



MÁSTER UNIVERSITARIO EN INGENIERÍA INDUSTRIAL

TRABAJO FIN DE MÁSTER ANALYSIS OF THE GLOBAL COMMERCIAL AIRCRAFT FINANCE MARKET

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Madrid

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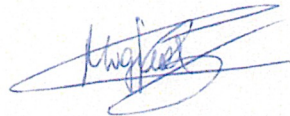
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Madrid

Julio de 2019

ANÁLISIS DEL MERCADO FINANCIERO GLOBAL DE AERONAVES COMERCIALES

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Director: Baíllo Moreno, Álvaro.

Entidad Colaboradora: Banco Santander.

RESUMEN DEL PROYECTO

Introducción

El sector de la aviación comercial viene creciendo a ritmo exponencial de manera sostenida en la última década y se espera que el crecimiento se mantenga a un ritmo medio cercano al 5% anual, durante los próximos 20 años. Este crecimiento requerirá una importante inversión en nuevas aeronaves, con un valor económico de 6.8 trillones de dólares [1]. Esta inversión en nueva capacidad (CAPEX) se sustentará en una variedad de fuentes y estructuras de financiación.

El objetivo principal de este proyecto es llevar a cabo un análisis detallado del funcionamiento de este mercado basado en la información pública disponible y en documentos proporcionados por el equipo de financiación de aeronaves del Banco Santander.

Dicho análisis se realiza desde el punto de vista de las empresas de arrendamiento y buscar proporcionar un enfoque sistemático y cuantitativo, de forma que pueda ser actualizado periódicamente y permita realizar un seguimiento de la evolución del mercado.

Metodología

Para la consecución del objetivo marcado se llevan a cabo una serie de fases en el proyecto, a través de las cuales se pasa desde una visión global, hasta los aspectos clave del mercado financiero de aeronaves comerciales.

En primer lugar, se introduce el mercado de aeronaves comerciales, se analizan las perspectivas de evolución del mismo y se realiza estudio general explicando los diferentes sectores del mercado, sus participantes (fabricantes, aerolíneas, arrendadores y empresas de compraventa de piezas) y las transacciones entre los mismos. Este apartado proporciona una visión del mercado en su totalidad, para después profundizar en las transacciones del mercado secundario entre aerolíneas y arrendadores.

En segundo lugar, se continúa con las operaciones de leasing de aeronaves y se realiza un análisis práctico del leasing operativo, ya que es uno de los más comunes y resulta interesante estudiar la multitud de condiciones y cláusulas que incluye un contrato de este tipo, desde los momentos previos a la entrega del avión, hasta la devolución del mismo,

pasando los diferentes periodos de mantenimiento durante su operación.

Después, se da paso al análisis de la calidad crediticia de las aerolíneas, lo cual constituye una información crucial para el arrendador en las operaciones de leasing. En este apartado se muestra información real sobre análisis financieros de aerolíneas y se aporta también el enfoque cuantitativo y sistemático mencionado en la introducción.

La siguiente área de estudio se centra en mercado global de arrendamientos y, en concreto, en las compañías de leasing. En este capítulo se analizan las tendencias en esta industria y su desarrollo futuro.

Tras examinar la industria de las compañías de arrendamiento de aeronaves, se dedica un apartado a la valoración de activos y la determinación de los diferentes factores cualitativos que afectan en la retención de valor de los aviones y que, por lo tanto, se deben tener en cuenta a la hora de ejecutar su compra. Como ejemplo, se incluye el comentario de mercado y los valores estimados por el tasador Flight Ascend para un Airbus A321-200 neo.

Por último, a modo de caso práctico, se elabora un modelo de financiación para un arrendamiento de tipo financiero de un Airbus A330-900 neo.

Resultados

Al tratarse de un proyecto de estudio, el resultado es básicamente el propio análisis elaborado, el cual puede ser

actualizado periódicamente, introduciendo los cambios que experimente la industria.

En cuanto a los resultados cuantitativos obtenidos con este proyecto, se pueden diferenciar los siguientes:

- Primero, en la fase de análisis crediticio de las aerolíneas, se obtienen una serie de variables clave para determinar dicha solvencia. Además, se incluye una comparación entre Ryanair y British Airways, donde se evalúan estas variables a partir de sus resultados financieros de 2018 y se comentan las diferencias entre un operador de bajo coste y una compañía de bandera.

