 billion. All regions are forecast to have an increase in profits. Profit per departing passenger is forecast to be $7.08 and passenger traffic is forecast to hit 3.5 billion.

Table 7 IATA Forecasts of EBIT and Net Profits Global Airline Industry by Region

System-Wide Global Commercial Airlines	EBIT Margin % of Revenues						Net Profit, $ Billion					
	2010	2011	2012	2013	2014	2015F	2010	2011	2012	2013	2014	2015F
Global	4.9	3.1	2.6	3.5	5.1	6.0	17.3	8.3	6.1	10.6	19.9	25.0
Regions												
North America	5.7	3.0	3.4	5.3	7.6	8.4	4.2	1.7	2.3	7.2	11.9	13.2
Europe	2.4	0.8	0.7	0.7	1.9	2.4	1.9	0.3	0.4	0.5	2.7	4.0
Asia-Pacific	8.0	6.6	4.7	5.7	6.4	7.7	9.2	5.0	2.7	2.3	3.5	5.0
Middle East	3.7	3.1	3.0	0.9	2.6	3.0	0.9	1.0	1.0	0.5	1.1	1.6
Latin America	5.1	2.0	1.5	2.2	3.5	4.0	1.0	0.2	-0.2	0.2	0.7	1.0
Africa	1.7	0.6	-0.4	-0.5	0.4	1.4	0.1	0.0	-0.1	-0.1	0.0	0.2

For U.S. carriers the outlook is highly positive. In looking at the 2014 to 2034 period, IATA considers three policy scenarios referring to liberalization of bilateral ASAs. The trend has

been toward greater liberalization, and with this liberalization will come an additional 2.3 – 5 billion-passenger trips which represents a 1.8 to 2.8 percent growth.

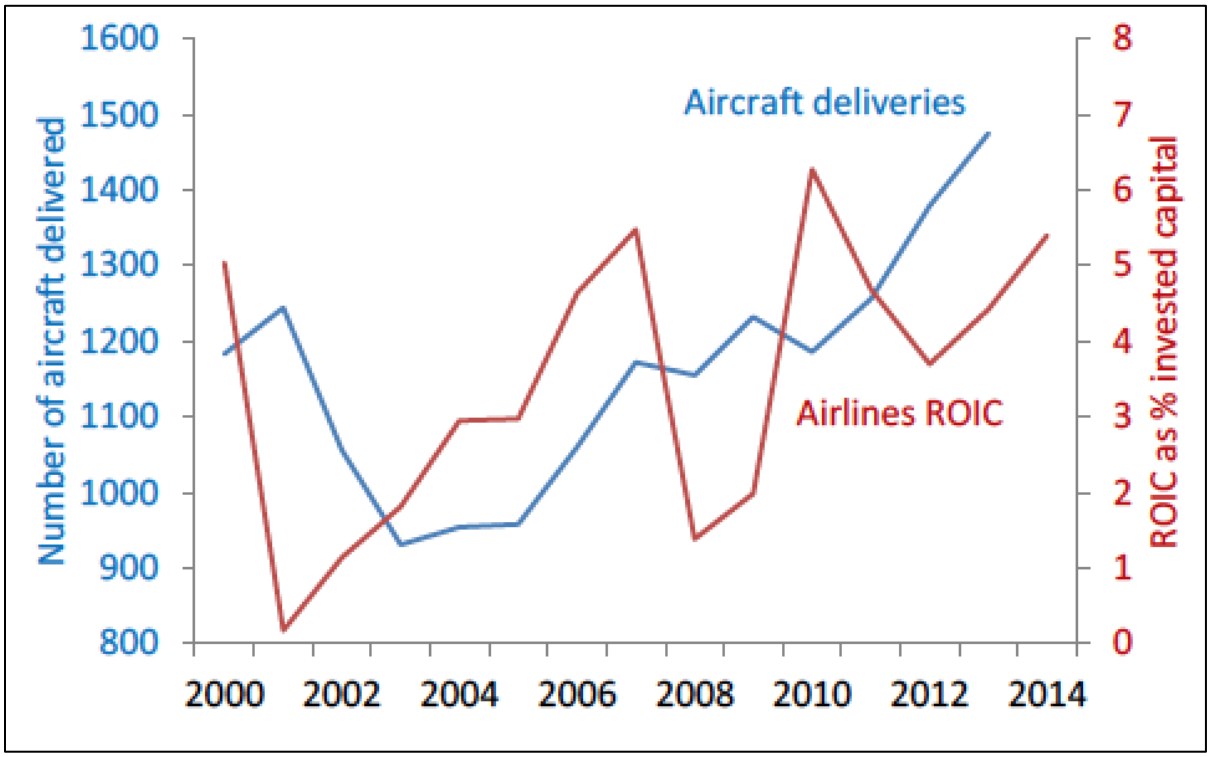
The most dramatic news in the IATA report was regarding the measure of Return on Invested Capital (ROIC) relative to the Weighted Average Cost of Capital (WACC)[27]. IATA reports that ROIC globally is 5.4 percent in 2014 up from 4.4 percent in 2013, a significant jump. They also report that WACC is 7.6 percent, which implies insufficient profitably to attract investors globally. However, in examining other sources of WACC, applicable to carriers in developed economies, the WACC is measured to be 5.2 percent; the air transport industries WACC was ranked as 83 out of 96 industry sectors making it one of the lowest across a range of industries. While the IATA estimate is inclusive of all economies, the estimate for developed economies only would most likely show that ROIC exceeds WACC.

A most important analysis reported by IATA was the relationship between aircraft deliveries and airline industry ROIC. If structural oversupply was present, one would expect these variables to move in opposite directions. However, as this report shows, the relationship between these variables is positive due to the following key factors: growth in the number of markets; the development of new passenger markets; and, more robust economic growth.

Figure 2 shows the industry is confident in bringing new aircraft into the fleets. There were new deliveries of 1,400 new aircraft in 2014. A significant number were used to retire older aircraft and less fuel-efficient aircraft. Consequently, average fleet fuel efficiency will increase for major carriers globally. The industry has benefited from a decrease in breakeven load factors, a result of superior revenue management and the increasing contribution of ancillary revenues. The growth in ROIC has also been aided by airline consolidation, continued use of capacity discipline and the increase in metal neutral joint ventures for all three alliances. All alliances have these ventures in place on both the Atlantic and Pacific and they serve to control capacity growth.

[27] WACC in excess of ROIC has been a core tenet of the case for structural oversupply. It is taken to indicate that investors will not be attracted to the industry. While this report does not look to the financial markets for evidence supporting or refuting structural oversupply, the strong airline share price performance of the past two years would belie the claim that airlines are not attractive to investors.

Figure 2 The Relationship Between Aircraft Deliveries and Airline Industry ROIC



The general trend is positive and indicates the relative balance of supply and demand, not one of structural oversupply.

C.4.3. Pricing Strategy Effectiveness

This section uses industry data and expert insight to show that demand for passenger air services is projected to grow in response to pricing strategies; revenue per passenger is expected to grow; and the overall outlook for profitability is one of continuing improvement, as illustrated in Table 7 above. The reported trends by IATA and their forecasts of growth in passengers, routes and profits indicate that pricing strategies and new revenue management systems are paying dividends for the industry. These findings do not support a structural oversupply narrative in the global market for air passenger services.

Growth in passenger demand can occur as a result of economic growth so that demand increases with economic activity. The growth in urbanization and the middle class also has a significant positive effect on passenger growth as supported by Airbus' long term forecast. Thus, it is not simply that real GDP is increasing but that growth in the middle class, especially in developing economies like India and China, will stimulate demand.

Demand also grows in response to airline competition through pricing, revenue management and service strategies. Revenue growth is often the result of demand growth, but over the last several years airlines have been modifying their business models to decouple revenues from strict reliance on passenger growth. Airlines are now growing the amount of revenue per passenger by selling ancillary services and pricing other services that in the past had been included in fares, such as baggage fees. In 2012, 53 airlines posted revenues of $27.1 billion in ancillary revenues, in 2013 this figure grew to $31.5 billion (for 59 airlines).

Table 8 reports the results for 2013 for the top 10 airlines for ancillary revenues; the three largest are U.S. carriers and among the top 10, U.S. carriers account for half the total. In 7 years ancillary revenues from the top 10 carriers have moved from $2 billion to $20 billion. It is clear this trend has made airlines less vulnerable to market downturns.

Table 8 Top 10 Airlines- Total Ancillary Revenue (US dollars)

Annual Results - 2013		Ancilliary Sources	Annual Results-2007	
$5,703,000,000	United	Various	$600,000,000	United
$2,528,183,000	Deta	Various	$521,429,760	Ryanair
$2,079,000,000	American	Various	$272,846,172	easyJet
$1,714,598,496	Air France/KLM	Various	$194,200,000	Alaska Air Group
$1,689,457,120	Ryanair	Various	$91,306,080	Aer Lingus
$1,623,500,000	Southwest	Various	$83,664,000	Air Berlin
$1,385,021,933	easyJet	Various	$79,747,344	Korean Air
$1,282,738,470	Lufthansa Group	Various	$78,585,787	WestJet
$1,273,430,400	Qantas Airways	Various	$77,904,000	Austrian
$1,102,700,000	US Airways	Various	$71,074,080	Alitalia
$20,381,629,419			$2,070,757,223	

International airlines have also been imposing fuel surcharges to protect themselves against large swings in fuel costs. The recent dramatic fall in oil prices will provide short-term gains. More importantly, the new equilibrium price of oil is forecast to be well below the values in the past. This will reduce carrier costs and provide a broader base for airline revenue.

Demand growth exhibits wide variation across markets. The International Air Transport Association (IATA) recently stated that airlines expect to see a 31 percent increase in passengers between 2012 and 2017; by 2017 total passengers are expected to rise to 3.91 billion, an increase of 930 million passengers from the 2.98 billion carried in 2012.

The IATA airline industry traffic forecast for 2014-2019 noted, "demand [i.e., air passenger growth] is expected to expand by an average of 6.2 percent compound annual growth rate (CAGR) between 2014 and 2019. By comparison, air passenger growth expanded by 4.3 percent CAGR between 2008 and 2012, largely reflecting the negative impact of the 2008 global financial crisis and recession. Of the new passengers, approximately 6.9 percent will be carried on international routes." That is, of the new passengers, a larger than average share will be on international routes served primarily by widebody aircraft.

Boeing's regional and market forecasts for 2014-2033 are contained in Table 9. There are a number of features to recognize. First, expected intra-regional market growth varies significantly across markets as exhibited by the values in the shaded diagonal. Second, inter-regional market growth also differs considerably across regions; the China to Southeast Asia is anticipated to grow annually at 7.5[28] percent while the Southeast Asia to Europe market is forecast to grown at 7.2 percent., and Europe to Africa is expected to grow at 4.9 percent.

[28] See Figure 3, "Asia Emerging – PRC".

Table 9 Boeing's Forecast of Passenger Growth (2014-2033)

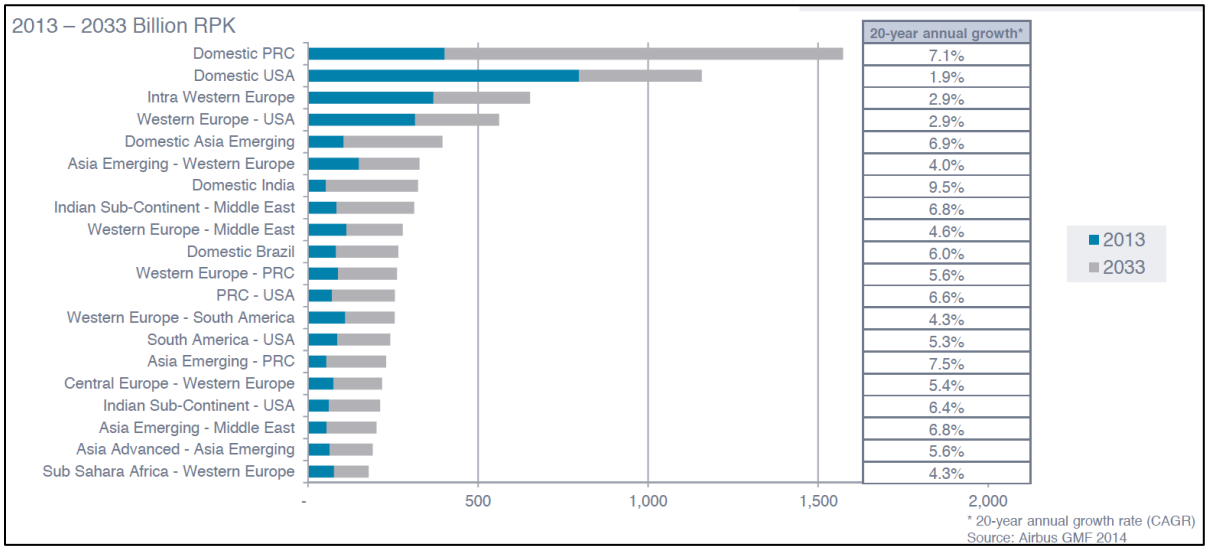
Airline passenger growth rates 2013–2033

RPKs in percentages	Africa	Latin America	Middle East	Europe	North America	Asia Pacific
Asia Pacific	7.1	8.8	7.4	5.3	4.3	**6.4**
North America	6.1	4.7	6.3	3.1	**2.3**	
Europe	4.9	4.9	5.4	**3.5**		
Middle East	7.3	-	**5.2**			
Latin America	8.0	**6.9**				
Africa	**6.7**					

Source: Boeing Current Market Outlook 2014

Airbus has a similar set of forecasts that also exhibit variability across regions. The Airbus forecast notes that historically, passenger traffic has doubled every 15 years. Their 20-year forecast shows a 4.7 percent compound annual growth rate for 2014-2033. The main drivers of their forecast are: forecast growth in global urbanization and middle class expansion (fourfold expansion over next 20 years).

Figure 3 Airbus' Forecast of Passenger Growth (2014-2033)



Source: Airbus Global Market Forecast 2014-2033 (http://www.airbus.com/company/market/forecast/)

A fundamental message of the Airbus forecasts is that traffic will grow at 4.7 percent annually, while annual widebody deliveries will be 4.2 percent of the widebody fleet. With one-third of the deliveries replacing retiring aircraft, the annual net growth in widebody aircraft is expected to be about 3 percent. Based on these forecasts, oversupply will not be a concern.

It was noted above that airlines benefit not just from general traffic growth but also revenue growth per passenger. The ability to grow revenue per passenger depends on passenger sensitivity to fare differentials. If passengers are not sensitive to fares then pricing strategies and the pricing of other services would have little impact on demand. Consequently, capacity utilization would remain low and the perception of excess capacity would remain.

Revenue growth per passenger has risen dramatically over time. The growth in ancillary revenue was described above. IATA also reports that profit per passenger has increased from $2.05 in 2012 to $6.02 in 2014 and is forecast to be $7.08 in 2015.

Airline fortunes for revenue and profit are no longer strictly tied to aircraft capacity, utilization and growth driven by economic activity.

C.4.4. Variability of Profitability over the Business Cycle

This section uses industry data and expert reports to discuss how airlines are exercising greater "capacity discipline", with greater focus on profitability and fleet adjustment.

With structural oversupply, some claim the global industry will realize negative economic profits over the business cycle. The supposed evidence for this is to examine airline profits over a business cycle.

This approach has several flaws, namely:

- It fails to account for business cycle variation across markets. Only if a firm operates in one market (or, in several markets with highly correlated business cycles) will such a test be useful.
- It assumes that there is no shift in a firm's business model, and that sources of revenue are uniform and uniformly affected over the cycle.
- It implicitly assumes that the firm's objective was strictly to maximize profits (as opposed to strategic goals vis-à-vis competing airlines[29]).
- It ignores the presence and importance of alliances and in particular the creation of metal neutral joint ventures, in different markets, among alliance partners

A historic strategic shift occurred in the U.S. airline market several years ago with lessons for the global market. In the past, U.S. carriers were narrowly focused on their domestic market. This has subsequently changed as the three full service network carriers (FSNC), United, Delta, and American are shifting to long haul international markets. IATA and CAPA have referred to the shift by many carriers in a number of developed and developing economies to focus on long haul markets as a structural improvement in profitability, which coincides with the operational strategy of capacity discipline. IATA forecasts profit improvements due to capacity discipline and both organizations note the significant variation in profitability across regions and markets. The shift (in the U.S. market, and by extension to the global market) was precipitated by four trends: 1) Fuel costs increased and became more volatile, 2) LCCs[30] grew and evolved to take upwards of 35-40 percent market share of domestic markets, 3) carrier consolidation/merger took place to reduce the number of carriers and increase concentration, and 4) U.S. carriers refocused their attention on long haul international markets that provided an opportunity to increase profits. Carriers have refocused on profits and are not chasing market share through over-serving particular markets with high

[29] For example, an airline may fly a route with greater frequency than required from a short-term profitability vantage in order to deter a competitor from entering the market.

[30] LCCs are low cost carriers, the iconic one is Southwest. Other low cost carriers are Jet Blue, Frontier and Virgin America. Ultra LCC are Alligent and Spirit.

frequency. Frequency is less important in international markets; network coverage (the number of destinations served) is of far greater importance.

Also important is the development of metal neutral joint ventures, which are in place for the Atlantic and Pacific for all three major alliances. Under these types of agreements the airlines forming the agreement jointly determine fares, capacity, deployment and revenue and cost sharing. In effect, they act as a single carrier or a cartel. Under such arrangements, they effectively control the amount and type of capacity in a market while dampening the effects of business cycle threats through their collective action.

Orders of aircraft and projected deliveries do not indicate oversupply or softer profits for the airline industry. Both *Aviation Strategy* and *IATA* forecasts assume that deliveries would run at the rate of 1500-1600 aircraft in the next three years to build to 6.8 percent of the global fleet by 2018 However, the vast majority of these aircraft are narrow body planes that operate in domestic markets and not internationally. When examining the production rates for Boeing and Airbus for wide body aircraft, they are each producing about 100-110 wide bodies annually. These aircraft are being used to replace older wide bodies; e.g., B767 and B747 and A340. Therefore, overcapacity is highly unlikely, even remote. As Figure 2 shows aircraft deliveries and airline ROIC are both moving upwards. These new aircraft are being used more intensively, load factors are rising and the number of scheduled departures is increasing; over 33 million departures in in 2014 for a 5.5 percent increase from 2013 which grew 4.6 percent relative to 2012. Revenue passenger kilometers (RPK) grew 5.7 percent in 2013 and grew a further 5.9 percent in 2014. The compound annual growth rate in passenger traffic for the next 10 years in forecast by IATA to be 4 percent.

C.4.5. Growth in City-Pair Markets Served

This section, drawing from aviation studies and expert insights, discusses the importance of new markets relative to the growth of existing markets.

On the demand side, in long haul international markets frequency is less important while network reach, number of destinations served, is more important. Traffic growth will respond to the growth in city pairs rather than the growth in number of flights in established markets. Therefore, traffic growth is forecast to increase by more than seat capacity because aircraft are being deployed into new markets; this is the principle role of both the 787, A350 and B777 aircraft – opening new routes and markets. Looking at OAG data, it is seen that the number of directional city pairs with at least 365 departures per year (single daily service) grew by 18.1 percent from 2004 to 2013; single daily service would be a high level of service for use of widebody aircraft, if the growth of city pair markets that had 3 times weekly service is calculated, the growth over the period is near 30 percent. The growth in the number of new markets served this can lead to a further growth in traffic, traffic which is not considered by those simply looking at fleet comparison with traffic growth.

IATA reports that the growth in unique city-pair markets has been dramatic, moving from 15,782 in 2013 to 16,161 in 2014. Figure 1 above shows the growth in unique city-pairs and the change in real transport costs over time. These two trends illustrate the forces and airline strategies that are in place to ensure long term market growth. Real costs are falling, as airlines improve operational efficiency. New advanced technology aircraft, like the Boeing 787, allow firms to develop new markets. As connectivity improves, there is an increase in

global trade which translates into passenger growth from globalized supply chains (See Figure 1).

When factoring new market expansion along with the higher retirement rates of aircraft, a picture of the industry emerges of demand growth overtaking supply growth and very slim prospects, if any, for structural oversupply.

C.5. OUTLOOK FOR 2015 – 2017

There are currently a number of principal trends that minimize the concern of structural oversupply in the outlook years. These trends are summarized in the following sections.

C.5.1. Continuing Effects of Capacity Discipline

Capacity discipline, which has emerged as an industry trend in recent years, is expected to continue and have far-reaching effects on fleet size adjustments.

Wittman (2013)[31] and Swelbar (2013) have shown that U.S. carriers have adopted a strategy of capacity discipline. This has resulted in higher fares and improved financial performance for U.S. carriers. In the EU there has been consolidation as well. A number of carriers are developing 'airlines within airlines' which are low cost variants to compete with the LCCs in domestic markets; Rouge in Canada and Eurowings in Germany. The key FSNC are careful in deploying capacity and in growing international capacity. The capacity growth figures reported by IATA are for all aircraft capacity and narrow body aircraft make up the largest part of capacity and capacity growth.

C.5.2. Stability in fuel prices

Fuel prices are highly uncertain. Until December the forecast was for steadily rising prices, albeit slowly. Oil has fallen over 50 percent and is expected to stabilize at $60 to $70 a barrel. However, the gains to airlines are not evenly distributed: U.S. carriers have gained more since foreign carriers purchase fuel in U.S. currency. The dollar has increased by 17 percent in the last three months offsetting the gains to some airlines from lower fuel costs. The net effect is that fuel costs have declined for most carriers. This, however, is not expected to deter carriers from continued efforts to improve fuel efficiency of the fleet with newer aircraft.

C.5.3. Growth in City-Pair Markets Should Continue

New air services will be introduced in the emerging market countries, and increased service will follow in the international gateway hubs. The analysis indicates that there is little risk of supply outstripping demand in the outlook period (as evidenced by forecast growth of the widebody fleet with the projected growth in demand). As reported in 2014, new city-pair markets have expanded by 382, or 5 percent.

[31] See Michael Wittman, *New Horizons in U.S. Airline Capacity Management: From Rationalization to "Capacity Discipline*, MIT International Center for Air Transportation, November 5, 2013

C.5.4. Competition will continue to Grow Market Size

The best evidence indicates that passengers, particularly in long haul international markets, are fare sensitive, with lower fares stimulating traffic[32]. The paper by Dresner[33] et al. (2014) estimated that the international long haul service price elasticity is 1.4, which is relatively high (i.e., passengers on these routes are indeed price sensitive). Schedule passenger growth in 2015 is forecast at 7 percent by IATA, whereas the 2015 forecast was 5.7 percent just one year earlier, which represents a considerable increase.

C.5.5. Decoupling of Demand from GDP

The analysis shows that air travel demand is less dependent on GDP growth, which together with capacity discipline measures means that airline profitability will fluctuate less with the business cycle. The dampening of these fluctuations will reduce the likelihood of an unwarranted capacity build-up and lessen the probability of structural oversupply developing in the outlook period. Airbus reports in its forecasts that increased urbanization and a growing middle class are the two biggest factors driving increased passenger demand particularly in emerging markets. Growth in real GDP per capita was of less importance.

C.5.6. Other Major Trends

The other major trends affecting the global airline industry are the increasing dominance of the major alliances; so-called "metal neutral" joint ventures between airlines; and a trend towards increasing consolidation of the industry (i.e., greater concentration – larger share of regional traffic handled by a smaller number of airlines).

The net effect of these other major trends will be to further reduce the probability of structural oversupply in the outlook period.