Las variables escogidas para examinar la calidad crediticia de los operadores aéreos son las siguientes:

- Ingresos de pasajeros
 - Ingreso Neto
 - Margen neto
 - Rendimiento obtenido por pasajero
 - RPK
 - ASK
 - Factor de carga
 - Margen RASK-CASK
 - EBITDAR
 - Razón de cobertura de costes fijos
 - Ratio entre la deuda neta ajustada y EBITDAR
- Después, al estudiar la industria de compañías de arrendamiento, se determinan un conjunto de variables relevantes para la comparación y análisis de un arrendador con respecto a la industria. En dicho

apartado se lleva a cabo un ejemplo de comparación entre la empresa Aircastle y una muestra de arrendadores de la industria, a través de los resultados financieros publicados en su informe anual de 2018.

Para la comparativa se utilizan variables que reflejan el beneficio, la flexibilidad financiera y el rendimiento del capital, como es el caso de:

- Ingresos
 - Ingreso neto
 - Coste de la deuda
 - Deterioro de activos
 - Ratio entre deuda y capital
 - Ratio entre EBITDA e interés neto
 - Rentabilidad financiera
- Para finalizar, se desarrolla un modelo en Excel de un arrendamiento de tipo financiero, como se ha mencionado en la metodología. Dentro de este modelo, se estructura la financiación de la aeronave y se determinan los pagos a realizar por el operador. Además se elabora un examen de riesgos a través de un análisis préstamo a valor y se determina el retorno obtenido por el arrendador, para diferentes escenarios de valor residual de la aeronave al final del periodo de arrendamiento.

Conclusiones

Según lo mencionado en la introducción, la industria de aeronaves comerciales constituye un sector de gran atractivo por

su crecimiento. No obstante y pese a que siga creciendo, la previsión a futuro es de ralentización.

Algunas de las causas de esta ralentización a futuro, pueden ser las guerras de comercio a nivel mundial, el cese de políticas económicas expansivas, un posible aumento del precio de los combustibles o la incertidumbre política generada por situaciones como el Brexit en Europa.

Sin embargo, esta desaceleración no supone un problema de mayor magnitud y el hecho de que se estime una cantidad de entregas cercana a 44,000 aeronaves para 2037, lo corrobora.

Por otro lado, entrando en las dinámicas del mercado, hoy en día existe una gran competitividad entre las aerolíneas, a nivel de tarifas, operaciones y eficiencia. Por ello, los operadores buscan tener cada vez más flexibilidad de operación y ajustar su capacidad a la demanda lo máximo posible.

Esta situación beneficia la posición de las empresas arrendadoras ya que por el momento nada aporta más flexibilidad de operación que el alquiler temporal.

Por último, de cara a futuras investigaciones y teniendo en cuenta la tendencia de evolución que está siguiendo la industria de aviación, resultaría interesante desarrollar el estudio en base a los tipos de arrendamiento u otro tipo de operaciones que surjan como medio para cumplir las necesidades crecientes del mercado.

ANALYSIS OF THE GLOBAL COMMERCIAL AIRCRAFT FINANCE MARKET

Introduction

The commercial aviation sector has been growing at an exponential rate in a sustained manner during the last decade and growth is expected to remain at an average rate close to 5% per year, over the next 20 years. This growth will require a significant investment in new aircraft, with an economic value of 6.8 trillion dollars [1]. This investment in new capacity (CAPEX) will be based on a variety of financing sources and structures.

The main objective of this project is to carry out a detailed analysis of the operation of this market based on the public information available and documents provided by the aircraft financing team of Banco Santander.

The analysis is completed from the point of view of the leasing companies and seeks to provide a systematic and quantitative approach, so that it can be updated periodically and allows to monitor the evolution of the market.

Methodology

For the achievement of the marked objective, a series of phases are carried out in the project, from a global vision to the key aspects of the commercial aircraft finance market.

Firstly, the commercial aircraft market is introduced, the prospects for its evolution are analyzed and a general

study is carried out explaining the different sectors, its players (manufacturers, airlines, lessors and companies selling and selling parts) and the transactions between them. This section provides an overview of the market, going then into detail in secondary market transactions between airlines and lessors.