C.6. SUMMARY AND CONCLUSIONS

This report addresses the question: "Is there structural oversupply in the global market for passenger air services?" It examines the current state of the global market and the outlook for the period 2015-2017. The report concludes that structural oversupply does not exist; neither at present nor in the outlook period. The report finds that the trends identified in our 2014 report are reconfirmed and, if anything, strengthened.

Structural oversupply results in the production of too much output for a market. Excess supply leads to lower prices and lower profits. The report shows that, in fact, average fares have been rising. Moreover, the profits of air carriers in the U.S. and elsewhere have been positive and increasing as the world economies recover from the financial crises of 2008. It also shows that the profitability of the airline industry is buoyed by:

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[32] The route between the U.S. and Australia is an excellent example. Prior to 2009, the Sydney-Los Angeles market was restricted to two firms, Qantas and United. Fares were high, but in 2009 Virgin Australia was permitted to enter the market. Fares fell, and after a year Delta entered the market and competition drove fares even lower. Non-stop passenger traffic between the U.S. and Australia expanded by over 50 percent between 2006 (pre-recession peak) and 2012.

[33] Dresner, Martin, Cuneyt Eroglu, Christian Hofer, Fabio Mendez and Kerry Tan (2014), The Impact of Gulf Carrier Competition on U.S. Airlines.

- growth in passenger traffic, new market growth, and per passenger revenue growth;
- airline consolidation through mergers, or integration in one of the three global airline alliances;
- continuing liberalization of the global market for passenger air services (through ASAs and the loosening of restrictive practices).

The report examined capacity-related issues in the global airline industry. It considered issues relating to capacity measurement and showed that meaningful capacity measures do not indicate any persistent excess capacity in the global market for passenger air services.

Airlines are able to adjust the size and composition of their fleet with relative ease since there is a well-developed aircraft leasing industry; secondary markets for aircraft; and, some flexibility in adjusting the schedule for delivery of new aircraft. The leasing industry facilitates the movement of aircraft across airlines and regions to meet demand. International airlines also operate in many different markets and can redeploy aircraft from markets with weak demand to those with strong demand. This applies to narrowbody aircraft as well as to widebody aircraft.

The report further describes the evolution of the U.S. and global passenger air services market and, with it, the new business strategies of airlines and their alliances that are reflective of the changes in markets. Excess capacity, the report notes, was one of the consequences of historic airline regulation. The flexibility of capacity adjustment was a consequence of deregulation in the U.S. market, and this feature is evident in the global air services market as countries continue to deregulate air services.

The report presents the forecasts of traffic growth made by IATA, Boeing and Airbus. It shows that comparing fleet growth to demand growth is by itself not informative. Rather, one has to examine the growth in the number of city-pair markets. Ignoring this growth is a major contributor to erroneous claims of too much capacity. Growth in the number of markets – not simply market growth – is shaping the future of the airline industry.

The conclusions of the report are clear. The global market for passenger air services, like most markets, is evolving with new revenue and network strategies and new business models. Key features of the new revenue strategies are growing revenue per passenger through pricing ancillary services, and managing fares and revenue with increasingly sophisticated systems. The global industry is consolidating through integration in global alliances. "Capacity discipline" is the new operational guideline for airlines, and it has contributed to rising average fares and increasing airline profits.

The growth in passenger traffic is forecast to be robust in most markets in the outlook period (2015-2017). Regional traffic shows significant growth and variability across regions, reflecting uneven economic growth. The forecast 20-year compound average annual growth in global traffic of 4.7 percent outpaces the projected net growth of the widebody fleet of approximately 3 percent. If these forecasts prove true, it is more likely in the longer term that instead of overcapacity, aircraft will be in shorter supply with a concurrent trend of rising prices in secondary markets for aircraft.

Export-Import Bank of the United States

"Evaluation of the Global Passenger Airline Industry: Does Structural Oversupply Exist?"

Final Report

Prepared by Washington Consulting Group

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Contents

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ABOUT THIS DOCUMENT

This document is the first draft report for the "Evaluation of Structural Oversupply in Global Passenger Airline Industry". David Gillen and Daniel Brod were the authors of the report for the Washington Consulting Group.

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A. EXECUTIVE SUMMARY

This report examined the issue of structural oversupply in the global market for passenger airline services. This market, and especially the long haul intercontinental segments of the market, relies on wide-body aircraft to provide the principal service of air passenger travel.

The report is a qualitative assessment that is supported by data analysis and published aviation studies. The judgment and experience of independent academics and professional observers of the industry contributed to the analysis. The general study approach was to characterize conditions of structural oversupply and its consequences (i.e., causes and effects), and to determine whether the empirical evidence supports – or refutes – a finding of structural oversupply in the global market for air services.

The report concludes that the global passenger airline industry, while possessing many unique features, is not fundamentally different than many other industries. Structural oversupply results from large and irreversible capital investments, long term capital planning horizons, and the inability or lack of incentive to adjust capacity. The report demonstrates that while the first two features are generally present in the global market for air services, they are largely mitigated by the ability to adjust capacity. The report finds that the trends identified in the 2014 and 2015 reports are reconfirmed if not strengthened.

The principal indicators of the global market for air services show that structural oversupply does not exist. The reasons for this determination are summarized in the following bullets:

- Profitability, highly variable across markets and carriers, is rising and with less volatility to the business cycle. This trend has strengthened in the past year.
- Demand is forecast to grow at an annual compound average growth rate of 6.9 percent for the period 2014-2019 according to the International Air Transport Association (IATA).
- Continuing trends of urbanization and a growing middle class in China and India are driving strong growth in these markets.
- Capacity and utilization indicators show airlines are exercising greater "capacity discipline" with fleet adjustment, resulting in improved profitability. In the presence of structural oversupply, a capacity discipline operational strategy would be sub-optimal (i.e., airlines could serve markets with greater frequency and lower load factors for higher profitability.) Data of the past year reconfirm this trend.
- The three global airline alliances – Star, Oneworld and Skyteam – have been successful in attaining anti-trust immunity for joint ventures on Atlantic and Pacific routes, strengthening their ability to engage in capacity discipline.
- New technology narrow-body aircraft that are fuel-efficient and well-suited for long haul routes will reduce the reliance on wide-body aircraft in a number of markets.
- Airlines are shifting towards higher-profit, long haul routes. The net effect of this will be to increase – relative to single aisle aircraft – the demand for wide-body aircraft. Recent data confirm this trend.

- The shift to longer haul requiring more wide-body aircraft (and newer narrow-body aircraft) will, in some cases, result in the replacement of older narrow-body aircraft on longer-range routes. These older narrow-body aircraft will be redeployed to shorter haul and regional markets, or will be retired.
- Recent data confirm that overall capacity utilization continues to trend upward.
- Multiple capacity adjustment mechanisms (aircraft retirement, redeployment, delivery deferrals, leasing) are widely used throughout the industry for wide-body and narrow-body aircraft. The existence and robust functioning of these mechanisms, minimize the likelihood that structural oversupply will prevail in the global market for air services.

Non-economic factors (fortress hubs[1], other barriers to entry, foreign ownership restrictions) have some competition-inhibiting effects. However, these effects are seen to be limited (or, gradually eroding) and not contributing to a condition of structural oversupply.

ASAs[2] define the restrictions by which foreign carriers must abide in a county's home market. These agreements are moving to more liberalized regimes, especially in the Asian markets, with fewer restrictions regarding "freedoms of the air"[3], flight frequency and other factors. Greater liberalization of ASAs enhances competition. The analysis of the period 2016 to 2018 shows no compelling evidence that structural oversupply will be a concern in the global market for air services.

1 "Fortress hubs" refer to hub airports where a single airline, or alliance of airlines, control 70 percent or more of the airport's capacity slots, thus making it nearly impossible for a competing airline to initiate operations from the same airport.

2 Air service agreements (bi-lateral agreements governing air transport between countries). ASAs that significantly liberalize scheduled passenger service relative to a previous status quo are often called "open skies" agreements. The U.S. currently has 105 open skies agreements.

3 http://en.wikipedia.org/wiki/Freedoms_of_the_air

B. ANALYSIS ASSUMPTIONS

B.1. INTRODUCTION

The analysis assumptions represent an expert outlook that was derived from the broad consensus of aviation professionals and observers. While the assumptions draw from a number of sources that may not be fully harmonized (e.g., Boeing and Airbus forecasts, IMF and World Bank), the outlook is generally consistent. In cases where there seem to be discrepancies among different sources, care was taken to base conclusions on multiple indicators.

While recognizing that all assumptions and forecasts are uncertain to some extent, the subsequent analysis shows that the industry as a whole is better insulated than in the past to absorb unanticipated shocks in prices and demand. The analysis conclusions should remain robust even if there is significant variance from some of the assumption elements.

The following are the assumptions that guided the report's analysis.

B.2. LIST OF ASSUMPTIONS

1. Market assumptions
    a. Global and regional market growth forecasts based on Boeing and Airbus forecasts updated to 2015 (outlook is positive with variability across regions)
    b. Macroeconomic "new normal" – slower long-term growth in developed economies and a shift from export-driven growth to domestic consumption in Southeast Asia
    c. World Bank and IMF forecasts for economic growth and slow recovery in developed and developing economies
    d. Moderate GDP-based growth in air passenger markets overall, with weaker growth in North American and Southeast Asian markets
    e. Economic and financial globalization expansion has slowed
    f. Strong U.S. dollar against other world currencies
2. Energy outlook
    a. Continued instability in oil markets
    b. Oil prices remaining below 50 dollars per barrel in the outlook period
    c. Fuel prices increasing slowly, if at all, in the outlook period
3. Emerging markets assumptions
    a. Volatile GDP growth based on World Bank and IMF forecasts.
    b. Relatively stronger GDP growth in Africa, but commodities downturn will dampen previous growth forecasts
    c. India and Brazil will have weaker GDP growth with greater volatility

d. Slowing growth in China's air service markets

4. Industry trends
    a. Airline consolidation will continue but at a slower pace
    b. Alliances will exercise capacity discipline and continued development of "metal neutral" joint ventures within established alliances.[4]
    c. Legacy carriers will continue transition to long haul international
    d. Low-cost carriers will expand, will develop long haul routes with wide-body aircraft and continue efforts to expand in trans-Atlantic routes with narrow body aircraft
    e. Airlines to emphasize the development of new routes over expanding service on existing routes.
    f. Continued use of fortress hubs in the European Union (EU) by the three alliances
5. Non-market assumptions
    a. Slowing liberalization of bi-lateral service agreements with small increase in liberalization in emerging markets
    b. No significant change in foreign ownership restrictions
6. Government interventions in infrastructure markets
    a. Terminal and air space restrictions, special levies, etc. – no significant change to status quo
    b. Slot controls at select North American airports (JFK, LGA, EWR) and slot controls to continue in Europe
    c. Uncertainty regarding London airport expansion (third Heathrow runway or shift to Gatwick – with major implications for international routing of aviation)
    d. Development of slot controls at congested airports in Southeast Asia and Latin America
7. Effects of environmental policies
    a. EU policy on emissions trading will be introduced at a slower pace than previously planned
    b. International agreement on emissions trading will proceed slowly (despite the recent Paris climate convention)
8. Steady growth in the use of biofuels as governments tighten environmental regulations

[4] A metal neutral joint venture is an alliance between two or more airlines where the revenues and/or profits are shared regardless who is the operating carrier.

C. OVERSUPPLY IN THE GLOBAL MARKET FOR AIR SERVICE

C.1. OVERVIEW

C.1.1. About this Section

This section presents the core of the analysis regarding structural oversupply in the global market for air service.

Following the overview, the section is divided into four major subsections: conditions of structural oversupply, effects of structural oversupply, outlook for 2016-2018, and conclusions.

C.1.2. General Description of Structural Oversupply

Structural oversupply occurs when firms in a market have the supply of their good or service in excess of demand for a prolonged period of time. The most prominent outcome of such a condition is significant losses on capital invested.

C.1.2.1. Conditions

The fundamental cause of structural oversupply is failure to adjust either the supply of underlying inputs used to produce a product, or the supply of the product itself. This failure may be a result of immobile assets, a lack of a market that can trade the assets or a lack of incentive by firms to adjust output. Immobility can be physical in the sense that the assets cannot be moved to markets able to absorb the supply. It can also result from assets being specific to producing a narrow product or set of products (i.e., immutable).[5]

Finally, the lack of incentive to adjust output can occur for a number of reasons. Among these: producer subsidies, sunk costs in installed or non-tradable assets, or use of laws (such as Chapter 11) that allow a firm to continue operations while in bankruptcy.

C.1.2.2. Effects

The oversupply of a product or service that is not a result of cyclical influences or behavioral causes (e.g., price wars) will exhibit the following features of a market where supply will generally exceed demand:

- Price levels below costs – not necessarily operating costs but less than average total costs, such that capital costs are not fully recovered
- Weak or no entry by new firms, or expansion by established firms
- Frequency of bankruptcy well in excess of the average in other industries
- Downward pressure continually exerted on price levels as excess capacity incentivizes producers to sell as much as possible

[5] Common examples of industries with structural oversupply that have exhibited these features are the steel industry and the wine industry in Australia.

- Low profit earnings by firms, whereby ROIC is less than WACC[6]

An industry suffering from structural overcapacity should exhibit all of these features. However, all or any combination of these elements may occur in markets at any time due to cyclical effects, economic downturns, or temporary disequilibria resulting from external factors (e.g., conflicts, natural disasters). The fundamental difference between a structural problem and a cyclic circumstance is a continuing and persistent malaise in the industry.

C.2. CONDITIONS OF STRUCTURAL OVERSUPPLY

C.2.1. About this Subsection

This subsection discusses fundamental conceptual issues relating to the notion of supply. In aviation, supply is generally measured as available seat miles (ASM). In order to address issues relating to supply for an industry operating over an extensive and evolving network, it is critical to examine capacity and its utilization. These are measured by a number of metrics including: load factor; hours per day of flying; number of departures or flights. Capacity and utilization metrics, and their behavior over time, are key to assessing the structural oversupply conditions.

Included in this subsection is an analysis of capacity adjustment mechanisms in the industry, which, if found to be robust, would refute the presence of structural oversupply. This is especially the case with regard to the important aircraft leasing sector. The subsection concludes with a discussion of the non-economic factors that influence capacity adjustment.

C.2.2. Capacity and Utilization Metrics

An analysis of structural oversupply needs to consider aircraft utilization as well as seat density, and not just fleet size or aircraft on order.[7] Aviation often uses operational measures of capacity utilization such as load factor, the ratio of revenue passenger miles (or kilometers) to available seat miles (or kilometers) and average hourly utilization of an aircraft. These operational measures have limited economic meaning. It is possible by charging very low fares to have a high load factor, perhaps even 100 percent. Observing such a high load factor, one could erroneously conclude there is too little capacity in the market. On the other hand, observing a low load factor could lead an observer to conclude that there is too much capacity, which may not be the case[8]. Therefore, load factor in isolation cannot be used as an indicator of too little or too much capacity. Rising load factors coupled with increasing capacity and rising profits is an indicator of a financially healthy industry.

The daily utilization of aircraft is sometimes used as a metric of capacity usage and, hence, over-capacity. However, such a metric fails to account for the average stage length (the average distance flown on a flight or average time for a flight).

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6 ROIC is return on invested capital. WACC is weighted average cost of capital.

7 The number of seats on an aircraft of a given make and model can vary considerably. As an example an Airbus A320 can have anywhere from 144 seats to 180 seats depending on number of classes.

8 The first example is a case of poor pricing and, perhaps, inadequate revenue management. The second case may be the result of strong revenue management; Southwest Airlines has one of the lowest load factors among U.S. carriers yet is consistently the most financially successful carrier.

Rising load factors combined with airline profits, as currently exhibited, refute a condition of structural oversupply. The concurrent trend of longer average stage lengths, and the extensive employment of revenue management tools, reinforces this assessment[9].

The International Air Transport Association (IATA) year end 2015 economic performance report stated that:

- Passenger load factor had increased from 79.8 in 2014 to 80.6 percent in 2015 and is forecast to be 80.4 percent in 2016,
- Breakeven load factor fell from 63.3 percent in 2014 to 61.7 percent in 2015, and is forecast to be lower in 2016, 61.0 percent.
- Aircraft fleet in use went from 25,845 in 2014 to 26,842 in 2015, and 2016 fleet is forecast with new deliveries to be 27,889; however simply counting aircraft is not a measure of capacity and ignores the retirement rate of older aircraft.[10]

Capacity can also be measured as number of aircraft or number of seats in a market; number of seats can vary with frequency. Seats per aircraft can also vary as is evident with different carriers configuring their aircraft in different ways. In addition, counting aircraft orders and deliveries fails to account for the ability of carriers to park aircraft when needed or required.

The number of new aircraft is expected to grow in the next few years, reflecting the introduction of two new derivative aircraft in the market: the Boeing 737MAX and the Airbus 320 NEO. Both aircraft were bought to market earlier than intended because of the threat of the Bombardier C-Series entering the single aisle market. This means that in 2019-2020, projections show a decrease in aircraft deliveries as these have been moved forward in time.

The precipitous drop in oil prices in 2015, continuing into 2016, makes unclear what will happen to older aircraft. Currently, 50 percent of new aircraft are being used to replace older, fuel inefficient aircraft. This is discussed at greater length below.

Operational measures of capacity offer limited information in assessing the state of structural oversupply in the global market for air services. It is important in network industries to account for changes in average stage length and the proportion of international to domestic flying. Fleet expansion is not a harbinger of oversupply because capacity is not measured by number of aircraft, rather, by how they are used, deployed and configured.

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9 For example, two airlines could use their aircraft on average 10 hours per day. One airline flies short stage lengths and generates 3 flights per day while the other airline flies longer stage lengths and generates 2 flights per day. Clearly, the amount of revenue and profit produced will differ in each case.

10 CAPA (Center for Asia Pacific Aviation) undertook an analysis for the global airline fleet for the period 1972 to 2012 using a composite measure of capacity utilization for the global airline fleet composed of load factor, flown hours per day (as percent of maximum) and aircraft in use (as a percent of the total fleet). Their analysis found: significant variation in the number of aircraft in use over time; growth in the average load factor; and overall capacity utilization trending upward since 1972 – from less than 50 percent in 1972 to 63 percent in 2012. From 1972 through 2012 the average load factor increased from 55 percent to approximately 78 percent – certainly the introduction of revenue management had an influence here. Average daily aircraft utilization in 1972 was 72 percent, declining to 65 percent in 2012. The aircraft in use as a percentage of the fleet went from 80 percent in 1972 to about 68 percent in 2012.

No single measure of capacity (number of aircraft, daily use or load factor) is adequate to define or describe capacity. Moreover, seemingly idle capacity may be economically advantageous to airlines. A composite measure[11] of capacity utilization shows long-term improvement in the global industry's capacity utilization. More recent evidence from an IATA analysis confirms the continuation of these trends. The review of capacity and its utilization in the global market for air services does not indicate that structural oversupply exists. This finding applies to the entire fleet including narrow-body aircraft.

While deliveries as a percentage of the fleet is increasing, 50 percent of new aircraft are replacing older less fuel efficient aircraft. Global fleet growth is approximately 3.7 percent annually, but much of this is targeted to emerging markets. North America and Europe are mature markets and are renewing their fleets. Latin America is growing at 4.2 percent, Africa and the Middle East by 5.5 percent and Asia/China/India at 6.1 percent. The bulk of aircraft orders are destined for the Asia-Pacific region, where in spite of having a small in-service fleet, their orders are equal to North America and Europe combined. Moreover, almost half of the new aircraft are for low cost carriers (LCCs). This growth in capacity, as measured by number of aircraft, is less than IATA's forecast demand growth of 6.7 percent for 2016.

Wide-body capacity growth is moderating relative to recent trends. In part, this is due to the retirement of older wide-body aircraft: B767s, A300s and A310s in particular. The wide-body fleet is 19 percent of the global fleet and is growing at 3.4 percent, a much lower growth rate than narrow-body aircraft and lower growth than in the past.

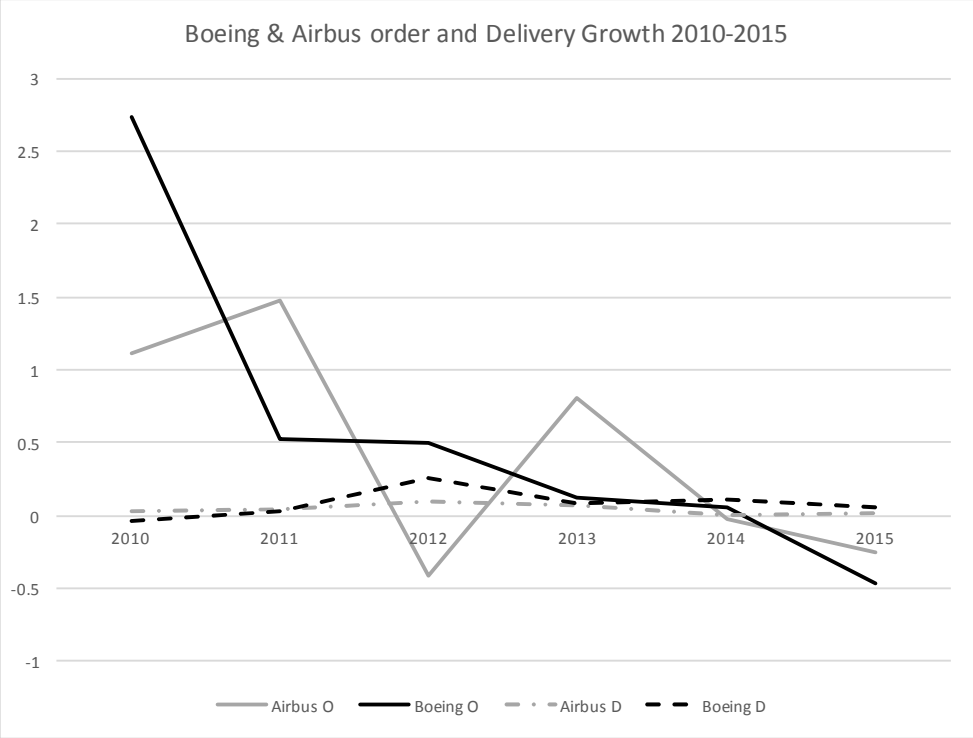
Boeing since 1958 has produced 23,011 aircraft (used for scheduled passenger and freight services). Of these 17,216 have been delivered leaving a current backlog of 5795 aircraft. This backlog is composed of 4392 narrow body which cover 76 percent of the backlog, 80 B767, 524 B777, 779 B787-9 and 20 B747-8. Airbus since 1974 has produced 16,351 aircraft, it has delivered 9520 leaving a current backlog of 6831. This backlog is comprised of 5583 A 320 family (82 percent of backlog), 346 A330, 762 A350 and 140 A380 aircraft.

The vast majority, 74 percent of aircraft delivered were narrow-body, while the largest destinations for all aircraft were Europe (20%), North America (28%), Asia Pacific (22%) and Leasing Companies (17%).

Figure 1 illustrates the growth in both orders and deliveries for Airbus and Boeing; Boeing orders and deliveries are shown in black and Airbus orders and deliveries are in grey. What we see is a dramatic decrease in the growth rates of orders for Boeing over time with negative growth since 2014. However, there is a steady (near zero) growth rate in deliveries. Airbus exhibits a much higher variance in growth rates for orders, but the trend is downward. The growth in deliveries is very much like Boeing, a small but steady near zero, growth rate. What we are seeing is airlines have significantly reduced orders from the period prior to 2010 when orders could grow by 200 percent or fall by 80 percent. As illustrated elsewhere in this report, the airlines have moved away from the cyclical ordering of aircraft

11 See footnote 10.

Figure 1 Boeing and Airbus Order and Delivery Growth 2019-2015



Source: IATA

It is useful, given the changes taking place in order and delivery growth, to examine the state of orders and deliveries as of 2015. Table 1and Table 2 below report orders for wide-body aircraft from Boeing and Airbus, respectively; these are aircraft orders in 2015 (aircraft ordered but not delivered in 2015 plus orders received in 2015), not deliveries and reflect the backlog of orders relative to production capacity. The purpose of these tables is to understand who is ordering aircraft of which type, narrow or wide body and where aircraft are being delivered. These tables report the numbers and percentages of wide-body deliveries classified by origin of purchaser. In Airbus' case 37 percent of deliveries to leasing companies are for new wide-body aircraft, and wide-bodies account for 13 percent of orders for airlines that are members of one of the three alliances. For Boeing, no wide-body aircraft are ordered by leasing companies, but wide-bodies consist of 33 percent of orders by members of one of the three alliances and 70 percent of orders of U.S. airlines. This is a clear sign that the three large U.S. carriers are focused on developing their long haul international networks.

In their financial and operations report, IATA states that there has been an increase in unique city-pair services; increasing from 16,618 in 2015 to a forecast 17,116 in 2016. Thus the new capacity of B787 and A350 in particular is aimed at opening new markets, rather than simply increasing frequencies on existing markets. At the same time, fares in real terms have continued to decline. This makes air travel and, notably, international air travel more accessible.

Table 1 Airbus 2015 Aircraft Orders

	Wide-body	Total Narrow- and Wide-Body Aircraft Orders	Percent Wide-body of Category Total
Foreign Airline Alliance Member	43	322	13%
Foreign Airline not Member of Alliance	13	474	3%
Leasing	84	230	37%
Unidentified	33	101	33%
US Airline	0	12	0%
Grand Total of Aircraft on Order	173	1139	15%

Table 2 Boeing Aircraft Orders in 2015

	Wide-body	Total Narrow- and Wide-Body Aircraft Orders	Percent Wide-body of Category Total
Foreign Airline Alliance Member	65	196	33%
Foreign Airline not Member of Alliance	32	137	23%
Leasing	0	158	0%
Unidentified	55	291	19%
US Airline	60	86	70%
Grand Total of Aircraft on Order	212	868	24%

Debate continues as to whether older aircraft retirement will proceed unabated at the current pace, which is approximately 50 percent of new aircraft delivered. Some carriers, such as Delta and Southwest, continue to use older aircraft while using some retired aircraft for spare parts. In other cases, the older aircraft are directed to the service of emerging economies. Some speculate that the combination of low oil prices, low priced older aircraft, and relatively inexpensive access to capital will lead to an increase in new entrants.

C.2.3. Identifying Overcapacity

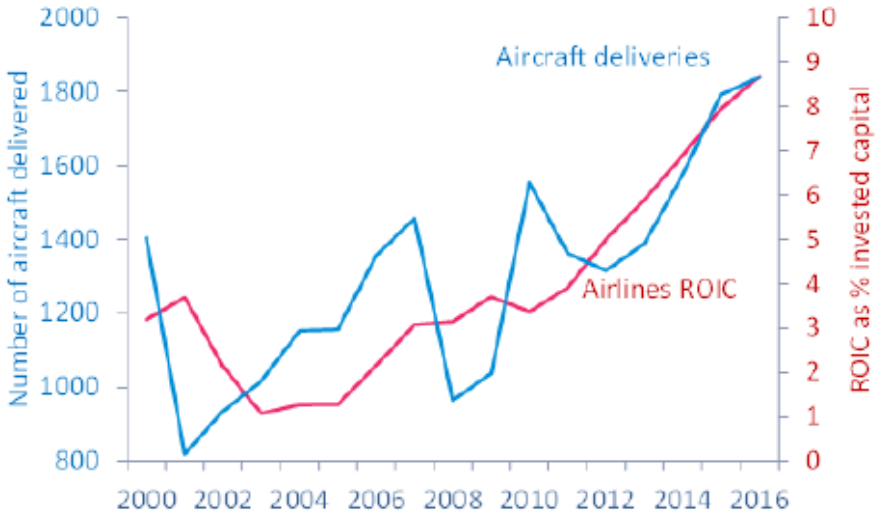
Over the last several years the three global airline alliances – Star, Oneworld and Skyteam – have been successful in obtaining anti-trust immunity for joint ventures for Atlantic and Pacific routes. Metal-neutral joint ventures (a form of alliance venture in which participating airlines share information on pricing, frequency, capacity growth and share revenues and profits) in both markets are now fully immunized, and allow participating airlines to make joint capacity allocation as well as purchase decisions. These enable the alliances to engage in capacity discipline. As CAPA reports[12] fleet growth used to vary widely, between 2

[12] CAPA World Airline Profit Outlook 2016: Margins at a new high of 8.2 percent, fertile ground for new entry, January 15, 2016.

percent and 7 percent. But in the last 10 years the fleet growth curve has been relatively flat at about 4.4 percent, which demonstrates that capacity discipline has taken over.

Figure 1 shows that the increase in aircraft deliveries has not affected the ROIC. These data are for IATA member airlines. It needs to be emphasized that LCCs are not members of IATA, thus the data represent traditional legacy carriers flying internationally, and some of whom may be government owned (e.g. Thai, Malaysian). The most profitable and fastest growing companies of the industry (Ryanair, EasyJet, Wizz, and Air Asia) are not reflected in the data. If they were, the numbers would be significantly higher for both deliveries and ROIC.

Figure 2 Aircraft Deliveries and Airline Industry ROIC



Source: IATA Year End Industry Performance Report 2015

Capacity discipline has been at the heart of a fundamental shift by the major airlines in the world to no longer chase market share and, rather, to focus on profits and ROIC. This trend began in North America, but it has spread to Europe where a few airlines, IAG (a holding company of Aer Lingus, British Airways, Iberia and Vueling) for one, have followed the example of North American carrier discipline. This shift to a profit focus has been accompanied by a careful attention to costs. As a result, higher profits are not simply a by-product of lower oil prices and therefore lower fuel costs, but also of an reduced operating ratio; operating ratio is operating expenses/net revenues, a measure of efficiency. Additionally, airline net profits, particularly for U.S. based carriers have been growing from the increase in ancillary revenues (like baggage handling).

C.2.4. Capacity Adjustment Mechanisms

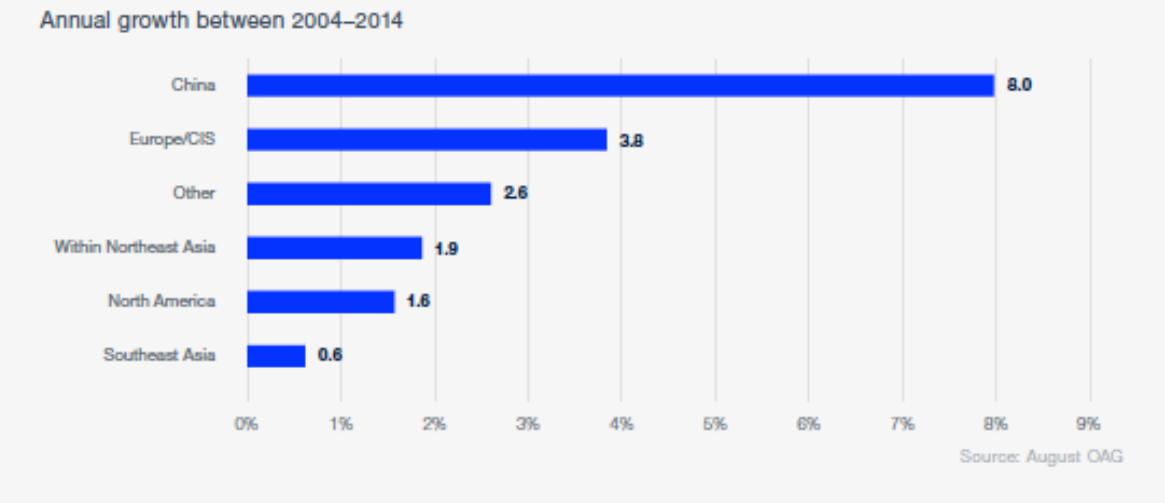
Well-functioning capacity adjustment mechanisms enable firms to rapidly adjust capacity and efficiently meet market demand. These are a critical feature of markets that are not burdened with problems of structural oversupply. If capacity is indeed economically adjustable, then conditions of oversupply could not persist for any length of time in the global marketplace, although there may be limited periods of temporary disequilibrium due to the entry of new airlines or the expansion of established airlines into new routes.

Global markets used to cycle with a more predictable ebb and flow, but in recent years the economy exhibits sudden shocks accompanied by deep and rapid change that is unanticipated. Airlines need to be nimble, with the ability to acquire, shed or redeploy aircraft as needed to meet changing demand while responding to competitive pressures. The leasing industry for aircraft emerged in response to the need for a more liquid market in aircraft and aircraft capacity, and as a means for airlines to avoid the high capital cost of fleet development and adjustment. The leasing sector provides liquidity for airline assets, and for capacity adjustment within a relatively short time frame. It also reduces ownership risk and allows airlines to remain competitive. The emergence of the aircraft leasing industry was a key development in response to airlines' needs, and to ensuring that aircraft capacity was sufficiently mobile for sustained profitability.

Besides leasing, airlines also have the ability to shed or increase capacity through other well-functioning market mechanisms. There is a well-developed and substantial market for used aircraft. Airlines will often sell to one another, but in many cases the manufacturer acts as an intermediary to ensure quality and fit. With the highly developed leasing market, it is difficult to see that structural oversupply can exist or persist for a significant period of time because price adjustments in the leasing and other secondary markets would result in the absorption of excess capacity.

Aircraft are mobile assets and can be moved into expanding markets or where there is potential for growth. In situations of excess seat capacity in a market, airlines will down gauge (i.e., transition to smaller aircraft) and redeploy into other markets. For example, Boeing reports that between 2014 and 2015 there were an additional 1600+ single aisle markets and 350+ wide-body markets. In addition to this, as markets develop, added frequencies reflect market growth, while also serving to expand the market. Figure 3 below illustrates the growth in frequencies in markets.

Figure 3 Frequencies Have Grown 2.3 Percent Annually in the Period 2004-2014



Airlines are also controlling capacity by deferring delivery of aircraft. As an example American has decided to defer 35 of its A320 NEO by four years; they will enter service in 2021-2023. American has also decided to defer delivery of 787-9 aircraft by one year for each delivery. Air France has deferred A380 and B777 orders for one to two years.

Additionally, in the period 2011-2015 year-over-year growth in passenger traffic has exceeded the year-over-year growth in passenger capacity. The result is that average load factors have increased in each year. In Table 3 below, demand and supply growth rates are reported for the world and by region. In the 2016 forecast, capacity expansion will marginally exceed projected growth in passengers, but the projected load factor in 2016 is expected to be 80.46 – down 0.2 from 2015. Yet – at the same time – profits, profit margin and net profit per passenger are all expected to grow in 2016. IATA and CAPA forecast that in 2016 profits will be greater than at any time in the last five decades.

Table 3 Global Demand and Supply for Air Services 2011-2015 and Projection for 2016

System-Wide Global Commercial Airlines	Passenger Traffic (RPK) % Change over Year						Passenger Capacity (ASK) % Change over Year					
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Global	6.3	5.1	5.4	5.7	6.7	6.9	6.6	4.0	4.8	5.5	5.5	7.1
Regions												
North America	2.9	1.0	2.6	2.7	4.3	4.4	2.8	0.4	1.6	2.0	3.7	4.8
Europe	8.4	4.6	4.1	5.4	5.8	5.9	8.6	2.8	2.5	4.5	3.9	6.2
Asia-Pacific	6.6	6.1	7.2	7.0	8.1	8	7.0	5.4	7.1	7.0	6.0	8.4
Middle East	10.0	14.7	11.9	12.9	11.6	12.5	9.8	12.4	11.4	13.0	12.1	12.2
Latin America	11.3	9.4	6.6	5.5	6.0	6.8	9.3	7.6	4.6	6.5	5.6	7.5
Africa	1.6	7.5	4.8	1.5	1.2	1.4	3.2	6.4	5.0	2.5	0.4	1.6

Source: IATA 2011-2015 Domestic & International, IATA Economic Briefing Financial Forecast December 2014 RPK is revenue passenger-kilometers. ASK is available seat-kilometers.

Table 4 Global Financial and Operational Indicators

Year	ROIC	Pax LF	Capacity Growth ATK[13]	Flights (Millions)	Profit Margin	Net Profit/Pax
2004	2.9	73.5	10.10	23.8	0.9	-2.7
2005	3.0	74.9	5.70	24.9	1.1	-1.9
2006	4.6	76	4.80	25.5	3.2	2.1
2007	5.5	77	6.60	26.7	3.9	5.8
2008	1.4	76	2.70	26.5	-0.2	-10.1
2009	2.0	76	-4.20	25.9	0.4	-1.9
2010	6.3	78.5	3.70	27.8	4.9	6.5
2011	4.7	78.4	6.00	30.1	3.1	2.9
2012	4.3	79.4	3.00	31.2	2.0	2.1
2013	4.9	79.7	3.60	32.0	3.5	3.4
2014	6.5	79.8	5.40	33.4	5.5	5.2
2015	8.3	80.6	5.80	34.4	7.7	9.3
2016	8.6	80.4	6.5	36.5	8.2	9.59

Source: IATA, Domestic and International Traffic, Economic Performance of the Airline Industry, 2014 Mid-Year Report, IATA Economics.

a) ROIC - Return on invested capital (percent)
b) PAX LF - Passenger load factor (percent revenue passengers per available seats)
c) Capacity Growth ATK – percent increase in available ton-kilometers
d) Flights (millions)
e) Profit Margin – Operating profit as percent of revenues
f) Operating Profit / Pax – Dollars operating profit per departing passenger

C.2.5. Growth of New Markets

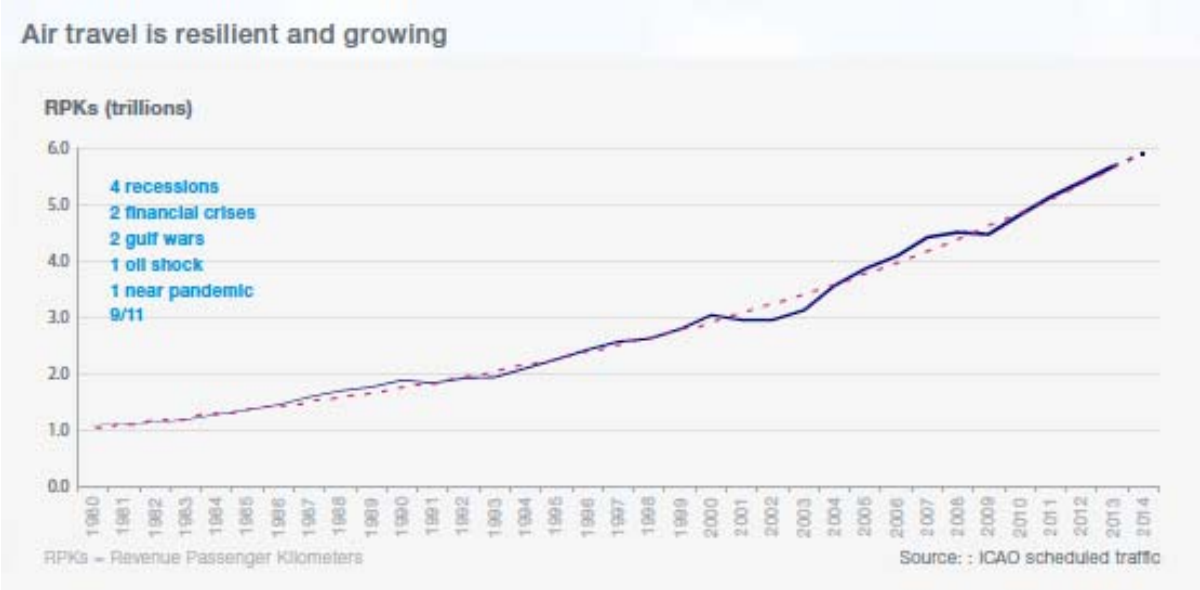
The growth in air passenger demand has been resilient over the long term. As Figure 4 illustrates, there has been a steady growth in air passenger demand for the past 35 years. Certainly, individual events such as 9/11, the 2008 financial crises and the SARS pandemic caused slowdowns in traffic growth, but not by significant amounts for any sustained time period, and not across multiple markets. For example, while 9/11 had a dramatic impact on air travel in North America, there was little measurable impact in Europe or Asia.

Air travel demand is driven by macroeconomic and value of services factors. Trade and trade liberalization; GDP growth and GDP per capita growth; and, labor force participation are key macroeconomic factors. The important value of service factors affecting demand growth are: network structure (connectivity); infrastructure (particularly airport services); the airline business model; and, the regulatory environment.

Three key factors have resulted in a structural change in the demand for air travel that are expected to sustain its continued growth. These factors are: Migration, urbanization and a growing middle class.

[13] ATK is conventionally used by IATA in order to combine the growth in passenger and cargo capacity in a single metric.

Figure 4 Demand for Air Travel



Migration has led to a constant growth in the flows of people between home country and adopted country. Developed economies (U.S., Canada, Europe and Australia), which have attracted economic migration for decades, exhibit these patterns of travel growth. A good example is Turkish Airlines, which has developed a number of routes from Istanbul into several cities in Germany due to the significant number of Turkish nationals living there. The United States has a footloose population, and one that travels frequently for holidays. In 1994, air travel between North American and Europe accounted for 73 percent of the global market. By 2014, the share declined to 49 percent, and it is expected to fall to 38 percent by 2034. Air travel is becoming more geographically diverse.

The number of mega-city gateways in the world is forecast to grow to 91 by 2033 from 47 in 2015. The new gateways will develop in cities with more than 20,000 daily long haul passengers. A growing middle class has a significant impact on demand. In 2013, North America had 1.6 commercial air passenger trips per capita, while Europe had about 1 trip per capita. China, on the other hand, logged 0.25 trips per capita, and India, 0.06 trips per capita. Over the next 10 years, the number of trips per capita are expected to grow to 0.13 in India and 0.37 in China. In 2013, 22 percent of the population of emerging economies took an air trip; in 2023 this is projected to grow to 44 percent as the middle class increases in both countries. China is transitioning from investment-led to consumer-led growth, and this will tend to accelerate air travel demand.

C.2.6. Non-Economic Factors that Affect Capacity Adjustment

This section describes the effects of non-economic factors. In general, the factors themselves are seen to have a net effect of inhibiting competition. Actions taken relative to the status quo can be either more restrictive (competition inhibiting – e.g., new fees such as security, ANS or airport fees affecting potential entrants)[14], or less restrictive (competition promoting – e.g.,

[14] Entry will most always occur as an LCC or ULCC, these fees will have a large rimpact on this type of business model since low fares are the prime strategic variable for competition.

liberalizing air service agreement). The status quo, and the emerging trends with regard to non-economic factors, do not contribute to conditions of structural oversupply.

Air Service Agreements (ASAs), or bi-laterals[15], affect access to markets. The U.S. air policy in place for more than a decade is to negotiate open skies agreements with other countries. A **full** "open skies" ASA removes nearly all economic and operational governmental restrictions on air carriers including pricing, capacity and routes. Such agreements allow unlimited access to U.S. and partners' markets, and in most agreements full pricing flexibility on 5th and 6th freedoms. This latter feature means air carriers of partner countries to an open skies agreement can fly passengers from the home country to the partner country and pick up passengers and fly them to a third country (called fifth freedom rights- e.g. Seattle-Tokyo-Busan by a US carrier). With Sixth Freedom Rights, a domestic-based airline can pick up passengers in a foreign country and fly passengers between two foreign countries via the home country (e.g. London-Washington-Mexico City by a U.S. carrier). Open skies agreements provide maximum operational flexibility for airlines and airline alliances. The U.S. currently has 111 open skies agreements and is among the countries in the world with most highly accessible markets. As ASAs continue the liberalization trend, new gateway airports may emerge with expanded opportunities for new entrants to the air service markets.

C.3. EFFECTS OF STRUCTURAL OVERSUPPLY

C.3.1. About this Subsection

This subsection continues the analysis of structural oversupply by considering the evidence of its effects. That is, what are the features of airline industry performance that would indicate (without sufficiency), or refute (with sufficiency) structural oversupply[16]?

C.3.2. Entry and Exit of Firms in the Industry

In the European Union in the last 20 years, there have been a total of 595 airline (scheduled and charter) bankruptcies. However, for airlines that operated wide-body services there were 3 bankruptcies and 7 mergers. In the U.S. there have been 188 airline failures since 1979. In the decade of the 1980s, there were 86 – not a surprisingly large number since domestic deregulation took place in 1978, and a significant number of airline failures had been anticipated. In the 1990s there were 47, and from 2000 to 2010 there were 42. Since 2010 there have been 11. Of the total (from 1990 to the present), only about 10 percent were national passenger carriers, and the remainder were small regional or cargo carriers. Most large airlines restructured under Chapter 11. The trend of large airlines moving in and out of bankruptcy has slowed as airlines have adopted business models that provide greater insulation from the effects of business cycle fluctuations.

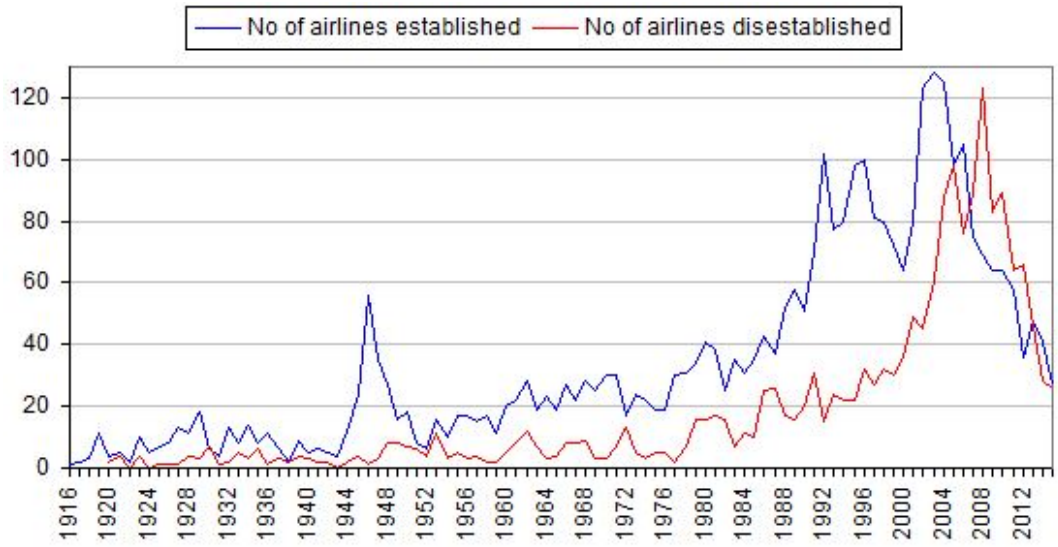
Figure 5 below shows the entry and exit of carriers over time. The absolute peak was reached in 2003. Since then the number of airlines entering the market globally has been trending

[15] ASAs determine the extent to which the parties to an agreement enjoy so-called "Freedoms of the Air" in the aviation markets of the foreign country. The agreements may also determine frequency of access, affected airports, affected carriers and aircraft gauge (wide- or narrow-body) serving the respective countries.

[16] If effects are present there may be structural oversupply. However, the absence of effects strongly indicates that there is no structural oversupply.

downward, with the average being 46 from 2010 to 2015, only a little higher than in the 1980s. The downward trend in new entry has continued after the global financial crisis, in spite of the recovery in industry profitability. However, the period from 2010 to 2015 was a period of high oil prices and recent entrant LCCs were flying older, fuel inefficient aircraft. For some, like Allegiant, this was not an issue since their capital costs were so low. For others, this was a hurdle that proved too difficult to overcome. In spite of low capital costs, increasing profitability in aviation, and a viable leasing market, there has not been increased entry. The claim that failures were a result of "too many aircraft" simply does not ring true.