Secondly, the analysis continues with aircraft leasing operations and a practical analysis of the operating lease is carried out, since it is one of the most common. Besides, it is interesting to study the multitude of conditions and clauses included in a contract of this type, from the previous moments to the delivery of the aircraft, until its redelivery, passing through the different periods of maintenance during its operation.

After that, the study focuses on the analysis of airlines creditworthiness, which constitutes a crucial information for the lessor in leasing operations. In this section real information on financial analysis of airlines is shown and the quantitative and systematic approach mentioned in the introduction is also provided.

The following area of study centers the attention on the global leasing market and, specifically, on leasing companies. This chapter analyzes the trends in this industry and future developments.

After examining the industry of aircraft leasing companies, a section is dedicated to the valuation of assets and

determination of the different qualitative factors that affect the value retention of aircrafts and, therefore, that must be considered when executing its purchase. As an example, the market commentary and values estimated by the appraiser Flight Ascend for the Airbus A321-200 neo are included.

Finally, as a case study, a financing model for the finance lease of an Airbus A330-900 neo is developed.

Results

As this is a study project, the result is basically the analysis itself, which can be updated periodically, introducing the changes experienced by the industry.

Regarding the quantitative results obtained, the following can be differentiated:

- In first place, in the airline's creditworthiness analysis phase, a series of key variables are obtained to determine their solvency. In addition, a comparison between Ryanair and British Airways is included, where these variables are evaluated based on their 2018 financial results and the differences between a low-cost operator and a flagship carrier are discussed.

The variables chosen to examine their solvency are the following:

- Passenger revenues
- Net income
- Net income margin
- Passenger yield
- RPK
- ASK

- Load factor
- RASK-CASK margin
- EBITDAR
- Fixed charge cover
- Adjusted net debt to EBITDAR

- In second place, when analyzing the leasing industry, a set of relevant variables are determined to compare and analyze a lessor with respect to the industry. In this section, an example of comparison between the company Aircastle and a sample of lessors is carried out, using the financial results published in its 2018 annual report.

For the comparison, variables that measure profitability, financial flexibility and return are used, as is the case of:

- Revenues
- Net income
- Cost of debt
- Impairments
- Debt to equity ratio
- EBITDA to net interest ratio
- ROE

- Finally, an Excel model is developed to structure a financial lease, as mentioned in the methodology. Within this model, the financing of the aircraft is structured and the payments to be made by the operator are determined. In addition, a risk evaluation is carried out through a loan-to-value analysis and the return obtained by the lessor is determined for different residual value scenarios.

Conclusions

As mentioned in the introduction, the commercial aircraft industry is a sector of great attractiveness due to its maintained growth. However, although it continues to grow, the forecast for the future is that it is going to slowdown.

Some of the causes of this slowdown may be global trade wars, the cessation of expansionary economic policies, a possible increase in the price of fuel or the political uncertainty generated by situations such as Brexit in Europe.

Nevertheless, this deceleration is not a problem of greater magnitude and the fact that it is estimated a delivery amount close to 44,000 aircraft by 2037, confirms this.

On the other hand, entering the market dynamics, today there is great competition among airlines, regarding fares, operations and efficiency. Therefore, operators increasingly seek operational flexibility and to adjust their capacity to demand as much as possible.

This situation benefits the position of the lessors since, for the moment, no transaction contributes more to flexibility of operation than leasing.

Ultimately, for future research and taking into account the trend of evolution that is following the aviation industry, it would be interesting to develop the study based on the types of lease or other operations that may arise as means to meet the growing needs of the market.

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1 Introduction and Motivation

1.1 Framing the analysis

This project will carry out a detailed analysis of the operation of the commercial aircraft finance market through the use of public information collected through the internet, including documents from airlines or manufacturers, as well as specialized articles, journals and presentations provided by the aircraft financing team of Banco Santander.

Throughout the project, the entire market and the dynamics and processes associated with the various financial transactions that take place among players will be explained, emphasizing the relationship and leasing operations between aircraft leasing companies and airlines. Therefore, the analysis will take into consideration the perspective of the different players involved in this industry (manufacturers, airlines, lessors and financiers), but will particularly focus on the point of view of lessors.