Figure 5 Entry and Exit of Airline Firms



IATA reports that the growth in unique city-pair markets has been dramatic, moving from 15,782 in 2013 to 16,161 in 2014 and 16,618 in 2015 and a forecast growth to 17,116 in 2016. Figure 6 shows the growth in unique city pairs and the change in real transport costs over time. These two trends illustrate the forces and airline strategies that are in place to ensure long term market growth. Real costs are falling as airlines become more efficient. New technologically advanced aircraft, such as the B787 and Airbus 350, allow firms to develop new markets.

C.3.3. City-Pair Market Growth

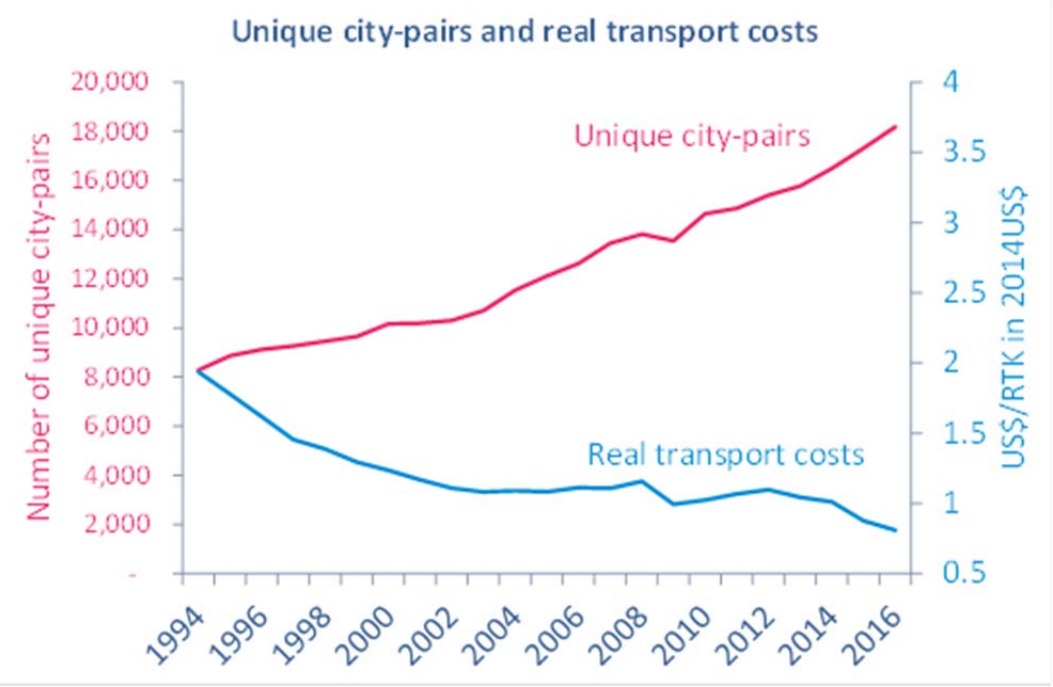
This section discusses the importance of new markets relative to the growth of existing markets.

On the demand side, in long haul international markets frequency is less important while network reach (i.e., number of destinations served) is more important. Traffic growth will respond to the growth in city pairs rather than the growth in number of flights in established markets.

IATA reports that the growth in unique city-pair markets has been dramatic. Real costs are falling, and airline operational efficiency is improving. New advanced technology aircraft, like the Boeing 787, allow airlines to develop new markets. As connectivity improves, there is an increase in global trade which translates into passenger growth from globalized supply chains.

When factoring new market expansion along with the higher retirement rates of aircraft, a picture of the industry emerges of demand growth overtaking supply growth and very slim prospects, if any, for the existence of structural oversupply.

Figure 6 Unique City-Pairs and Real Transport Costs



Source: IATA

From the perspectives of market and route entry and exit – the global market for air services does not appear to be an industry with structural oversupply.

C.3.4. Revenues, Yield and Profit

This section examines industry revenues, yields[17] and profits under conditions of structural oversupply. The presence of low yields and low fares would dominate the global market for air services with structural oversupply, and the data do not show this to be the case.

It is important to note that while the global airline industry is composed of a set of airlines that fly in international markets, not all airlines participate in all markets. More importantly, economic activity, growth, and business cycles differ significantly by country and region. Following the 2008 financial crisis not all economies fell into recession, and for those that did, the depth of the downturn and the pace of recovery were different on a country-by-country basis. The recovery has taken considerable time in the EU, for example, while

[17] Yield is a measure of the average fare paid by all passengers per mile. It is calculated by dividing total passenger revenues by the number of revenue passenger miles.

emerging markets have recovered more quickly and their growth is a significant factor in the demand for air passenger services. Table 5 displays the most recent World Bank real GDP growth forecasts from January 2016. Over the three-year period, 2016-2018, real GDP is forecast to increase or remain steady in every region. Most notably, growth will be highest in the developing regions. As both Boeing and Airbus point out in their market forecasts, the combination of emerging market growth and increased urbanization will drive passenger growth. As China transitions from an export-driven economy to one driven by domestic consumption, and as the growing middle class emerges, the demand for domestic, regional and international travel will increase.

Table 5 Real GDP Growth (percent) – History and Forecast

Country groups	2013	2014	2015e	2016f	2017f	2018f
Aggregates						
World	2.4	2.6	2.4	2.9	3.1	3.1
Low-income economies	6.4	6.1	5.1	6.2	6.6	6.6
High-income economies	1.2	1.7	1.6	2.1	2.1	2.1
Developing economies	5.3	4.9	4.3	4.8	5.3	5.3
BRICS	5.7	5.1	3.9	4.6	5.3	5.4
Regions/economies						
Developing Sub-Saharan Africa	4.9	4.6	3.4	4.2	4.7	4.7
Developing South Asia	6.2	6.8	7	7.3	7.5	7.5
Developing Middle East and N. Africa	0.6	2.5	2.5	5.1	5.8	5.1
Developing Latin America and the Caribbean	3	1.5	-0.7	0.1	2.3	2.5
Developing Europe and Central Asia	3.9	2.3	2.1	3	3.5	3.5
Developing East Asia and Pacific	7.1	6.8	6.4	6.3	6.2	6.2

Source: World Bank

Claims that structural oversupply is responsible for low fares and profits in the airline industry seem to ignore that fluctuations in economic activity vary by time and locale. Capacity does indeed shift from weak markets to strong markets. Since economic growth varies by time and locale, yields and revenues should as well. Most recently, U.S. carriers are shifting interest from domestic to international markets for two reasons; the LCC and ULCC carriers have a large share of the U.S. domestic market and second, long haul international flying offers much higher yields. To operationalize this shift to long haul in 2015 U.S. carriers have ordered 28 percent of total Boeing wide-body orders, there were no wide-body orders from Airbus (see Table 2).

IATA has also provided estimates of system-wide global growth in margin and net profit for 2016, which are reported in Table 6. Globally EBIT is forecast to grow from 7.7 percent in 2015 to 8.2 percent in 2016 and net profit to grow from $33.0 to $36.3 billion. All regions are forecast to have an increase in profits. Profit per departing passenger was $5.20 in 2014, and $9.31 in 2015. This is forecast to be $9.59 and passenger traffic is projected at $3.78 billion in 2016.

Table 6 IATA Forecasts of EBIT and Net Profits Global Airline Industry by Region

System-Wide Global Commercial Airlines	EBIT Margin % of revenues						Net Profit, $ Billion					
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Global	3.1	2.6	3.5	5.1	7.7	8.2	8.3	6.1	10.6	17.3	33.0	36.3
Regions												
North America	3.0	3.4	5.3	7.6	14.3	14.2	1.7	2.3	7.2	11.9	19.5	19.2
Europe	0.8	0.7	0.7	1.9	5.3	6.4	0.3	0.4	0.5	2.7	6.9	8.5
Asia-Pacific	6.6	4.7	5.7	6.4	6.6	6.9	5.0	2.7	2.3	3.5	5.8	6.6
Middle East	3.1	3.0	0.9	2.6	2.9	3.2	1.0	1.0	0.5	1.1	1.4	1.7
Latin America	2.0	1.5	2.2	3.5	1.3	3.2	0.2	-0.2	0.2	0.7	-0.3	0.4
Africa	0.6	-0.4	-0.5	0.4	-1.7	-0.2	0.0	-0.1	-0.1	0.0	-0.3	-0.1

Source: IATA

The most dramatic news in the IATA report was regarding the measure of Return on Invested Capital (ROIC) relative to the Weighted Average Cost of Capital (WACC)[18]. IATA reports that ROIC globally was 8.3 percent in 2015, up from 6.5 percent in 2014, a significant jump. ROIC is forecast to be 8.6 percent in 2016. The ROIC-WACC difference was 1.6 percent in 2015 and is forecast to increase to 1.7 percent in 2016. These are figures that reflect an average across all airlines in the IATA membership. If we were to look at developed economies, we can see that the U.S. and EU have significantly higher profits than the IATA reported average. North America is $19.2 billion and EU is $8.5 billion. This represents a net profit of $21.44 per passenger in North America and $8.80 in Europe.

A most important analysis reported by IATA was the relationship between aircraft deliveries and airline industry ROIC. If structural oversupply was present, one would expect these variables to move in opposite directions. However, as this report shows, the relationship between these variables is positive due to trends discussed above.

There were deliveries of 1,349 new Boeing and Airbus aircraft in 2014, and 1,393 in 2015. A significant number were used to retire older aircraft and less fuel-efficient aircraft. The industry has benefited from a decrease in breakeven load factors, a result of superior revenue management and the increasing contribution of ancillary revenues. The growth in ROIC has also been aided by airline consolidation, continued use of capacity discipline and the increase in metal neutral joint ventures for all three alliances. All alliances have these ventures in place on both Atlantic and Pacific routes and they serve to control capacity growth.

[18] WACC in excess of ROIC has been a core tenet of the case for structural oversupply. It is taken to indicate that investors will not be attracted to the industry. While this report does not look to the financial markets for evidence supporting or refuting structural oversupply, the strong airline share price performance of the past two years would belie the claim that airlines are not attractive to investors.

C.3.5. Pricing Strategy Effectiveness

The discussion of pricing strategy shows that the demand for passenger air services is projected to grow in response to pricing strategies; that revenue per passenger is expected to grow; and, that the overall outlook for profitability is one of continuing improvement. The reported trends by IATA and their forecasts of growth in passengers, routes, and profits indicate that pricing strategies and new revenue management systems are paying dividends for the industry. These findings do not support a structural oversupply narrative in the global market for air passenger services.

Demand also grows in response to airline competition through pricing, revenue management and service strategies. Revenue growth is often the result of demand growth, but over the last several years airlines have been modifying their business models to decouple revenues from strict reliance on passenger growth and on yield growth. Airlines are now growing the amount of revenue per passenger by selling ancillary services and pricing other services that in the past had been included in fares, such as baggage fees. In 2012, 53 of the largest global full service network carriers and LCC/ULCC airlines posted revenues of $27.1 billion in ancillary revenues, in 2013 this grew to $31.5 billion for 59 airlines.[19] U.S. carriers were among some of the most profitable.

Demand growth exhibits wide variation across markets. IATA recently stated that airlines expect to see a 31 percent increase in passengers between 2012 and 2017; by 2017 total passengers are expected to rise to 3.91 billion, an increase of 930 million passengers from the 2.98 billion carried in 2012.

The IATA airline industry traffic forecast for 2014-2019 noted, “demand [i.e., air passenger growth] is expected to expand by an average of 6.2 percent compound annual growth rate (CAGR) between 2014 and 2019. By comparison, air passenger growth expanded by 4.3 percent CAGR between 2008 and 2012, largely reflecting the negative impact of the 2008 global financial crisis and recession. Of the new passengers, approximately 6.9 percent will be carried on international routes.”

Boeing’s regional and market forecasts for 2014-2034 are shown in Table 7. There are a number of features to recognize. First, expected intra-regional market growth varies significantly across markets as exhibited by the values in the diagonal. Second, inter-regional market growth also differs considerably across regions; the China to Southeast Asia market is anticipated to grow annually at 7.4 percent while the Southeast Asia to Europe market is forecast to grown at 4.6 percent, and Europe to Africa is expected to grow at 4.7 percent. The transition of the Chinese economy and the emergence of countries such as Vietnam, Cambodia and Indonesia are reflected in the high expected growth rates in travel within South Asia, 9.1 percent, and between South Asia and South East Asia of 8.9 percent.

[19] The airlines included full service network carriers as well as LCCs and ULCCs. Which airlines are counted depends on whether they are included in Airline Bussiness or Air Transport World surveys or report their ancilliary revenue in their annual report or on their website (source data from Ideaworks).

Table 7 Boeing's Forecast of Passenger Growth (2014-2034)

	Africa	China	Europe	ME	NA	NE Asia	SA	S Asia	SE Asia
Africa	6.70%								
China		6.20%							
Europe	4.70%	5.90%	3.30%						
ME	7.30%		5.40%	5.00%					
NA	6.20%	6.50%	3.00%	6.10%	2.40%				
NE Asia		4.90%	2.90%		1.80%	1.50%			
SA			5.40%		6.00%		7.10%		
S Asia			6.50%	8.00%				9.10%	8.90%
SE Asia	7.40%	7.40%	4.60%	5.60%	5.90%	4.30%			7.70%

Source: Boeing Current Market Outlook 2014 (ME-Middle East, NA-North America, SA, South America, S Asia-South Asia)

Airbus has a similar set of forecasts that also exhibit variability across regions. The Airbus forecast notes that historically, passenger traffic has doubled every 15 years. Their 20-year forecast shows a 4.6 percent growth; a 5.8 percent compound annual growth rate for emerging markets (China, India, Middle East, Asia, Africa, CIS, Latin America and Eastern Europe) and 3.8 percent for advanced economies (North America, Western Europe, Japan). The main drivers of their forecast are: forecast growth in global urbanization and middle class expansion (fourfold expansion over next 20 years), and an increasing importance of private consumption in emerging markets. They note 25 percent of people in emerging markets took a flight in 2014. This figure is projected to be 74 percent in 2034.

A fundamental message of the Airbus forecasts is that traffic will grow at 4.7 percent annually, while annual wide-body deliveries will amount to 4.2 percent of the wide-body fleet. With one-third of the deliveries replacing retiring aircraft, the annual net growth in wide-body aircraft is expected to be about 3 percent. Based on these forecasts, oversupply will not be a concern.

C.3.6. Variability of Profitability over the Business Cycle

This discussion here shows how airlines are exercising greater "capacity discipline", with greater focus on profitability and fleet adjustment.

The structural oversupply narrative claims that the global industry will realize negative economic profits over the business cycle. The supposed evidence for this is diminished airline profits over a business cycle. The business cycle is generally defined in terms of the fluctuations in economic activity over time; the ups and downs of GDP around its long term trend.

This approach has several flaws, namely:

- It fails to account for business cycle variation across markets. Only if a firm operates in one market (or, in several markets with highly correlated business cycles) will such a test be useful.
- It assumes that there is no shift in a firm's business model, and that sources of revenue are uniform and uniformly affected over the cycle.

- It implicitly assumes that the firm's objective was strictly to maximize profits (as opposed to strategic goals vis-à-vis competing airlines[20]).
- It ignores the presence and importance of alliances and, in particular, the creation of metal neutral joint ventures in different markets among alliance partners.

Since the mid to late 2000s there have been three key strategic changes that have taken place in the airline industry, particularly as relates to U.S. carriers. First, prior to the financial crises airlines pursued strategies to grow market share or maximize revenue. Second, U.S. carriers recognized that future growth and higher yields were in long haul international routes, whereas they had previously concentrated primarily on the U.S. domestic market. Third, airline alliances evolved into tightly managed joint ventures with anti-trust immunity.

The first key change, a shift to a profit focus, is evident with the introduction of capacity discipline, beginning in approximately 2010. Until this time, the growth in ASMs and RPMs was closely tied to GDP; the GDP growth correlation with ASM growth was 0.83. However, in 2010 there was a discernable break in the pattern of domestic seat departures and GDP growth. Profits show a steady growth after 2010. The shift away from chasing market share was, in effect, instrumental in breaking the linked cycles of business and capacity expansion/contraction. There was no structural overcapacity at all.

The second key change was the historic strategic shift in the U.S. airline market several years ago, with lessons for the global market. In the past, U.S. carriers were narrowly focused on their domestic market. This has subsequently changed as the three full service network carriers (FSNC), United, Delta, and American are shifting to long haul international markets. IATA and CAPA have referred to the shift by many carriers in a number of developed and developing economies to focus on long haul markets as a structural improvement in profitability, which coincides with the operational strategy of capacity discipline. IATA forecasts profit improvements due to capacity discipline and both organizations note the significant variation in profitability across regions and markets. The shift (in the U.S. market, and by extension to the global market) was precipitated by four trends: 1) Fuel costs increased and became more volatile, 2) LCCs[21] grew and evolved to take upwards of 35 to 40 percent market share of domestic markets, 3) carrier consolidation/merger took place to reduce the number of carriers and increase concentration, and 4) U.S. carriers refocused their attention on long haul international markets that provided an opportunity to increase profits.

The third key change was the evolution of the three global alliances and the development of metal neutral joint ventures, which are in place for the Atlantic and Pacific for all three major alliances. Under these types of agreements, the airlines forming the agreement jointly determine fares, capacity, deployment and revenue and cost sharing. In effect, they act as a single carrier or a sanctioned cartel. Under such arrangements, they effectively control the amount and type of capacity in a market while dampening the effects of business cycle threats through their collective action.

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[20] For example, an airline may fly a route with greater frequency than required from a short-term profitability vantage in order to deter a competitor from entering the market.

[21] LCCs are low cost carriers, the iconic one is Southwest. Other low cost carriers are Jet Blue, Frontier and Virgin America. Ultra LCCs are Allegiant and Spirit.

When examining the production rates for Boeing and Airbus for wide body aircraft, they are each producing an average of 200 wide bodies annually. These aircraft are being used to replace older wide bodies; e.g., B767 and B747 and A340. This indicates that overcapacity is highly unlikely, even remote. These new aircraft are being used more intensively, load factors are rising from 79.8 in 2014 to 80.6 in 2015, and forecast to be 80.4 in 2016. The number of scheduled departures is increasing: over 33 million departures in 2014 for a 5.5 percent increase from 2013. By comparison, departures grew 4.6 percent relative to 2012, and 2016 is forecast to have 36.5 million, an increase of 5.8 percent over 2015. Revenue passenger kilometers (RPK) grew 6.0 percent in 2014, and grew an additional 6.7 percent in 2015. This is forecast to increase by 6.9 percent in 2016. The compound annual growth rate in passenger traffic for the next 10 years is forecast by IATA to exceed 5 percent.

C.4. OUTLOOK FOR 2016 – 2018

C.4.1. About this Subsection

This subsection describes the outlook for structural oversupply in the global market for air services in the period 2016-2018. A number of principal trends minimize the concern of structural oversupply in the outlook years, and these are summarized in this subsection.

C.4.2. Continuing Effects of Capacity Discipline

Capacity discipline, which has emerged as an industry trend in recent years, is expected to continue and have far-reaching effects on fleet size adjustments.

Wittman (2013)[22] and Swelbar (2013) have shown that U.S. carriers have adopted a strategy of capacity discipline. The key full-service national carriers are careful in deploying capacity and in growing it internationally. The capacity growth figures reported by IATA are for all aircraft capacity; narrow-body aircraft are still the largest proportion of fleet capacity but the relative growth rates show wide-body capacity is growing at a relatively higher rate than narrow-body capacity growth, specifically narrow-body (single aisle) growth is 4.6% and wide-body (double aisle) growth is 9%.

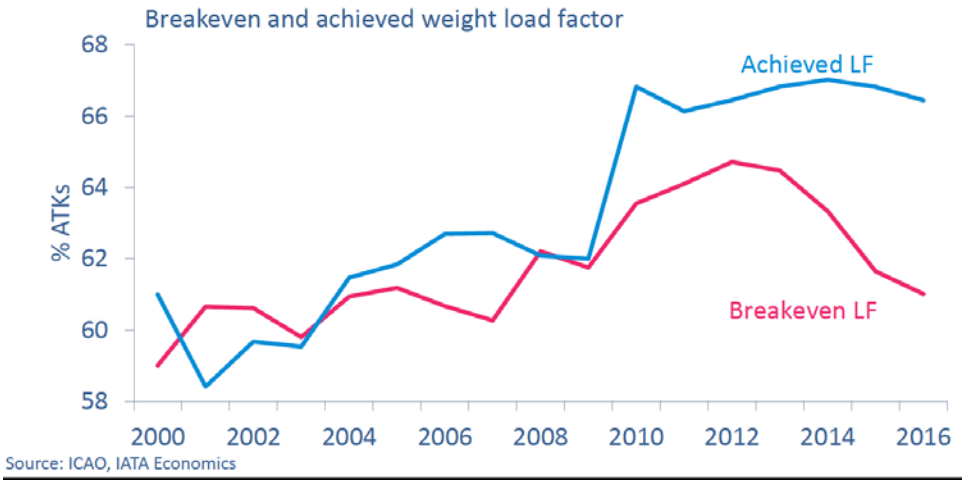
In addition to capacity management, profit driven airlines also focus on asset utilization. Capital productivity improvements also mean operating margins will improve even more, since improving capital productivity supports concurrent labor (flight and cabin crew) productivity improvements as well.

Figure 7 illustrates the improvements in asset utilization as reflected in achieved load factors and the decline in breakeven load factors.[23]

[22] See Michael Wittman, *New Horizons in U.S. Airline Capacity Management: From Rationalization to "Capacity Discipline*, MIT International Center for Air Transportation, November 5, 2013

[23] The breakeven load factor is the load factor, ratio of passengers to seats, where revenue from the flight equals expenses of the flight or where flight operating profit equals zero.

Figure 7 Asset Utilization Raised and Sustained



C.4.3. Stability in Fuel Prices?

Fuel prices are highly uncertain. Oil prices have declined over 75 percent, and it is unclear at what level they will stabilize. There are mixed signals as to where oil prices will go next; the International Energy Agency is forecasting rising oil prices going forward while Goldman Sachs is forecasting falling oil prices into the future. The airlines have seen fuel costs fall considerably but the gains are not evenly distributed: U.S. carriers have gained more since foreign carriers purchase fuel in U.S. currency and the U.S. dollar has risen against most currencies. The net effect however, is that fuel costs have declined for most carriers. This, however, is not expected to deter carriers from investing in fuel efficient aircraft for three reasons; money right now is cheap for purchasing new aircraft (capital), fuel efficiency also means less carbon emissions and countries are imposing more stringent emissions rules and third, oil will rise at some point which will increase cost, reducing profits and make purchasing aircraft more of a challenge.

C.4.4. Growth in City-Pair Markets Should Continue

New air services will continue to be introduced in the emerging market countries, and increased service will follow in the international gateway hubs. The analysis indicates that there is little risk of supply outstripping demand in the outlook period (as evidenced by forecast growth of the wide-body fleet with the projected growth in demand). As reported in 2015, new city-pair markets are forecast to expand by 498, or 3 percent in 2016.

C.4.5. Competition will Continue to Grow Market Size

The best evidence indicates that passengers, particularly in long haul international markets, are fare sensitive, with lower fares stimulating traffic[24]. Schedule passenger growth in 2015 was 6.5 percent (passenger departures) and 6.7 percent (RPK) by IATA, whereas the 2016

[24] The route between the U.S. and Australia is an excellent example. Prior to 2009, the Sydney-Los Angeles market was restricted to two firms, Qantas and United. Fares were high, but in 2009 Virgin Australia was permitted to enter the market. Fares fell, and after a year Delta entered the market and competition drove fares even lower. Non-stop passenger traffic between the U.S. and Australia expanded by over 50 percent between 2006 (pre-recession peak) and 2012.

forecast is for 6.7 percent (passenger departures) and 6.9 percent (RPK), which represents a considerable increase in scheduled passengers; based on IATA figures there will be an additional 266 million additional scheduled passengers in 2016 relative to 2015.

C.4.6. Decoupling of Demand from GDP

The analysis shows that air travel demand is less dependent solely upon per capita income growth. While economies are expanding and populations are growing, which will increase the demand for air travel along some trend, the data show demographic drivers of proportionately greater increase in air travel demand. This increasing growth in travel demand together with capacity discipline measures mean that airline profitability will fluctuate less with the business cycle. The dampening of these fluctuations will reduce the likelihood of an unwarranted capacity build-up, and will lessen the probability of structural oversupply developing in the outlook period.

C.4.7. Other Major Trends

The other major trends affecting the global airline industry are the increasing dominance of the major alliances; so-called "metal neutral" joint ventures between airlines; and a trend towards increasing consolidation of the industry (i.e., greater concentration – larger share of regional traffic handled by a smaller number of airlines). These developments reflect greater protectionism on the part of North American and European legacy carriers. The attacks on liberalism and open skies agreements in 2015 by the established legacy carriers (in the U.S. and Europe, with IAG a notable exception) reflects a move away from more liberal trade in these areas. The Asia Pacific is the complete opposite: liberalism is alive and well, and being vigorously pursued since although there are metal neutral joint ventures there only involve a small subset within any alliance and there are still a number of independent airlines offering competitive capacity.[25]

The net effect of these other major trends will be to further reduce the probability of structural oversupply in the outlook period. The argument is that when there are a greater number of airlines, each firm does not take account of how its own capacity expansion would impact others on a route or in a market. As the number of airlines in a market decreases, the increased concentration means each is more aware of how capacity expansion affects it and the other firms in the market. The reduction in the U.S. from 6 to 3 network carriers is one reason why capacity discipline is holding. There are also fewer carriers competing for positions in long haul international markets and therefore capacity will grow at a slower pace.

C.4.8. Summary

In our view there is no oversupply of global aircraft capacity nor is there a threat of one. We take this view for several reasons. First, passenger demand is growing at a sustainable healthy pace in spite of somewhat weak macroeconomic market recovery in some parts o fteh world. The Chinese and other SE Asian economies while not growing at the torrid ace of previous years are growing at 7% and shifting to more domestic consumption than export growth. India also has seen a more than 20% growth YOY in scheduled passengers. Demand

[25] A metal neutral joint venture does not automatically include all airlines that are members of a particular alliance. For example, the transatlantic joint venture in Star Alliance includes Lufthansa, United and Air Canada, Star Alliance currently has 28 member airlines.

growth is stimulated by falling real average fares and service and route expansion. Secondly, airlines have shifted their business model to focus on return on assets rather than compete for market share. The three major U.S. carriers have been highly successful in improving profitability. This has come from not only shifting the business model, but also decoupling profits to some extent from the business cycle and by improved revenue management. Thus, profits are not only higher they are less variable. The shift in business model means airlines are working at route development and opening new markets. Thirdly, breakeven load factors are going down while actual load factors are rising; 61.7% for the former and 80.6% for the latter. Fourth, the aircraft fleet is growing at somewhat more than half the pace of demand; demand is expected to grow at 6.7% while the aircraft fleet is forecast to grow at 3.9%. While aircraft departures will grow at 5.8% yoy, seat growth will remain at 1.9% and available seat kilometers will grow at 7.1% yoy indicating more longer haul flying. The number of unique city pair routes is growing at 2.9% or near 500 new city pair markets. Fifth, leasing market remain strong and leasing firms with these firms having about half of Airbus wide-body orders. Airlines can expand, contract and redeploy capacity with the liquid leasing market.

C.5. CONCLUSIONS

While a number of emerging trends suggest a possible oversupply of narrow-body single aisle aircraft in the short term because Airbus and Boeing chose for competitive reasons to incrementally change the Boeing 737 and Airbus 320 rather than develop a new platform which moved aircraft production forward in time relative to planned production[26], these concerns are assuaged by the overall outlook. Fuel costs are projected to remain at or near their current low levels, which may slow the retirement rates of older aircraft, as they are redeployed start-up LCCs.

The enhanced range of the new narrow-body aircraft, as well as the capabilities of the 787 and 350, will allow airlines to take advantage of liberalization and the growing middle class, especially in China. These aircraft allow new network design strategies and in particular more hub bypass flying. As a result, one can be sanguine about the increase in capacity. It is not structural – it is a product of the conflation of lower costs of fuel, capital and aircraft, liberalization and a growing middle class in large emerging markets such as China.

There are two uncertainties: oil prices and demand growth in mature developed economies; economic growth is uneven but rising. The profits obtained in 2015 were from lower costs, ancillary revenue growth and higher yields from revenue management. However, yields in real terms trended downward which has stimulated demand to some degree. Cost disciplined airlines will be profitable in 2016 even with uncertain demand growth in the EU an din some respect North America. The future of oil prices remains unclear. However, given that a number of new fuel efficient aircraft are coming online, carriers ordering these aircraft will have an advantage even if oil prices rise somewhat.

While demand is forecast to grow in 2016, it is the restructuring of China's economy that creates some uncertainty. Many argue that the shift to a domestic consumer economy should be good for airlines as average incomes are rising, there is increased urbanization and a

[26] For example, the Boeing 737 was designed in 1965 and first flew in 1967.

consumption led economy will result in expanding domestic and international routes in and to and from China.

Orders for aircraft are distributed across all regions: North America 2,189, South America 794, Europe 2,462, Africa 220, Middle East 1,073 and Asia with 4,309. The Asian orders are almost as large as North America and Europe combined. But it will be in these markets that aircraft will find demand and growth. LCCs in Asia and South Asia will grow significantly, as 50 percent of the aircraft orders are from LCCs. Aircraft are thus going to markets with the greatest growth and fewer aircraft are going to established markets, further diminishing the likelihood of an oversupply scenario.

Export-Import Bank of the United States

Study of Passenger Aircraft Oversupply Final Report

Prepared by Washington Consulting Group

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Contents

List of Tables

List of Figures

ABOUT THIS DOCUMENT

This document is the final report for the "Study of Passenger Aircraft Oversupply". David Gillen and Daniel Brod were the authors of the report for the Washington Consulting Group.

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A. EXECUTIVE SUMMARY

This report examined the issue of structural oversupply in the global market for passenger airline services with a three-year outlook period from 2017 to 2019. Structural oversupply occurs when firms in a market have the supply of their good or service in excess of demand for a prolonged period of time. The most prominent outcome of such a condition is significant losses on capital invested. The fundamental difference between a structural problem and a cyclic circumstance is a continuing and persistent malaise in the industry. This market, broadly utilizes two types of aircraft; narrow-body (single aisle) and wide-body (twin aisle). The long haul intercontinental segment of the market relies on wide-body aircraft to provide the principal service of air passenger travel. Narrow-body use focuses on shorter haul routes, usually regional or intra-continental flights.

The report is a qualitative assessment that is supported by data analysis and published aviation studies. The judgment and experience of independent academics and professional observers of the industry contributed to the analysis. The general study approach was to characterize conditions of structural oversupply and its consequences (i.e., causes and effects), and to determine whether the empirical evidence supports – or refutes – a finding of structural oversupply in the global market for air services. An effort is made to distinguish short run effects from long run trends.

The report concludes that the global passenger airline industry, while possessing many unique features, is not fundamentally different than many other industries. Both demand and supply side forces drive the demand for aircraft and their utilization. Structural oversupply results from large and irreversible capital investments, long term capital planning horizons, and the inability or lack of incentive to adjust capacity. The report demonstrates that while the first two features are generally present in the global market for air services, they are largely mitigated by the ability to adjust capacity. There is a liquid market in aircraft and prices adjust to reflect market conditions. The report finds that the trends identified in studies for the Export-Import Bank of the U.S. in 2015 and 2016 are reconfirmed.

The principal indicators of the global market for air services show that structural oversupply does not exist. The reasons for this determination are summarized in the following bullets:

- Profitability, highly variable across markets and carriers, has been rising for the past 3 years. It peaked last year and is turning down. It is still however, well above the weighted average cost of capital. Volatility over the business cycle has dampened over the past several years and continues in 2017. This trend has strengthened in the past year.
- Demand is forecast to grow at an annual compound average growth rate of 3.7 percent for the period 2016-2035 according to the International Air Transport Association (IATA). This means a doubling of global air travel passengers over the next 20 years.
- Continuing trends of urbanization and a growing middle class in China and India are driving strong growth in these markets. Over the past decade (2005-2015) the developing world's share of passenger traffic has grown from 24 percent to 40 percent. This trend is continuing.
- Capacity and utilization indicators show airlines are continuing to exercise "capacity discipline" in domestic markets. In the presence of structural oversupply, airlines would be unlikely to engage in capacity discipline because they could realize relatively higher profits with contrary practices like lower load factors and increased flight frequencies. Since capacity discipline remains the prevailing industry strategy, there is little likelihood of structural oversupply.
- For international markets, the data indicate that capacity discipline is a less prevalent operational strategy. This is especially the case in East Asia, where airlines are rapidly expanding in many markets. Over time, there may be some shake out and consolidation in these markets followed by an expanded adoption of capacity discipline.

- The three global airline alliances – Star, Oneworld and Skyteam – have been successful in attaining antitrust immunity for joint ventures on Atlantic and Pacific routes, strengthening their ability to engage in capacity discipline. However, this has resulted in higher fares and created opportunities for the development of long haul low cost carriers (LCCs), resulting in an increased demand for wide-body aircraft.
- New technology narrow-body aircraft that are fuel-efficient and well-suited for longer haul routes (e.g., Boston-London) will reduce the reliance on wide-body aircraft in a number of markets, particularly the North Atlantic. It will also increase opportunities for LCC airlines to enter international markets.
- Legacy airlines are shifting towards higher-profit, long-haul routes. The net effect of this shift will cause an increase in demand by legacy carriers for wide-body aircraft, rather than narrow-body. LCCs continue to focus on a common type narrow-body aircraft. Recent data confirm this trend.
- The shift to longer haul, requiring more wide-body aircraft (and newer narrow-body aircraft), will occasionally result in the replacement of older narrow-body aircraft on longer haul routes. These older narrow-body aircraft will be redeployed to shorter haul and regional markets, as well as to developing markets in Africa, Latin America and India, or will be retired.
- Recent data confirm that overall capacity utilization has levelled off and is forecast to decrease slightly in 2017[1].
- Multiple capacity adjustment mechanisms (aircraft retirement, redeployment, delivery deferrals, leasing) are widely used throughout the industry for wide-body and narrow-body aircraft. The existence and robust functioning of these mechanisms, minimize the likelihood that structural oversupply will prevail in the global market for air services.

Non-economic factors (fortress hubs[2], other barriers to entry, foreign ownership restrictions) have some competition-inhibiting effects. However, these effects are seen to be limited (or, gradually eroding) and not contributing to a condition of structural oversupply.

ASAs[3] define the restrictions by which foreign carriers must abide in a county's home market. These agreements are for the most part moving to more liberalized regimes, especially in the Asian markets, with fewer restrictions regarding "freedoms of the air"[4], flight frequency and other factors. Greater liberalization of ASAs enhances competition. Growing protectionist trends globally create significant

[1] One measure of capacity utilization is load factor, which has held steady in the range of 65-67 percent of available ton-kilometers (ATK) for the past five years. This should soften slightly, but remain well above the breakeven load factor – 62-63 percent in recent years. (Note that this is a combined load factor for passenger and freight).

[2] "Fortress hubs" refer to hub airports where a single airline, or alliance of airlines, control 70 percent or more of the airport's capacity slots, thus making it nearly impossible for a competing airline to initiate operations from the same airport.

[3] Air service agreements (bi-lateral agreements governing air transport between countries). ASAs that significantly liberalize scheduled passenger service relative to a previous status quo are often called "open skies" agreements. The U.S. currently has over 100 open skies agreements (some in force, some provisional and others subject to comity and reciprocity).

[4] "ICAO FAQ: Freedoms of the Air". International Civil Aviation Organisation. The freedoms of the air are a set of commercial aviation rights granting a country's airlines the privilege to enter and land in another country's airspace. http://www.icao.int/Pages/freedomsAir.aspx.

uncertainty with regard to the continued growth of global economic trade and global air services. Nonetheless, looking at broader economic indicators the analysis of the period 2017 to 2019 provides no compelling evidence that structural oversupply will be a concern in the global market for air services.

B. ANALYSIS ASSUMPTIONS

B.1. INTRODUCTION

The analysis assumptions represent an expert outlook derived from the broad consensus of aviation professionals and observers. While the assumptions draw from a number of sources that may not be fully harmonized (e.g., Boeing and Airbus forecasts, IMF and World Bank), the outlook is generally consistent. In cases where there seem to be discrepancies among different sources, care was taken to base conclusions on multiple indicators.

While recognizing that all assumptions and forecasts are uncertain to some extent, the subsequent analysis shows that the industry as a whole is facing challenges from slowing economies in some regions and emerging uncertainties in institutional and trade relationships. Unlike in the past, the industry faces demand challenges related to economic growth projections. Nonetheless, the industry has created a flexible and liquid capacity management regime that allow it to absorb short run unanticipated shocks in prices and demand. The analysis conclusions should remain robust even if there is significant variance from some of the assumption elements. We have however included a list of 'significant uncertainties' that arise with a change in U.S. Administrations, the Brexit negotiations and potential disruptions to the trading regime as developed under the WTO.

The following are the assumptions that guided the report's analysis.

B.2. LIST OF ASSUMPTIONS

1. Market assumptions
    a. Global and regional market growth forecasts based on Boeing and Airbus forecasts updated to 2016 (outlook is positive with variability across regions)
    b. World and Regional economic growth based on IMF forecast (2016). Reduced economic growth in both EU and US. Global forecast range is 2.9 to 3.1 percent growth. Significant variability across regions
    c. Macroeconomic continued "new normal" – slower long-term growth in developed economies and a shift from export-driven growth to domestic consumption in Southeast Asia
    d. Monetary policy will continue a low interest rate regime making investment attractive conditional on broader macroeconomic indicators
    e. Moderate GDP-based growth in air passenger markets overall, with weaker growth in North American and EU markets
    f. Economic and financial globalization expansion has slowed
    g. Strong U.S. dollar against other world currencies
2. Energy outlook
    a. Continued instability in oil markets
    b. Oil prices remaining in the range of 45 to 55 dollars per barrel in the outlook period (while not ruling out occasional spikes or declines)
    c. Fuel prices trending upward at a slow pace, if at all, in the outlook period
3. Emerging markets assumptions
    a. Volatile GDP growth based on World Bank and IMF forecasts.

b. Relatively stronger GDP growth in Africa, but commodities downturn will dampen previous growth forecasts

c. India and Brazil will have weaker GDP growth with greater volatility

d. Slowing growth in China's air service markets

4. Industry trends

a. Airline consolidation globally to continue, but at a slower pace

b. Alliances will exercise capacity discipline and continued development of "metal neutral" joint ventures within established alliances[5]

c. Legacy carriers will continue transition to long haul international

d. Low-cost carriers (LCCs)[6] will expand, will develop long haul routes with wide-body aircraft and continue efforts to expand in trans-Atlantic routes with narrow-body aircraft

e. Airlines to emphasize the development of new routes over expanding service on existing routes. This is particularly true for LCC who are increasingly entering long haul routes

f. Continued use of fortress hubs in the European Union (EU) by the three alliances

5. Non-market assumptions

a. Slowing liberalization of bi-lateral service agreements with small increase in liberalization in emerging markets

b. A softening of foreign ownership restrictions since the growth of metal neutral joint ventures have reduced the impact and effectiveness of ownership restrictions

c. The new fuel efficient Boeing and Airbus narrow-body aircraft, Boeing 737MAX and Airbus 320NEO provide for longer range and the potential for increased intercontinental flying

6. Government interventions in infrastructure markets

a. Terminal and air space restrictions, special levies, etc.[7] – no significant change to status quo

b. Slot controls at select North American airports (JFK, LGA) and slot controls to continue in Europe[8]

c. Commitment to a third runway at London Heathrow but the impact of Brexit may affect the value of the investment

d. Development of slot controls at congested airports in Southeast Asia and Latin America

[5] A metal neutral joint venture is an alliance between two or more airlines where the revenues and/or profits are shared regardless who is the operating carrier.

[6] LCCs are low cost carriers, the iconic one is Southwest. Other low cost carriers are Jet Blue, Frontier and Virgin America. Ultra LCCs (ULCCs) are Allegiant and Spirit. Non-domestic LCCs include Ryanair, WestJet, Gol, Norwegian, Wizz Air, Lion Air, Air Asia, Virgin Australia.

[7] Governments in many countries afford favored status to domestic airlines through lessened restrictions in use of airspace and terminals. Special levies, in many cases, apply only to foreign airlines.

[8] Slot control is a means of airside congestion management at airports. It restricts airlines to the use of time and gate slots.

7. Effects of environmental policies
    a. EU policy on emissions trading to be introduced at a slower pace than previously planned
    b. International agreement on emissions trading to proceed slowly (despite the recent Paris climate convention)
    c. The U.S. carriers to seek to prevent the addition of environmental impact fees to U.S. carriers
    d. Steady but slower growth in the use of biofuels as EU and other developed economies commit to reducing aviation emissions, but a reduction in biofuel use by U.S. carriers
8. Major Uncertainties
    a. A possible disruption in global trade as world moves to greater protectionism
    b. A possible reversal in globalization as industries retrench to their home markets
    c. The new relationship between the UK and EU, and whether UK to be included in the EU common aviation market; uncertainty in institutional trade arrangements
    d. A potential change in the U.S. approach to open skies, particularly as it relates to the major Middle Eastern carriers; possibly disruptive to manufacturers and the degree of competition in Trans-Atlantic markets

C. OVERSUPPLY IN THE GLOBAL MARKET FOR AIR SERVICE

C.1. OVERVIEW

This section presents the core of the analysis regarding structural oversupply in the global market for air service.

Following the overview, the section is divided into four major subsections: conditions of structural oversupply, effects of structural oversupply, outlook for 2017-2019, and conclusions.

C.1.1. General Description of Structural Oversupply

Structural oversupply occurs when firms in a market have the supply of their good or service in excess of demand for a prolonged period of time. The most prominent outcome of such a condition is significant losses on capital invested.

C.1.1.1. Conditions

The fundamental causes of structural oversupply are either due to supply or demand failures. Supply failures occur if there is a failure to adjust either 1) the supply of the underlying inputs used to produce a product, or 2) the supply of the product itself. Demand failure occurs if there is fundamental change in the underlying demand for the product.

These failures may be a result of asset immobility, asset non-tradability (i.e., absence of suitable markets), or lack of incentives by firms to adjust output. Immobility may refer to physical immobility, i.e., inability to move the asset to its market. It can also refer to the inability to adjust the asset to produce alternative products (i.e., asset immutability). [9]

Finally, the lack of incentive to adjust output can occur for a number of reasons. Among these: producer subsidies, sunk costs in installed or non-tradable assets, or use of laws (such as Chapter 11) that allow a firm to continue operations while in bankruptcy. It may also occur in markets that are shrinking and incumbent firms engage in a war of attrition by maintaining output, driving prices lower and forcing out higher cost firms.

C.1.1.2. Effects

The oversupply of a product or service that is not a result of cyclical influences or behavioral causes (e.g., price wars) will exhibit the following features of a market where supply will generally exceed demand:

- Price levels below costs for a sustained period of time – not necessarily operating costs but less than average total costs, such that capital costs are not fully recovered
- Weak or no entry by new firms, or limited expansion by established firms and no evolution in business models
- Frequency of bankruptcy well in excess of the average in other industries
- Downward pressure continually exerted on price levels as excess capacity incentivizes producers to sell as much as possible
- Low profit earnings by firms, whereby ROIC is less than WACC[10]

[9] Common examples of industries with structural oversupply that have exhibited these features are the steel industry and the wine industry in Australia.

[10] ROIC is return on invested capital. WACC is weighted average cost of capital.

An industry suffering from structural overcapacity should exhibit all of these features. However, all or any combination of these elements may occur in markets at any time due to cyclical effects, economic downturns, or temporary disequilibria resulting from external factors (e.g., conflicts, natural disasters). The fundamental difference between a structural problem and a cyclic circumstance is a continuing and persistent malaise in the industry.

C.2. CONDITIONS OF STRUCTURAL OVERSUPPLY

This subsection discusses fundamental conceptual issues about supply, or available capacity. In aviation, supply is generally measured as available seat miles (ASM). The airline industry operates over an extensive and evolving network, and addressing issues of supply requires an examination of capacity and its utilization. These are measured by a number of metrics including: load factor; hours per day of flying; number of departures or flights. These metrics, and their behavior over time, are key to assessing the structural oversupply conditions.

Included in this subsection is an explanation of capacity adjustment mechanisms in the industry, which, if found to be robust, would refute the presence of structural oversupply. This is especially the case with regard to the important aircraft leasing sector. The subsection concludes with a discussion of non-economic factors that influence capacity adjustment.

C.2.1. Capacity and Utilization Metrics

The airline industry often uses operational measures of capacity utilization such as load factor, the ratio of revenue passenger miles (or kilometers) to available seat miles (or kilometers) and average hourly utilization of an aircraft. These operational measures have limited economic meaning. It is possible, for example, by charging very low fares to have a high load factor, perhaps even 100 percent. Observing such a high load factor, one could erroneously conclude there is too little capacity in the market. On the other hand, observing a low load factor could lead an observer to conclude that there is too much capacity, which may not be the case[11]. Therefore, load factor in isolation cannot be used as an indicator of too little or too much capacity. **Rising load factors coupled with increasing capacity and rising profits is an indicator of a financially healthy industry.**

Capacity measures need to account for stage length and the proportion of international to domestic flying. Trips or departures, for example, are sometimes considered as a measure of capacity. However, with a transition to longer hauls an airline may record fewer trips with more miles flown.

Capacity can also be measured as number of aircraft or number of seats in a market; number of seats can vary with frequency. Seats per aircraft can also vary as is evident with different carriers configuring their aircraft in different ways[12]. In addition, counting aircraft orders and deliveries fails to account for the ability of carriers to park aircraft when needed or required.

Operational measures of capacity offer limited information in assessing the state of structural oversupply in the global market for air services. Fleet expansion is not a harbinger of oversupply because capacity is not measured by number of aircraft, rather, by how they are used, deployed and configured.

[11] The first example is a case of poor pricing and, perhaps, inadequate revenue management. The second case may be the result of strong revenue management; Southwest Airlines has one of the lowest load factors among U.S. carriers yet is consistently the most financially successful carrier.

[12] The number of seats on an aircraft of a given make and model can vary considerably. As an example, an Airbus A320 can have anywhere from 144 seats to 180 seats depending on number of classes and the desired seating density.

A decrease in passenger load factor can result from a number of factors. An important one is the increased densification of aircraft seating. There could be an increase in the number of passengers, yet load factor could fall with increased densification.

Load factors are closely tied to airline profitability, and the changes in breakeven load factor[13] will depend on average yield[14] and on total costs. A decrease in the breakeven load factor means costs have fallen or average yield has increased or both. An increase in breakeven load factor means that either costs have risen, or average yield has fallen, or both.

No single measure of capacity (number of aircraft, daily use or load factor) is adequate to define or describe capacity. Moreover, seemingly idle capacity may be economically advantageous to airlines.

C.2.2. Identifying Overcapacity

With overcapacity in the global air passenger market we would expect to see lower airline capacity utilization and declining profitability followed by waves of airline failures. Moreover, the structural nature of overcapacity would indicate an inability of airlines to adjust aircraft fleets and operations to accommodate weak demand. The reality strongly indicates otherwise.

C.2.3. Capacity Adjustment Mechanisms

This subsection discusses capacity adjustment mechanisms and their role in preventing conditions of structural oversupply in the global market for air passenger travel.

Well-functioning capacity adjustment mechanisms enable airlines to adjust capacity relatively quickly and efficiently in response to market demand. If capacity is indeed economically adjustable, then conditions of oversupply could not persist for any length of time in the global marketplace. There may, however, be limited periods of temporary disequilibrium due to: 1) the entry of new airlines, 2) the expansion of established airlines into new routes, or 3) a regional downturn in demand.

Global markets, in general, used to cycle with a more predictable ebb and flow. But in recent years, sudden shocks accompanied by unanticipated deep and rapid changes have become more common occurrences. To survive and thrive, airlines must be able to respond rapidly with the ability to acquire, shed or redeploy aircraft as needed to meet changing demand while responding to competitive pressures. The leasing industry for aircraft emerged to facilitate rapid adjustments in aircraft and aircraft capacity, and as a means for airlines to avoid the high capital cost of fleet development and adjustment.

Besides leasing, other well-functioning market mechanisms support the ability to shed or redeploy aircraft. There is a developed and substantial secondary market for used aircraft. Airlines will often sell to one another, but in many cases the manufacturer acts as an intermediary to ensure quality and fit. **With the highly-developed leasing market, it is difficult to see how structural oversupply could exist or persist for a significant period of time because price adjustments in the leasing and other secondary markets would result in the absorption of excess capacity.**

Aircraft are mobile assets and can be moved into expanding markets, or where there is potential for growth. In situations of excess seat capacity in a market, airlines will down gauge (i.e., transition to smaller aircraft) and redeploy into other markets, while adding frequencies to serve expanding markets.

C.2.4. Growth of New Markets

Structural oversupply cannot exist or persist with steady and robust sources of growing demand.

[13] The breakeven load factor is the load factor, ratio of passengers to seats, where revenue from the flight equals expenses of the flight or where flight operating profit equals zero.

[14] Yield is a measure of the average fare paid by all passengers per mile. It is calculated by dividing total passenger revenues by the number of revenue passenger miles.

Air travel demand is driven by macroeconomic and value of services factors. Trade and trade liberalization, GDP growth and per capita growth are key macroeconomic factors. The important value of service factors affecting demand growth are: network structure (connectivity); infrastructure (particularly airport services); the airline business model; and, the regulatory environment.

Three key factors have resulted in a structural change in the demand for air travel that are expected to sustain its continued growth. These factors are: migration, urbanization and a growing middle class. The profound increase in passenger traffic in China and India can be largely explained by these factors.

Migration has led to a constant growth in the flows of people between home country and adopted country. Developed economies (U.S., Canada, Europe and Australasia), which have attracted economic migration for decades, exhibit these patterns of travel growth. A good example is Turkish Airlines, which has developed a number of routes from Istanbul into several cities in Germany due to the significant number of Turkish nationals living there. Air travel is becoming more geographically diverse, and less dependent upon any single economy.

The number of megacity gateways[15] in the world is forecast to grow to 91 by 2033 from 47 in 2015. The new gateways will develop in cities with more than 10,000 daily long haul passengers. A growing middle class has a significant impact on demand. China is transitioning from investment-led to consumer-led growth, and this will tend to accelerate air travel demand.

C.2.5. Non-Economic Factors that Affect Capacity Adjustment

This section describes non-economic factors that can affect capacity adjustment. In general, the factors themselves are seen to have a net effect of inhibiting competition. Actions taken relative to the status quo can be either more restrictive (competition inhibiting – e.g., new fees such as security, airport fees affecting potential entrants)[16], or less restrictive (competition promoting – e.g., liberalizing air service agreement). The status quo and the emerging trends with regard to non-economic factors do not contribute to conditions of structural oversupply.

Air Service Agreements (ASAs), or bi-laterals[17], affect access to markets. The U.S. air policy in place for more than two decades has been to negotiate open skies agreements with other countries. A full "open skies" ASA removes nearly all economic and operational governmental restrictions on air carriers including pricing, capacity and routes. Such agreements allow unlimited access to U.S. and partners' markets, and in most agreements full pricing flexibility on Fifth and Sixth Freedoms. This latter feature means air carriers of partner countries to an open skies agreement can fly passengers from the home country to the partner country and pick up passengers and fly them to a third country (called Fifth Freedom Rights- e.g., Seattle-Tokyo-Busan by a U.S. carrier). With Sixth Freedom Rights, a domestic-based airline can pick up passengers in a foreign country and fly passengers between two foreign countries via the home country (e.g. London-Washington-Mexico City by a U.S. carrier). Open skies agreements provide maximum operational flexibility for airlines and airline alliances. The U.S. currently has over 100 open skies agreements and is among the countries in the world with most highly accessible markets. As ASAs continue the liberalization trend, new gateway airports may emerge with expanded opportunities for new entrants to the air service markets.

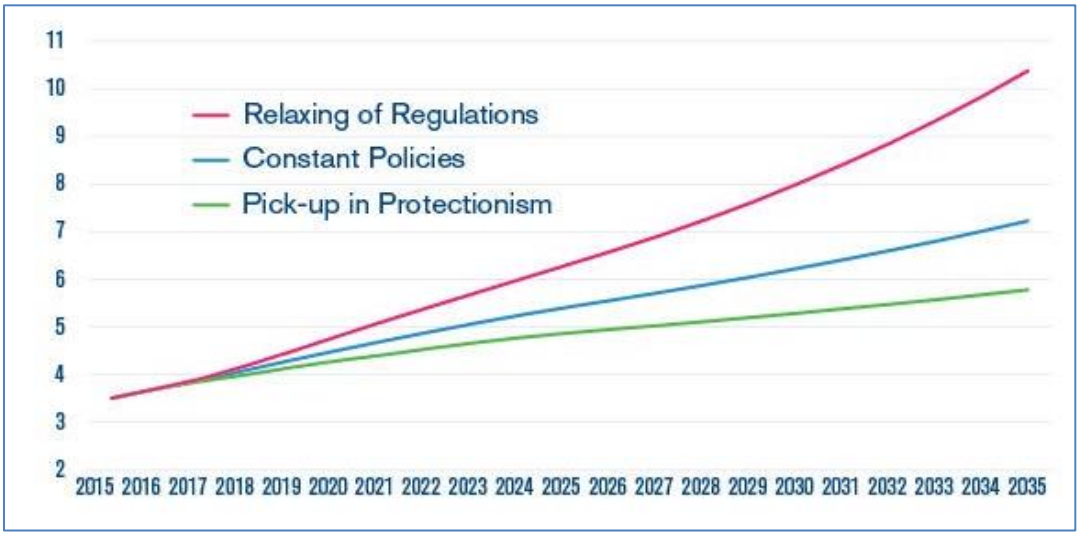
[15] A gateway airport is a large national or regional hub airport through which passengers connect between points abroad and local destinations. A megacity gateway has more than 10,000 daily long haul passengers.

[16] Entry will most always occur as an LCC or ULCC, these fees will have a larger impact on this type of business model since low fares are the prime strategic variable for competition.

[17] ASAs determine the extent to which the parties to an agreement enjoy so-called "Freedoms of the Air" in the aviation markets of the foreign country. The agreements may also determine frequency of access, affected airports, affected carriers and aircraft gauge (wide- or narrow-body) serving the respective countries.

Figure C-1 illustrates how changes in institutional and governance arrangements can have a significant impact on the rate of passenger growth. The reduction in regulations in international markets and the consistency of trade policies both have a positive impact on the growth rate, while increases in protectionism reduce the growth rate.

Figure C-1 Air Travel Demand Forecast (Billions of Passengers – segment basis)



Source: IATA

In recent months, along with ongoing security concerns, there have been several measures that could be characterized as "protectionist". Measures such as travel bans and restrictions on the use of personal devices on certain flights will – as Figure C-1 indicates – have a depressing effect on air travel demand. For those airlines most affected, their demand for aircraft will also grow less slowly. It is too early to tell whether recent developments will endure and, if so, whether their impacts will endure as well. In any case, it is unlikely that these effects will be of a magnitude to change the overall picture and long-term trends.

C.3. EFFECTS OF STRUCTURAL OVERSUPPLY

This subsection continues the analysis of structural oversupply by considering the evidence of its effects. That is, what are the features of airline industry performance that would indicate (without sufficiency), or refute (with sufficiency) structural oversupply? [18]

C.3.1. Macroeconomic Conditions

Air travel demand is driven by macroeconomic and value of services factors. Key factors include trade and trade liberalization along with GDP growth and GDP per capita growth.

Table C-1 displays the most recent World Bank real GDP growth forecasts from January 2017 through 2019. Over the three-year period, 2017-2019, real GDP is forecast to increase or remain steady in every region. Most notably, growth will be highest in the developing regions. As both Boeing and Airbus point out in their market forecasts, the combination of emerging market growth and increased urbanization will drive passenger growth. As China transitions even more from an export-driven economy to one driven by domestic consumption, and as the growing middle class emerges, the demand for domestic, regional and international travel will increase.

[18] If effects are present, there may be structural oversupply. However, the absence of effects strongly indicates that there is no structural oversupply.

Table C-1 Real GDP Growth (percent) – History and Forecast

Country groups	2014	2015	2016	2017f	2018f	2019f
Aggregates						
World	2.7	2.7	2.3	2.7	2.9	2.9
Low-income economies	6.2	4.8	4.7	5.6	6	6.1
High-income economies	2.7	2.7	2.3	2.7	2.9	2.9
Developing economies	4.3	3.5	3.4	4.2	4.6	4.7
BRICS	5.1	3.8	4.3	5.1	5.4	5.5
Regions/economies						
Developing Sub-Saharan Africa	4.7	3.1	1.5	2.9	3.6	3.7
Developing South Asia	6.7	6.8	6.8	7.1	7.3	7.4
Developing Middle East and N. Africa	3.3	3.2	2.7	3.1	3.3	3.4
Developing Latin America and the Caribbean	0.9	-0.6	-1.4	1.2	2.3	2.6
Developing Europe and Central Asia	2.3	0.5	1.2	2.4	2.8	2.9
Developing East Asia and Pacific	6.7	6.5	6.3	6.2	6.1	6.1

Source: World Bank

The precipitous drop in oil prices in 2014-15 turned around in 2016. Prices of both oil and jet fuel are expected to increase in 2017 (see Figure C-2). Older aircraft will fall in value and will likely move to developing nation markets. However, both Southwest and Delta are purchasing second hand aircraft from the EU and elsewhere to replace their oldest aircraft. The new fuel efficient 737 and 320 will replace older aircraft and, again, Southwest is the launch customer for the Boeing 737MAX. Currently, 50 percent of new aircraft are being used to replace older, fuel inefficient aircraft. This is discussed at greater length below.

Figure C-2 Jet Fuel and Crude Oil Price (US$ / Barrel)

C.3.2. Aircraft Orders and Deliveries

The size of the world's airline fleet will grow over time to meet the increasing demands for air travel. These demands result from growing population, greater urbanization, rising average incomes, lower airfares and the opening of new routes among other factors. To meet this demand, manufacturers of aircraft used in scheduled passenger and cargo service will grow the in-service airline fleet by 10,000

between 2017 and 2027.[19] Aircraft deliveries to airlines will be approximately 20,000 which means approximately 10,000 older technology aircraft will be retired.

The net growth by world region is forecast to be uneven. The major growth area will be Asia, predominately China and India. North America will have relatively small absolute growth. The composition of the fleet will change with narrow-body aircraft becoming a larger proportion of the fleet, and the share of smaller regional and turboprop aircraft declining. By 2027, the share of narrow-body aircraft will be 65 percent and wide-body aircraft 21 percent. Regional jets and turboprop aircraft will be approximately 14 percent.

Table C-2 illustrates the variation in fleet growth by region. The growth in global feet is forecast to be 3.9 percent from 2017-2022 and 3.0 percent from 2022-2027.[20] North America and Europe are mature markets and are renewing their fleets with growth rates of 0.8 percent and 2.7 percent respectively. Over the next 10 years the compound average growth rate (CAGR) for the Middle East will be 5.5 percent, China and India will grow at 9.0 percent each, and the rest of the Asia-Pacific region by 4.2 percent. A large share of aircraft orders is destined for the Asia-Pacific region.

Table C-2 Global Airline Fleet Forecast 2017-2027

Region	Africa	Middle East	Asia Pacific	China	India	Latin America	North America	Eastern Europe	Western Europe	World
2017 Fleet										
Narrow-body	447	516	1,981	2,316	346	1,066	3,917	716	3,027	14,332
Wide-body	167	709	1,304	328	52	157	1,188	117	978	5,000
Regional Jet	143	74	213	111	5	292	1,855	180	492	3,365
Turboprop	294	23	648	-	46	263	714	131	552	2,671
Total	*1,051*	*1,322*	*4,146*	*2,755*	*449*	*1,778*	*7,674*	*1,144*	*5,049*	*25,368*
2027 Fleet										
Narrow-body	618	841	3,546	5,452	831	1,571	4,960	890	4,419	23,128
Wide-body	277	1,325	1,772	705	102	343	1,434	121	1,342	7,421
Regional Jet	45	28	237	315	60	200	1,444	74	364	2,767
Turboprop	164	69	730	23	73	182	457	47	447	2,192
Total	*1,104*	*2,263*	*6,285*	*6,495*	*1,066*	*2,296*	*8,295*	*1,132*	*6,572*	*35,508*
Fleet Growth 2017-2022	0.5	6.6	5.2	10.6	11.9	2.8	0.9	-0.8	3.2	3.9
Fleet Growth 2022-2027	0.5	4.5	3.4	7.3	6.2	2.4	0.7	0.6	2.2	3.0
Fleet Growth 2017-2027	0.5	5.5	4.2	9.0	9.0	2.6	0.8	-0.1	2.7	3.4

Source: 2017 Global Fleet MRO Market Forecast Summary Oliver Wyman

Moreover, almost half of the new aircraft are for low cost carriers (LCCs).

Wide-body capacity growth is moderating relative to recent trends. In part, this is due to the retirement of older wide-body aircraft: B767s, A300s and A310s, in particular. The wide-body fleet is 19 percent of the global fleet and is growing at 3.4 percent, a much lower growth rate than narrow-body aircraft, and lower growth than in the past.

In 2017, the narrow-body fleet is projected to be 14,332 aircraft and this is forecast to increase to 18,580 in 2022 and 23,128 in 2027; this represents 56, 61 and 65 percent of the total fleet, respectively. Small narrow bodies, seating 100-150, make up 23 percent of the fleet and this will shrink to 11 percent by

[19] World fleet statistics include Boeing, Airbus, and all other aircraft manufacturers who manufacture aircraft for scheduled commercial passenger or freight service, generally with 18 seats or more. Data are also presented that refer only to aircraft statistics for Boeing and Airbus. This may explain some of the discrepancies in fleet growth versus growth in deliveries by Boeing and Airbus.

[20] Oliver Wyman, Global Fleet and MRO Market Outlook 2017-2027 (February 2017)

2027. This significant decline in share reflects the growth by Boeing 737MAX and Airbus 320NEO, with seating in excess of 150.[21] This larger single-aisle type will represent 70 percent of the category.

Wide-body (twin aisle) aircraft numbered approximately 5,000 in 2017 and 20 percent of the fleet. In 2022, the number will increase to 6,262 and to 7,421 in 2027. This represents a CAGR of 4.6 percent from 2017 to 2022, and 3.5 percent from 2022 to 2027. Despite the significant increase in wide-body fleet numbers, its overall fleet share remains relatively constant at around 20 percent (21 percent in 2027). The Boeing 787 and Airbus 350 dominate wide-body fleet growth.

Based on data available on the Boeing and Airbus websites as of January 2017, the tables below describe who was ordering and taking delivery of aircraft, and how deliveries compared to orders, forming the basis for computed backlog data. Note that the data refer to 2016, thus the difference between orders and deliveries reflect 2016 in-year orders and deliveries. This differs from the cumulative order backlog of Boeing and Airbus discussed below. The order and delivery data are contained in Table C-3 through Table C-6.

We summarize these tables noting that:

- Excess orders over deliveries indicate that backlogs of aircraft are growing
- Purchasing cycles of airlines are reflective of the increased focus on capacity discipline
- Orders by and deliveries to leasing companies illustrate the significant role these companies play in managing airline capacity
- U.S. airlines benefit from the purchases by non-U.S. alliance members by way of the expanded alliance network

[21] As an example, the B737MAX-8 can seat 184 in single class, 162 in a 2-class configuration and a maximum of 189 passengers. The B737MAX-9 can seat 204 in single class, 178 in a 2-class configuration and a maximum of 220 passengers.

Table C-3 Airbus 2016 Aircraft Orders

Category of Purchasing Entity	Total Aircraft	Of this, Wide-body	Percent Wide-Body in Category
Non-U.S. Airline Member of Alliance	82	36	44%
Non-U.S. Airline Not Member of Alliance	419	83	20%
Leasing	93	20	22%
Unidentified	275	19	7%
U.S. Airline	80	1	1%
Grand Total of Aircraft Orders	949	159	17%

Source: Constructed based on data obtained from Airbus website.

Table C-4 Boeing 2016 Aircraft Orders

Category of Purchasing Entity	Total Aircraft	Of this, Wide-body	Percent Wide-Body in Category
Non-U.S. Airline Member of Alliance	184	47	26%
Non-U.S. Airline Not Member of Alliance	84	16	19%
Leasing	43	1	2%
Unidentified	430	56	13%
U.S. Airline	46	27	59%
Grand Total of Aircraft Orders	787	147	19%

Source: Constructed based on data obtained from Boeing website.

Table C-6 reports deliveries for Boeing aircraft. Boeing took orders for 787 aircraft in 2016 and delivered 748 aircraft so their cumulative order backlog increased marginally. Wide-body aircraft represented 34 percent of total deliveries, primarily the B787 aircraft. Leasing companies took 20 percent and 11 percent of total and wide-body deliveries by Boeing, respectively. 55 percent of wide-body deliveries went to non-U.S. carries who are members of an alliance; this group also took 33 percent of overall deliveries.

As of February 28, 2017, Airbus had a total backlog of 6,792 aircraft; they have had total orders for 17,074 aircraft and have delivered 10,282.[22] Boeing has backorders for 5,700 aircraft.

[22] Based on data provided on Airbus website.

Table C-5 Airbus 2016 Aircraft Deliveries

Category of Purchasing Entity	Total Aircraft	Of this, Wide-body	Percent Wide-Body in Category
Non-U.S. Airline Member of Alliance	236	83	35%
Non-U.S. Airline Not Member of Alliance	212	33	16%
Leasing	152	19	13%
Unidentified	4	4	100%
U.S. Airline	84	4	5%
Grand Total of Aircraft Orders	688	143	21%

Source: Constructed based on data obtained from Airbus website.

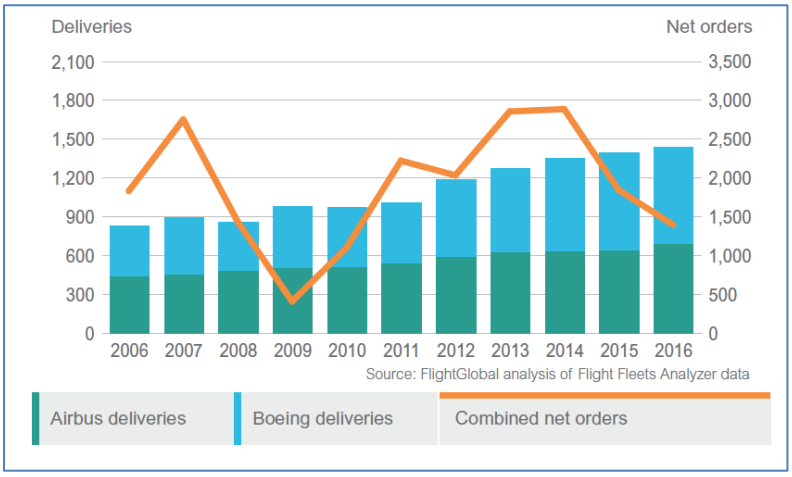
Table C-6 Boeing 2016 Aircraft Deliveries

Category of Purchasing Entity	Total Aircraft	Of this, Wide-body	Percent Wide-Body in Category
Non-U.S. Airline Member of Alliance	250	141	56%
Non-U.S. Airline Not Member of Alliance	190	47	25%
Leasing	148	28	19%
Unidentified	19	12	63%
U.S. Airline	141	30	21%
Grand Total of Aircraft Orders	748	258	34%

Source: Constructed based on data obtained from Boeing website.

Figure C-3 illustrates the growth in both orders and deliveries for Airbus and Boeing. What we see is a dramatic decrease in the growth rates of orders for aircraft over time with negative growth since 2014. However, there is a steady low growth rate in deliveries. Airbus exhibits a much higher variance in growth rates for orders, but the trend is downward. The growth rate in orders for Boeing and Airbus from 2014 to 2015 was -36 percent and from 2015-2016 it was 14 percent. The growth in deliveries for the sum of Boeing and Airbus is 3 percent in 2014-2015 and in 2015-2016. Airlines have significantly reduced orders from the period prior to 2010 when orders could grow by 200 percent or fall by 80 percent. As illustrated elsewhere in this report, the airlines have moved away from the cyclical ordering of aircraft. It is also true that the orders for new fuel efficient aircraft were moved forward in time with the result that orders and subsequently deliveries in later years will be much less.

Figure C-3 Airbus and Boeing Deliveries and Combined Net Orders 2006-2016

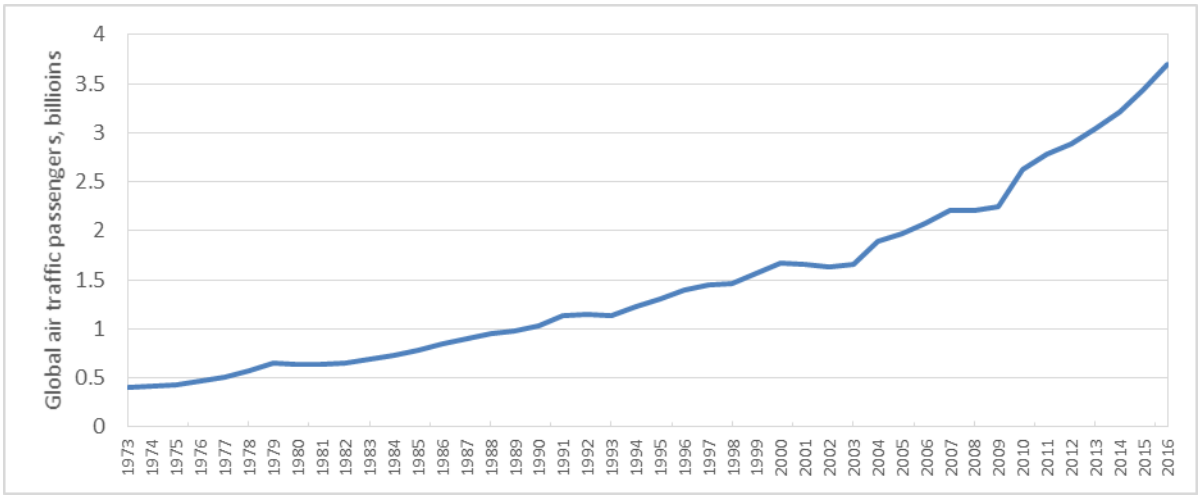


Source: Airline Business, January/February 2017

C.3.3. Passenger Demand and Growth

The growth in air passenger demand has been resilient over the long term. As Figure C-4 illustrates, there has been a steady growth in air passenger demand for the past 35 years. Certainly, events such as 9/11, the 2008 financial crises, and the SARS pandemic resulted in slowing traffic growth, but not by significant amounts for any sustained time period, and not across multiple markets. For example, while 9/11 had a dramatic impact on air travel in North America, there was little measurable impact in Europe or Asia.

Figure C-4 World Passenger Traffic Growth 1973-2016



Source: World Bank

Air travel demand in 2016 was reported to have grown by 6.3 percent[23], exceeding the multi-year average growth of 5.5 percent.

The travel propensities of the most recent U.S. generational cohort, the millennials, are significantly different from their parents and older generations. The Boston Consulting Group[24] reports the millennial

[23] Latest IATA 2016 estimate from February 2017 exceeds their year-end estimate of 5.9 percent, which appears in Table C-7.

[24] Website "bcg perspectives: Traveling with Millennials", https://goo.gl/BljCXL

generation, defined as those born between 1980 and 1997, is more interested than older generations in traveling abroad— by a 23 percent margin. This demographic generates more than $180 billion in annual tourism revenue, an increase of nearly 30 percent since 2007. Recent articles and surveys confirm this trend[25].

The number of scheduled departures (i.e., number of flights) is increasing: 36.6 million departures in 2016 and a forecast of 38.4 million in 2017. Passenger departures were 3.77 billion in 2016 and are forecast to rise to 3.96 billion in 2017 (while a sizable increase, the rate of growth has fallen from 5.7 percent to 4.9 percent).

In the period 2011-2015 year-over-year growth in passenger traffic has exceeded the year-over-year growth in passenger capacity, and based on IATA data this will continue. The result is that average passenger load factors have increased in each year, but load factors for 2017 are forecast to decrease slightly to 79.8 (partly due to the growth in the number of flights). In Table C-7 below, demand and supply growth rates are reported for the world and by region. In the 2017 forecast, capacity expansion will exceed projected growth in passengers—5.6 to 5.1 percent. However, these measures, in conjunction with other measures of supply and demand, indicate that demand and capacity are, generally, keeping pace with one another.

Table C-7 Global Demand and Supply for Air Services 2012-2017

System-Wide Global Commercial Airlines	Passenger Traffic (RPK) % Change over Year						Passenger Capacity (ASK) % Change over Year					
	2012	**2013**	**2014**	**2015**	**2016**	**2017F**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017F**
Global	5.3	5.2	5.7	7.4	5.9	5.1	4.0	4.8	5.5	6.7	6.2	5.6
Regions												
North America	1.0	2.6	2.7	4.3	4.4	2.5	0.4	1.6	2.0	3.7	4.8	2.6
Europe	4.6	4.1	5.4	5.8	5.9	4.0	2.8	2.5	4.5	3.9	6.2	4.3
Asia-Pacific	6.1	7.2	7.0	8.1	8	7.0	5.4	7.1	7.0	6.0	8.4	7.6
Middle East	14.7	11.9	12.9	11.6	12.5	9.0	12.4	11.4	13.0	12.1	12.2	10.1
Latin America	9.4	6.6	5.5	6.0	6.8	4.0	7.6	4.6	6.5	5.6	7.5	4.8
Africa	7.5	4.8	1.5	1.2	1.4	4.5	6.4	5.0	2.5	0.4	1.6	4.7

Source: IATA

The compound annual growth rate in passenger traffic for the next 10 years is forecast by IATA to exceed 5 percent. While the expansion of service is slowing, it is still significant and in absolute terms represents a huge growth in passengers and flights.

Boeing's regional and market forecasts for 2016-2035 are shown in Table C-8. The numbers represent two-way travel between regions and within regions; for example, Boeing forecast a 6.9 percent growth in air traffic within Africa and a 4.7 percent increase in traffic to and from Europe and Africa. There are a number of features to recognize. First, expected intra-regional market growth varies significantly across markets as exhibited by the values in the diagonal. Second, inter-regional market growth also differs considerably across regions. The transition of China's economy and the growth of countries such as

[25] See for example: Website "Tailwind by Hipmunk, Generation Gap: What Age Says About How You Travel" https://goo.gl/bZ2Fdj

Vietnam, Cambodia and Indonesia are reflected in the high expected growth rates in travel within South Asia, 9.5 percent, and between South Asia and South East Asia of 8.9 percent.

Table C-8 Boeing's Forecast of Two-Way Passenger Traffic Growth (2016-2035)

	Africa	China	Europe	ME	N Amer	NE Asia	S Amer	S Asia	SE Asia
Africa	6.9		4.7	7.1	6.1				6.5
China		6.2	5.5		6.7	4.6			7.0
Europe			3.2	5.4	2.9	2.7	5.3	5.8	4.2
ME				4.6	5.5			7.5	5.4
N Amer					2.6	1.8	5.7		6.6
NE Asia						1.6			3.8
S Amer							6.0		
S Asia								9.5	8.9
SE Asia									7.7

Values are bi-directional, i.e., to and from each origin-destination pair.

Source: Boeing Current Market Outlook 2016-2035

Airbus has a similar set of forecasts that also exhibit variability across regions. The Airbus forecast notes that historically, passenger traffic has doubled every 15 years. Their 20-year forecast shows an overall 4.6 percent compound annual growth rate; a 5.8 percent compound annual growth rate for emerging markets (China, India, Middle East, Asia, Africa, CIS, Latin America and Eastern Europe) and 3.8 percent for advanced economies (North America, Western Europe, Japan). The main drivers of their forecast are: forecast growth in global urbanization and middle class expansion (fourfold expansion over next 20 years), and an increasing importance of private consumption in emerging markets. They note 25 percent of people in emerging markets took a flight in 2014. This figure is projected to be 74 percent in 2034.

A fundamental message of the Airbus forecasts is that traffic will grow at 4.6 percent annually.

While annual wide-body deliveries will amount to 4.2 percent of the wide-body fleet. The proportion of new aircraft that replace older wide bodies varies between 50 and 30 percent depending upon, among other things: oil prices, operating cost differences and traffic growth. The annual net growth in wide-body aircraft is expected to be about 3 percent. Of narrow-body deliveries, a larger share of these aircraft will replace existing aircraft while a smaller share will increase the size of the narrow-body fleet. Thus, we see that in the longer term both the wide-body and the narrow-body fleets are growing at a slower pace than the projected growth in air travel demand.

As with the 737MAX and 320NEO, which shifted demand for narrow-body aircraft closer to near term, the same is true for the B787 and Airbus 350 aircraft. These were ordered in record numbers and thus shifted orders (and deliveries) closer to the present. This means further out in the future, the demand for and production of wide-body aircraft will decline.[26] There is a backlog of wide-body aircraft, but a sizable portion of this has resulted from deferrals. Based on these forecasts, oversupply will not be a concern (that is, there is little risk of aircraft supply outstripping the demand for air travel).

From 2004 through 2014, frequencies in all markets grew at an average of 2.3 percent annually (most recent frequency data published in Boeing's 2015 Current Market Outlook – and not included in Boeing's 2016 report). This growth is expected to continue into the future and is certainly evident in IATA's forecast of the continued growth in unique city-pairs.

When examining the production rates for Boeing and Airbus for wide-body aircraft, they are producing an aggregate of approximately 400 wide-body aircraft annually; 143 Airbus wide-body aircraft and 258 Boeing wide-body aircraft. These aircraft are being used to replace older wide-bodies; e.g., older model

[26] See website "AirInsight Commercial Aviation Analysis, The Withering Wide-Body Market in 2016" https://goo.gl/bPzrpS

B767 and B747 and A340, whose production is waning or limited to freight aircraft. These new aircraft are used on long haul international routes which means their utilization is somewhat lower simply due to route length.

C.3.4. Capacity Adjustment Mechanisms

Rising load factors combined with airline profits, as currently exhibited, refute a condition of structural oversupply. The concurrent trend of longer average stage lengths, and the extensive employment of revenue management tools, reinforces this assessment[27] (longer stage lengths reduce the average cost per flight-mile while revenue management serves to increase load factors – both of these serve to buoy the airlines' bottom line).

The IATA year end 2016 economic performance report stated that:

- Load factor (by weight, combining freight and passenger traffic) had fallen slightly from 66.9 percent in 2015 to be 66.3 percent in 2016 and is forecast to be 66.1 percent in 2017.
- Breakeven load factor (by weight) fell from 61.3 percent in 2015, to 60.8 percent in 2016 and is forecast to increase to 61.8 percent in 2017.
- Aircraft fleet in use went from 26,704 in 2015, to 27,712 in 2016 and is forecast to increase to 28,718 in 2017;[28] however, simply counting aircraft is not a measure of capacity and ignores the retirement rate of older aircraft.[29]

A composite measure[30] of capacity utilization shows long-term improvement in the global industry's capacity utilization. More recent evidence from an IATA analysis[31] confirms the continuation of these trends. A review of capacity and its utilization in the global market for air services does not indicate that structural oversupply exists. This finding applies to the entire fleet including wide- and narrow-body aircraft.

Airlines are also controlling capacity by deferring delivery of aircraft, there are numerous examples worldwide[32].

[27] For example, two airlines could use their aircraft on average 10 hours per day. One airline flies short stage lengths and generates 3 flights per day while the other airline flies longer stage lengths and generates 2 flights per day. Clearly, the amount of revenue and profit produced will differ in each case.

[28] IATA Economic Performance of the Industry End Year 2016 Report

[29] "Retired aircraft" are retired from regular airline service. They may be scrapped and sent to dessert "boneyards". Some narrow-body retired aircraft resurface in fleets of small charter operators, or irregular service of small airlines – usually in less-developed or middle-income countries.

[30] CAPA (Center for Asia Pacific Aviation) undertook an analysis for the global airline fleet for the period 1972 to 2012 using a composite measure of capacity utilization for the global airline fleet composed of load factor, flown hours per day (as percent of maximum) and aircraft in use (as a percent of the total fleet).

[31] Included in the IATA Annual Review of 2016, June 2016, https://goo.gl/RV9V8z

[32] United deferred delivery of 61 Boeing single aisle aircraft and will convert these into orders for the new Boeing 737MAX. Turkish Airlines is deferring delivery of 167 aircraft from both Airbus and Boeing; it will take up 10 out of the 34-aircraft planned for 2018, 35 instead of 40 jets in 2019 and 42 of the 52 twinjets initially planned for delivery in 2020. Emirates is deferring delivery of over a dozen A380s and American will defer delivery of 22 A350s for a bit over 2 years. Air France has deferred A380 and B777 orders for one to two years.

Over the last several years the three global airline alliances – Star, Oneworld and Skyteam – have been successful in obtaining antitrust immunity for joint ventures for Atlantic and Pacific routes. Metal-neutral joint ventures (a form of alliance venture in which participating airlines share information on pricing, frequency, capacity growth and share revenues and profits) in both markets are now fully immunized, and allow participating airlines to make joint capacity allocation as well as purchase decisions. These enable the alliances to engage in capacity discipline.

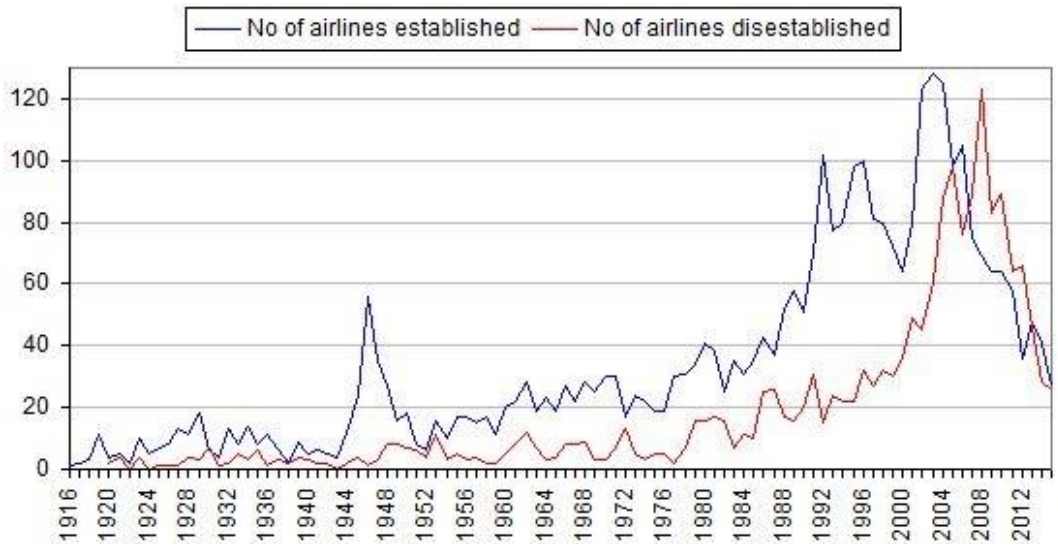
Capacity discipline has been at the heart of a fundamental shift by the major airlines in the world to no longer chase market share and, rather, to focus on profits and ROIC. This trend began in North America, but it has spread to Europe where a few airlines, IAG (a holding company of Aer Lingus, British Airways, Iberia and Vueling) for one, have followed the example of North American carrier discipline. This shift to a profit focus has been accompanied by a careful attention to costs. Similarly, Lufthansa which owns a number of European airlines under the Lufthansa Group, has been shifting capacity into LCCs (e.g., German Wings) and reducing capacity elsewhere.

C.3.5. Entry and Exit of Firms in the Industry

The trend of large airlines moving in and out of bankruptcy has slowed as airlines have adopted business models that provide greater insulation from the effects of business cycle fluctuations. Also, the significant merger wave among large U.S. carriers since 2007 has reduced the number of large weaker airlines.

Figure C-5 below shows the entry and exit of carriers over time globally. The absolute peak of new airline entrants was reached in 2003. Since then, the number of airlines entering the market globally has been trending downward, with the average being 46 from 2010 to 2015, only a little higher than in the 1980s. However, the period from 2010 to 2015 was a period of high oil prices and recent entrant LCCs were flying older, fuel inefficient aircraft. For some, like Allegiant, this was not an issue since their capital costs were so low. For others, this was a hurdle that proved too difficult to overcome. In spite of low capital costs, increasing profitability in aviation, and a viable leasing market, there has not been increased entry. Thus, the claim that failures were a result of "too many aircraft" simply does not ring true.

Figure C-5 Entry and Exit of Airline Firms Globally 1916 to 2015



Source: CAPA Centre for Aviation, Wikipedia

C.3.6. City-Pair Market Growth (and market growth overall)

This section discusses the importance of new markets relative to the growth of existing markets.

On the demand side, in long haul international markets frequency is relatively less important while network reach (i.e., number of destinations served) is more important. Traffic growth will respond to the growth in city pairs rather than the growth in number of flights in established markets; once two international cities have two non-stop daily flights, adding a third has relatively little impact on traffic growth.

City-pair growth has impacted the composition of global demand. In 1994, air travel between North American and Europe accounted for 73 percent of the global market. By 2014, the share declined to 49 percent, and it is expected to fall to 38 percent by 2034.

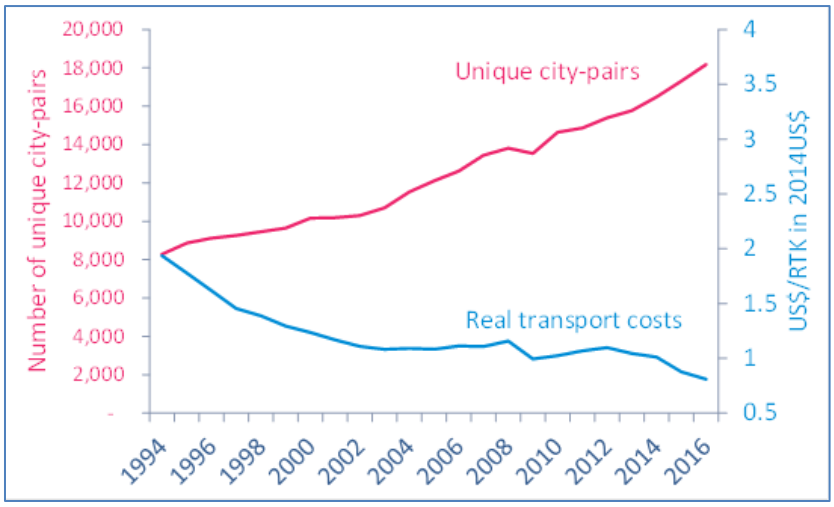
IATA's 2016 year-end financial and operations report states that the growth in unique city-pair markets has been dramatic, moving from 17,711 in 2015 to 18,429 in 2016. In 2016, the number of city-pair markets was 92 percent greater than in 1995.

Real costs (i.e., costs net of inflation) are falling, and airline operational efficiency is improving. New advanced technology aircraft, like the Boeing 787 and Airbus 350 as well as narrow-body Boeing 737MAX and Airbus 320NEO allow airlines to develop new markets. As connectivity improves, there is an increase in global trade which translates into passenger growth from globalized supply chains.

Figure C-6 shows the growth in unique city pairs and the change in real transport costs over time. These two trends illustrate the forces and airline strategies that are in place to ensure long term market growth. Growth in city-pairs is driven largely by the expansion of incomes and economic activity. Lower costs are reflective of new operational strategies by airlines.

When factoring new market expansion along with the higher retirement rates of aircraft, a picture of the industry emerges of demand growth overtaking supply growth and very slim prospects, if any, for the existence of structural oversupply.

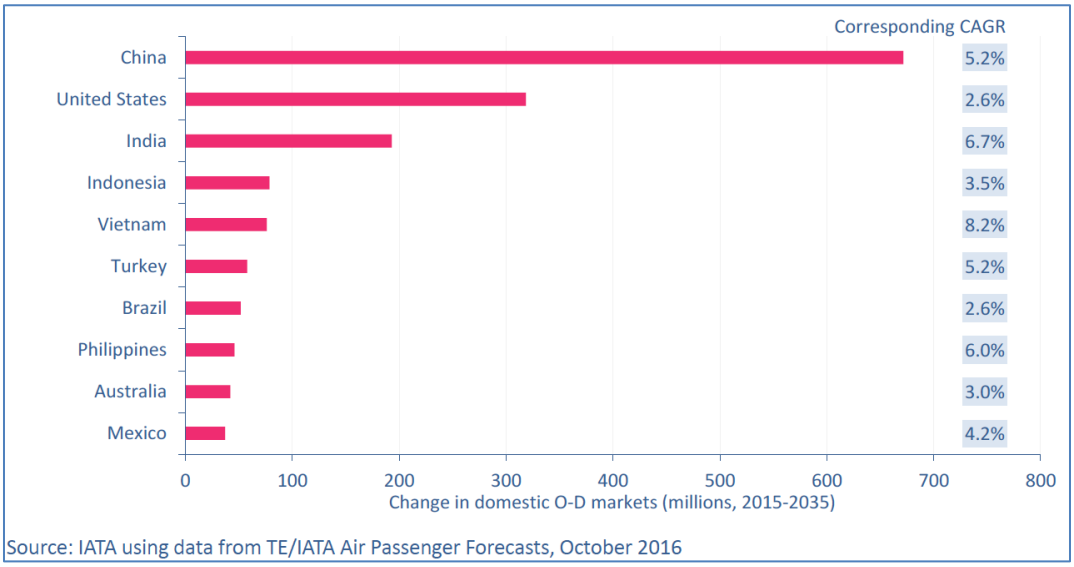
Figure C-6 Unique City-Pairs and Real Transport Costs



Source: IATA

From the perspectives of market and route entry and exit – the global market for air services does not appear to be an industry with structural oversupply. There are clearly markets in which demand is growing at a slower rate or may be impacted by exogenous events such as terrorism but other markets are flourishing. A good example is that passenger traffic into Turkey has been reduced significantly due to terrorism and political upheaval but traffic connecting through Istanbul is down relatively little. Markets in India, China and Latin America are growing considerably; Figure C-7 illustrates the markets with the largest increment to passenger numbers and the cumulative average growth rates. Those markets with the largest increment to passenger numbers are: China, India, Indonesia, Vietnam and Turkey.

Figure C-7 Largest Increment to Passenger Numbers on Domestic Markets



Some markets are slowing while other are expanding, this indicates that overcapacity is highly unlikely to persist in the long run.

C.3.7. Financial Indicators: Revenues, Yields, and Profits

This section examines industry revenues, yields, and profits under conditions of structural oversupply. With structural oversupply, one would expect low yields and low fares to dominate the global market for air services. However, this is not borne out by the data.

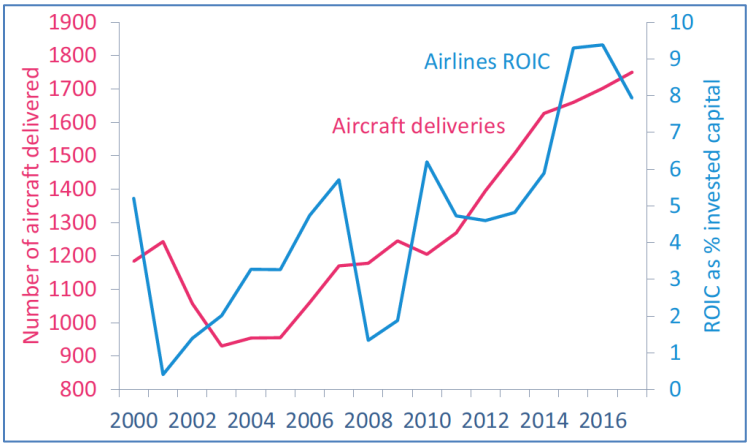
It is important to note that while the global airline industry is composed of a set of airlines that fly in international markets, not all airlines participate in all markets. More importantly, economic activity, growth, and business cycles differ significantly by country and region.

Revenue passenger kilometers (RPK) grew 5.9 percent in 2016, and are forecast to grow an additional 5.1 percent in 2017.

Claims that structural oversupply is responsible for low fares and profits in the airline industry seem to ignore that fluctuations in economic activity vary by time and locale. Capacity does indeed shift from weak markets to strong markets. Since economic growth varies by time and locale, yields and revenues should as well. Most recently, U.S. carriers are shifting interest from domestic to international markets for two reasons; the LCC and ULCC carriers have a large share of the U.S. domestic market and second, long haul international flying offers much higher yields

Globally, earnings before interest and taxes (EBIT) are forecast to decline from 8.2 percent in 2016 to 6.6 percent in 2017 and net profit to fall from $36.3 billion in 2016 to $29.8 billion in 2017. All regions are forecast to have decline in profits with the largest fall in the Middle East. Profit per departing passenger was $9.89 in 2015, and $9.43 in 2016, this will decline to $7.54 in 2017. The world airline industry is facing a set of headwinds; however, it is still profitable and markets are continuing to grow. The challenges are increased competition particularly from new long haul LCCs, and slower economic growth; although specific regional markets are expected to grow significantly.

Figure C-8 Aircraft Deliveries and Airline Industry ROIC



Source: IATA

Table C-9 IATA Forecasts of EBIT and Net Profits Global Airline Industry by Region

System-Wide Global Commercial Airlines	EBIT Margin % of revenues						Net Profit, $ Billion					
	2012	**2013**	**2014**	**2015**	**2016**	**2017F**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017F**
Global	2.6	3.5	5.1	7.7	8.2	6.6	6.1	10.6	17.3	33.0	36.3	29.8
Regions												
North America	3.4	5.3	7.6	14.3	14.2	12.9	2.3	7.2	11.9	19.5	19.2	18.1
Europe	0.7	0.7	1.9	5.3	6.4	4.5	0.4	0.5	2.7	6.9	8.5	5.6
Asia-Pacific	4.7	5.7	6.4	6.6	6.9	5.2	2.7	2.3	3.5	5.8	6.6	6.3
Middle East	3.0	0.9	2.6	2.9	3.2	0.7	1.0	0.5	1.1	1.4	1.7	0.3
Latin America	1.5	2.2	3.5	1.3	3.2	2.9	-0.2	0.2	0.7	-0.3	0.4	0.2
Africa	-0.4	-0.5	0.4	-1.7	-0.2	-3.6	-0.1	-0.1	0.0	-0.3	-0.1	-0.8

Source: IATA-Industry Fact Sheet December 2016.

The 2016 year-end IATA report indicated the ROIC is forecast to decrease from 9.4 percent to 7.9 percent.[33] This decline reflects the relatively small decline in net profits from $36.3 billion to $29.8 billion – which had been much smaller just five years earlier. The ROIC-WACC difference was 2.7 percent in 2016 and is forecast to decrease to 1.0 percent in 2017. These are figures that reflect an average across all airlines in the IATA membership. For developed economies, the U.S. and Europe have significantly higher profits than the IATA reported average. North America is $18.1 billion in 2017, down from $19.2 billion in 2016. Europe is $5.6 billion, down from $8.5 billion in 2016.

[33] WACC in excess of ROIC has been a core tenet of the case for structural oversupply. It is taken to indicate that investors will not be attracted to the industry. While this report does not look to the financial markets for evidence supporting or refuting structural oversupply, the strong airline share price performance of the past two years would belie the claim that airlines are not attractive to investors.

Table C-10 Global Financial and Operational Indicators

Year	ROIC	Pax LF	Capacity Growth ATK[34]	Flights (Millions)	Percent Profit Margin	Net Profit/Departing Pax
2005	3.3	75.0	6.1	24.9	1.1	-1.9
2006	4.7	76.1	4.8	25.5	3.2	2.2
2007	5.7	77.1	6.6	26.7	3.9	6.0
2008	1.3	76.1	2.7	26.5	-0.2	-10.5
2009	1.9	76.2	-4.2	25.9	0.4	-1.9
2010	6.2	78.7	3.7	27.8	4.9	6.4
2011	4.7	78.5	6.0	30.1	3.1	2.9
2012	4.6	79.4	3.0	31.2	2.6	3.1
2013	4.8	79.7	3.7	32.0	3.5	3.4
2014	5.9	79.9	5.4	33.0	4.7	4.1
2015	9.3	80.4	6.3	34.8	8.3	9.9
2016	9.4	80.2	6.2	36.6	8.3	9.4
2017F	7.9	79.8	5.0	38.4	6.6	7.5

Source: IATA, Domestic and International Traffic, Economic Performance of the Airline Industry Fact Sheet Industry Updated 12/2016, IATA Economics.

a) ROIC - Return on invested capital (percent)
b) PAX LF - Passenger load factor (percent revenue passengers per available seats)
c) Capacity Growth ATK – percent increase in available ton-kilometers
d) Flights (millions)
e) Percent Profit Margin – Operating profit as percent of revenues
f) Operating Profit / Pax – Dollars operating profit per departing passenger

Profits, profit margin, and net profit per passenger are all expected to decline slightly in 2017. IATA and CAPA forecast that in 2017 profits will be almost as large as the record last year but they are forecast to decline with higher fuel costs and increased pressure on fares particularly in long haul markets with the growth of long haul LCCs.

The industry had benefited from a decrease in breakeven load factors, a result of superior revenue management and the increasing contribution of ancillary revenues however this trend is reversing as unit costs are increasing and slowing demand has reduced achieved load factors.

C.3.8. Pricing Strategy Effectiveness

The discussion of pricing strategy shows that: 1) the demand for passenger air services is projected to grow in response to pricing strategies; 2) profit per passenger is expected to be $7.54, a decrease from the high in 2016 of $9.43; and, 3) the overall outlook for profitability is positive and only marginally below last year's record. The reported trends by IATA and their forecasts of growth in passengers, routes, and profits indicate that pricing strategies and new revenue management systems are still paying dividends for the industry. These findings do not support a structural oversupply narrative in the global market for air passenger services.

Demand also grows in response to airline competition through pricing, revenue management and service strategies. The growing presence of metal neutral joint ventures involving the three alliances in the North Atlantic and Pacific has slowed some demand growth because fares have been trending upwards. This impact will be mitigated somewhat with the entry of LCCs into long haul markets. Revenue growth is often the result of demand growth, but over the last several years, airlines have been modifying their business models to decouple revenues from strict reliance on passenger growth and on yield growth.

[34] ATK is conventionally used by IATA in order to combine the growth in passenger and cargo capacity in a single metric.

Airlines are now growing the amount of revenue per passenger by selling ancillary services and pricing other services that in the past had been included in fares, such as baggage fees. In 2012, 53 of the largest global full service network carriers and LCC/ULCC airlines posted $27.1 billion in ancillary revenues, in 2013 this grew to $31.5 billion for 59 airlines.[35] In 2015 global ancillary revenue was $59.2 billion and is forecast to be $60 billion by 2020. U.S. carriers were among some of the biggest collectors of ancillary service revenues.

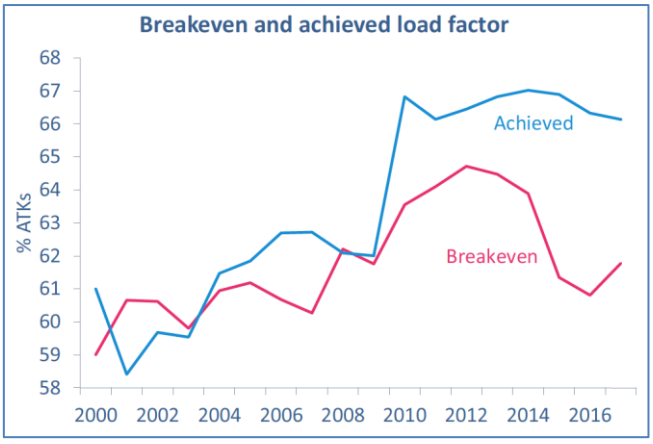
C.3.9. Capacity Discipline, Asset Utilization and Profitability

Wittman (2013) and Wittman and Swelbar (2013)[36] have shown that U.S. carriers have adopted a strategy of capacity discipline. The key full-service national carriers are careful in deploying capacity and in growing it internationally. The capacity growth figures for all aircraft capacity; narrow-body aircraft are still the largest proportion of fleet capacity but the relative growth rates show wide-body capacity is growing at a somewhat smaller rate than narrow-body capacity, specifically narrow-body (single aisle) growth (CAGR for 2017-2019) is 4.9 percent and wide-body (double aisle) growth is 4 percent.[37]

In addition to capacity management, profit-driven airlines also focus on asset utilization. Capital productivity improvements also mean operating margins will improve even more, since improving capital productivity supports concurrent labor (flight and cabin crew) productivity improvements as well.

Figure C-9 illustrates the changes in asset utilization as reflected in achieved load factors and the breakeven load factors. We can see until 2016 the achieved load factor was increasing and the breakeven load factor was falling. This changed in 2016 as achieved load factor declined slightly and breakeven load factor rose by a small amount. The increase in breakeven load factors explains the dip in profits, as unit costs increase with fuel cost increasing and a threat of a small pullback in rate of growth in demand.

Figure C-9 Asset Utilization Raised and Sustained



Souce: IATA Economic Performance of the Industry Year end 2016

Note: load factors are by weight, combing passenger and freight traffic

[35] The airlines included full service network carriers as well as LCCs and ULCCs. Airline counts depend on whether an airline is included in Airline Business or Air Transport World surveys, or report their ancillary revenue in their annual report or on their website (data source is Ideaworks).

[36] See M.D. Wittman, "New Horizons in U.S. Airline Capacity Management: From Rationalization to Capacity Discipline", MIT International Center for Air Transportation, November 5, 2013 and M.D. Wittman and W.S. Swelbar, "Capacity Discipline and the Consolidation of Airport Connectivity in the United States", Transportation Research Record 2449: 72-78. 2013

[37] Based on calculations 2017 Global Fleet MRO Market Forecast Summary Oliver Wyman

This discussion here shows how airlines are exercising greater "capacity discipline", and forming joint agreements that have antitrust immunity and ultimately result in higher fares with greater focus on profitability and fleet adjustment.

C.3.10. The Oversupply Narrative and Strategic Changes in the Airline Industry

The structural oversupply narrative claims that the global industry will realize negative profits. The supposed evidence for this is diminished airline profits over a business cycle. The business cycle is generally defined in terms of the fluctuations in economic activity over time; the ups and downs of GDP around its long-term trend.

This approach has several flaws, namely:

- It has traditionally been applied to products/services that participate in one market and fails to account for business cycle variation across markets. Only if a firm operates in one market (or, in several markets with highly correlated business cycles) will such a test be useful.
- It assumes that there is no shift in a firm's business model, in the firm's revenue strategies or in the firm's route and network development, and that sources of revenue are uniform and uniformly affected over the cycle.
- It implicitly assumes that the firm's objective was strictly to maximize profits (as opposed to strategic goals vis-à-vis competing airlines[38]).
- It ignores the presence and importance of alliances and, in particular, the creation of metal neutral joint ventures in different markets among alliance partners. The alliances create the opportunity to spread risk of regional market downturns.

Since the mid to late 2000s there have been four key strategic changes that have taken place in the airline industry, particularly as relates to U.S. carriers. First, prior to the financial crises airlines pursued strategies to grow market share or maximize revenue. Second, mergers among the legacy carriers has shrunk the number of competitors. Third, U.S. carriers recognized that future growth and higher yields were in long haul international routes, whereas they had previously concentrated primarily on the U.S. domestic market. Fourth, airline alliances evolved into tightly managed joint ventures with antitrust immunity.

The first key change, a shift to a profit focus, is evident with the introduction of capacity discipline, beginning in approximately 2010. Until this time, the growth in ASMs and RPMs was closely tied to GDP; the GDP growth correlation with ASM growth was 0.83.[39] However, in 2010 there was a discernable break in the pattern of domestic seat departures and GDP growth. Profits show a steady growth after 2010. The shift away from chasing market share was, in effect, instrumental in breaking the linked cycles of business and capacity expansion/contraction. There was no structural overcapacity at all.

[38] For example, an airline may fly a route with greater frequency than required from a short-term profitability vantage in order to deter a competitor from entering the market.

[39] See M.D. Wittman, "New Horizons in U.S. Airline Capacity Management: From Rationalization to Capacity Discipline", MIT International Center for Air Transportation, November 5, 2013 and M.D. Wittman and W.S. Swelbar, "Capacity Discipline and the Consolidation of Airport Connectivity in the United States", Transportation Research Record 2449: 72-78. 2013

The second significant change was the move among the legacy airlines in the U.S. to merge[40] to reduce the number of airlines competing in the U.S. domestic market but also competing for access to international markets; the big 3 control 80 percent of flights within the U.S.

The third fundamental change was the historic strategic shift in the U.S. airline market several years ago, with lessons for the global market. In the past, U.S. carriers were narrowly focused on their domestic market. This has subsequently changed as the three full service network carriers (FSNC), United, Delta, and American are shifting to long haul international markets.

The fourth major change was the evolution of the three global alliances and the development of metal neutral joint ventures, which are in place for the Atlantic and Pacific for all three major alliances. Under these types of agreements, the airlines forming the agreement jointly determine fares, capacity, deployment and revenue and cost sharing. In effect, they act as a single carrier or a sanctioned cartel. Under such arrangements, they effectively control the amount and type of capacity in a market while dampening the effects of business cycle threats through their collective action.

These four strategic changes will continue to assert their impact in the outlook period.

C.4. OUTLOOK FOR 2017– 2019

This subsection describes the outlook for structural oversupply in the global market for air services in the period 2017-2019. A number of principal trends mitigate the concern of structural oversupply in the outlook years, and these are summarized in this subsection. Admittedly, there are a set of uncertainties that could affect the demand supply balance in the longer term (i.e., beyond the outlook period of 2017-2019).

C.4.1. Continuing Effects of Capacity Discipline

Capacity discipline, which has emerged as an industry trend in recent years, is expected to continue through 2019 based on orders for new aircraft by Delta, United and American. It will have far-reaching effects on fleet size adjustments. Capacity discipline is manifest as an airline strategy, but also in terms of mergers and alliance joint ventures. In all cases capacity is carefully managed.

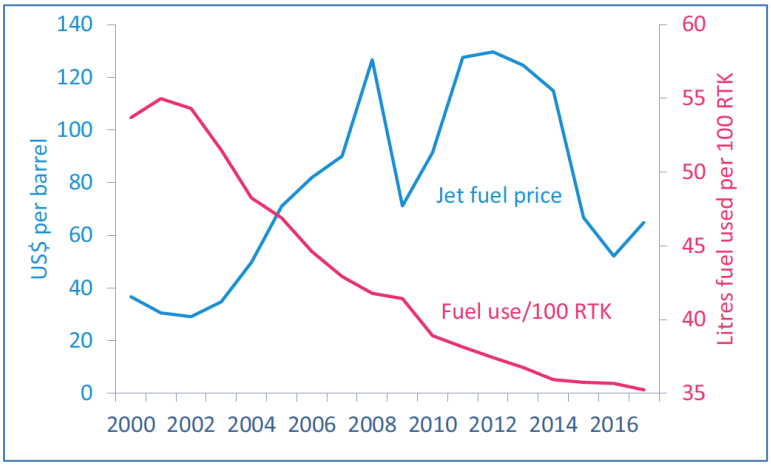
The achieved load factor has been stable since 2010, and we expect these levels – driven by capacity discipline strategies – to persist through the outlook period.

C.4.2. Volatile Fuel Prices Trending Upward?

Fuel prices are uncertain but the trend from 2016 seems to be upward. Oil prices have declined over 75 percent up to 2015 at which point fortunes changed. As illustrated in Figure C-10 jet fuel prices have trended downward since 2011 and bottomed out in 2015/16. However, fuel productivity has increased as fuel use per 100 revenue ton-kilometer (RTK) has consistently fallen. Therefore, even with the threat of rising fuel prices, the increasingly fuel efficient fleets of the dominant global airlines will mitigate the rise in costs.

[40] The first major merger was Delta and Northwest in 2008, the United-Continental merger in 2012 and the US Airways-American Airlines merger in 2015. National and LCC mergers included Southwest and Air Tran in 2011.

Figure C-10 Fuel Efficiency and the Price of Jet Fuel



Souce: IATA Economic Performance of the Industry Year End 2016

Fuel price uncertainty should not contribute significantly to possible oversupply conditions in the outlook period.

C.4.3. Growth in City-Pair Markets Should Continue

New air services will continue to be introduced in the emerging market countries, and increased service will follow in the international gateway hubs. The analysis indicates that there is little risk of supply outstripping demand in the outlook period (as evidenced by forecast growth of the wide-body fleet with the projected growth in demand). As reported in IATA's year-end report, new city-pair markets expanded by 718, or 4 percent, in 2016 (and projected to grow by a smaller 2.9 percent in 2017). As long as trade continues as it has in the past and the global supply chains remain intact, the growth in new city pairs should continue. The trend for the last decade or more has been that large markets do not get significantly larger, rather we get more markets or more new city pair routes. More markets need much more capacity than simply expanding existing markets.

The IATA forecast is for another profitable year for the world airline industry in 2017, albeit profits will be somewhat lower than in 2016. Given the performance of the airline industry and the momentum established by the industry to better manage capacity, the expectation is for the industry financial performance to continue on the current path, albeit with successively diminishing profits.

IATA reported in the January 2017 Airline Business Confidence Index that airline CFOs expected profitability in the near term to remain steady, but to increase over the next 12 months. Importantly 74 percent saw demand improving over the next year. However, they also saw yields being somewhat lower due to increased competitive pressures. Importantly, the majority of airline CFOs saw employment remaining the same or improving over the next 12 months.

City pair growth, demographics, and forecast economic growth indicate that demand growth will exceed the growth in net capacity in the outlook period. Downturns in some markets will be offset by growth in other markets. Airline profitability is healthy and is expected to remain so in the outlook period. These developments taken together, indicate little likelihood of structural oversupply.

C.4.4. Competition Will Continue to Grow Aggregate Passenger Travel Market

The best evidence indicates that passengers, particularly in long haul international markets, are fare sensitive, with lower fares stimulating traffic[41]. The data indicate that traffic will grow in 2017, but at a

[41] The route between the U.S. and Australia is an excellent example. Prior to 2009, the Sydney-Los Angeles market was restricted to two firms, Qantas and United. Fares were high, but in 2009 Virgin Australia was permitted to enter the market. Fares fell, and after a year Delta entered the market and competition drove fares even lower. Non-stop passenger traffic between the U.S. and Australia expanded by over 50 percent between 2006 (pre-recession peak) and 2012.

slower rate than in the previous year. The growth in traffic is stimulated by growing competition in a number of key markets that exerts downward pressure on fares.

In 2017 to 2019, expected conditions are for continuing strong traffic growth with generally lower cost and greater operating efficiency. This implies that structural oversupply is highly unlikely in the outlook period.

C.4.5. Decoupling of Demand from the Business Cycle

The analysis shows that air travel demand is less dependent upon per capita income growth. Economic growth projections support increasing travel demand. However, demographic drivers indicate a proportionately greater increase in air travel demand that for other consumer goods and services. Robust demand together with airline capacity management (like deferring orders of aircraft) means less fluctuation of profits with the business cycle than was experienced in the past. The dampening of these fluctuations will reduce the likelihood of an unwarranted capacity build-up, and will lessen the probability of structural oversupply developing in the outlook period.

C.4.6. Other Major Trends

Other major trends affecting the global airline industry include: 1) the continuing trend of the "metal neutral" joint ventures between alliance airlines spreading to major international markets – first the North Atlantic, next the Pacific and currently Latin America; and 2) a trend towards increasing consolidation of the industry (i.e., greater concentration – larger share of regional traffic handled by a smaller number of airlines). These developments reflect greater protectionism on the part of North American and European legacy carriers.

The net effect of these other major trends will be to moderate forces that lead to short run over capacity in some markets in the outlook period and reduce the probability of structural oversupply in the longer run.

C.4.7. Summary

In our view, there is no structural oversupply of global aircraft capacity for either narrow-body or wide-body aircraft nor is there a threat of one in the outlook period. A number of factors support this view.

First, passenger demand is growing at a sustainable healthy pace in spite of somewhat weak macroeconomic market recovery in some parts of the world. The economies of China and other South East Asia countries, while not growing at the torrid pace of previous years, are growing at near seven percent and shifting to more domestic consumption and away from export growth.

Secondly, airlines have shifted their business model to focus on return on assets rather than competition for market share. The three major U.S. carriers have been highly successful in improving profitability. This has come from not only shifting the business model, but also decoupling profits to some extent from the business cycle and by improved revenue management.

Thirdly, breakeven load factors, while turning up in 2016 (with actual load factors declining marginally) should still remain below actual load factors by four to six percent in 2017.

Fourth, the aircraft fleet is growing at somewhat more than half the pace of demand. While RPKs and ASKs are forecast to grow in 2017 at similar rates of 5.1 and 5.6 percent, respectively, the shift to longer hauls and new city-pair expansion (by a forecast 2.9 percent in 2017) leads analyst's to conclude that demand growth is indeed outstripping the growth in supply.

Fifth, the leasing market remain strong and leasing firms have about 22and 20 percent of Airbus and Boeing deliveries, respectively. Airlines can expand, contract and redeploy capacity with the liquid leasing market.

C.5. CONCLUSIONS

The possibility of structural oversupply in the global market for air passenger services is remote. However, there are several important distinctions when considering the shorter haul local and regional markets, serviced principally by narrow-body aircraft, and the longer haul international markets, serviced principally by wide-body aircraft.

A number of emerging trends suggest a possible non-structural oversupply of narrow-body aircraft in the short term. This is because the manufacturers chose – for competitive reasons – to incrementally change the Boeing 737 and Airbus 320 rather than developing a new platform; which moved aircraft production forward in time relative to planned production[42]. The current wide-body models are in the middle of their projected lifecycle, and their production is not similarly impacted as the narrow-body aircraft – and, therefore, the risk of short-term and non-structural oversupply seen in the narrow-body market is not a risk in the wide-body market

The concerns raised by supply-side activity are mitigated by the overall outlook. Fuel costs are projected to increase somewhat, which may increase the retirement rates of older narrow-body aircraft, as they are redeployed to start-up LCCs and developing economies where markets are growing more quickly.

The enhanced range of the new narrow-body aircraft, as well as the capabilities of the B787 and A350, will allow airlines to take advantage of liberalization and the growing middle class, especially in China. These aircraft allow new network design strategies and in particular more hub bypass flying. As a result, the growth in capacity should not be a cause for concern. Occasional and regional surges in capacity is not structural – it is a product of the conflation of higher costs of fuel but more fuel-efficient aircraft, liberalization and a growing middle class in large emerging markets such as China.

There are four major uncertainties: oil prices; demand growth in mature developed economies; the extent of continued globalization; and, the shift to protectionism as populist governments make gains in a number of countries. These factors should impact demand, generally, and, to a differing extent, impact both the wide- and narrow-body aircraft markets. The last factor is especially germane in developed economies like the U.S., U.K., and France. Oil and jet fuel prices are forecast to rise but as oil output increases in the U.S. (with shale production) coupled with a supply response from Middle East oil producers, an oil glut may occur. Economic growth is uneven but rising but there is uncertainty regarding major western economies and the EU as to the strength and depth of their economic growth. The profits obtained in 2015 and 2016 were from lower costs, ancillary revenue growth and higher yields from revenue management and capacity consolidation with resultant market power. However, yields in real terms trended downward which has stimulated demand to some degree. Cost-disciplined airlines were profitable in 2016 (e.g., Delta) even with uncertain demand growth in the EU and, in some respect, North America. Despite oil and fuel cost uncertainty, given that a number of new fuel efficient aircraft are coming online, carriers ordering these aircraft will have an advantage even if oil prices rise somewhat.

While demand is forecast to grow in 2017 the pace of growth is slowing each year since 2015. The restructuring of China's economy creates some uncertainty but the increasing freedom to travel and the growth in an increased propensity to travel should along with the shift to a domestic consumer economy should be good for airlines as average incomes are rising, there is increased urbanization and a consumption led economy will result in expanding domestic and international routes in and to and from China.

As the distribution of new capacity and new demand seems geographically well-balanced, there should be lower industry costs of capacity adjustment.

Thus, even if the global markets experience some periodic adjustment there does not seem to be a significant likelihood for a scenario of structural oversupply in the global market for air passenger

[42] For example, the Boeing 737 was designed in 1965 and first flew in 1967.

services, or in the supplier markets of wide- and narrow-body aircraft – not currently, or for the duration of the outlook period.

Finally, the analysis notes that certain recent developments have been disruptive to short-term travel demand forecasts with impacts resonating in the supplier aircraft markets. These developments include security concerns; actual or planned travel bans; restricted use of personal devices on flights by some airlines; and the perception that the U.S. may be less welcoming to foreign travelers. The developments may indeed be impactful in the short-term and may result in depressing aircraft orders or the cancelling of some orders already placed. The wide-body markets may experience stronger impacts as several Middle Eastern carriers serving long haul east-west routes are especially affected by these developments. It is our assessment that while impactful, these developments do not alter the longer term outlook nor are they likely to change the basic conclusion of this report, namely, there is no significant likelihood of structural oversupply in the market for global air passenger service.