1.2 Attractiveness of the commercial aviation industry

There are a variety of factors that make the commercial aviation industry an attractive matter for analysis and research. Furthermore, in recent years this industry has become even more appealing due to its evolution and the prospect for its future development. Some aspects that can be highlighted in this respect are:

- The commercial aviation sector has been growing at an exponential rate in a sustained manner in the last decade.
- IATA's Passenger Forecast predicts that passenger demand is going to double in the next 20 years.
- Profits for the commercial aviation industry are expected to be \$28 billion in 2019 according to IATA.
- Aircraft leasing operations account for about the 45% of the total fleet, a symptom of the attractiveness of this industry for investors and financiers.

In this context, about 44,000 [1] new commercial aircraft will be needed in 2037 to respond to this growth and replace existing aircraft that will reach the end of their life.

At the same time, for financing this significant CAPEX, a great variety of investors is needed, among which are leasing companies, capital markets, private equity/hedge funds or commercial banks.

1.3 The main pillars of the commercial aircraft finance market

As mentioned in section 1.1, the analysis will be mainly focused on aircraft leasing operations within the commercial aircraft finance market and all that this entails. Therefore, three major characteristics to be taken into account in these operations can be highlighted.

1.3.1 Airlines' creditworthiness

First of all, it is crucial to know the financial status of the airline before carrying out a leasing contract. In this type of contracts, periodic payments will be made and it is necessary to know if the airline is creditworthy and is well managed to be able to face such payments and comply with the contract at all times.

Throughout the project, an entire chapter will be devoted to the study of airlines creditworthiness and determining which are the most important financial ratios or variables to analyze the financial status of the operator.

1.3.2 Aircraft as a collateral

Secondly, these types of operations are always secured with the aircraft. This means that the lessor uses the aircraft as a guarantee, so if the airline breaches some condition of the contract, stops paying at some point or declares its bankruptcy, the lessor would keep the aircraft.

In addition, as aircrafts are mobile assets, before financing them it is necessary to carry out a broad study of the countries where they will operate and where they will be registered, as well as the type of financial vehicle that will be used. This is intended to properly securitize the operation, so that there are no problems in case of repossessing the aircraft.

1.3.3 Legal and tax framework

Following the reasoning of the previous section, it is essential for a lessor to know and control all aspects of the legal and tax framework in which the operation will be carried out. In case of an international transaction, it is advisable to search for a local consultant to determine the legal clauses of the contract and ensure that all the registers have been correctly made. In addition, it must be clearly established which jurisdiction will apply in case of a problem with the aircraft or breach of contract conditions.

All this is discussed in greater depth in Chapter 4, which explains the leasing structure of an aircraft and the clauses and conditions that are typically included in an operating lease.

1.4 Objectives and outline of this document

The main purpose of this project is to carry out a detailed analysis of the operation of the commercial aviation finance industry that can be updated periodically, thus allowing for a systematic review of its evolution through the years.

For the achievement of such goal, the principal objectives to be met are:

- Analysis of the dynamics of the secondary market (where airlines and lessors trade with used aircraft), as well as of the leasing structures used in the related transactions.
- Development of an airline creditworthiness evaluation methodology. Including identification and analysis of the best key indicators, for the aim of making a proper airline study from the lessor perspective.
- Drawing conclusions regarding current trends in aircraft leasing markets and make an assessment about their future development.
- Fully understanding of aircraft valuation practices, taking into account elements such as rental payments, maintenance, supply and demand, utilization, age, etc.
- Practical case study to value an aircraft and implement a lease structure, with the application of the knowledge acquired.

Regarding the outline, the analysis begins with a market outlook and the explanation of the market dynamics, players and segments. Then, after showing the market in general, the study goes into detail in the leasing transactions, dedicating two chapters to the leasing market, in which the credit quality of the airlines and the sector of the leasing companies are examined. Finally, the analysis finishes with a study about aircraft valuations and a case study in which the lease structure of an aircraft is elaborated and analyzed.

2 Market Outlook

2. Market Outlook

2.1 Global overview

The airline industry has traditionally been cyclical and very sensitive to increases in operating costs and changes in traffic demand, which are highly correlated with GDP growth as shown in Figure 1. Since 2010, with the growth of global GDP after the crisis, there was an expansion in the aviation industry. In addition, air traffic was increasing at a pace higher than 5% each year and there were several years of moderate oil prices (which account for c. 25% of an airline's operating costs).

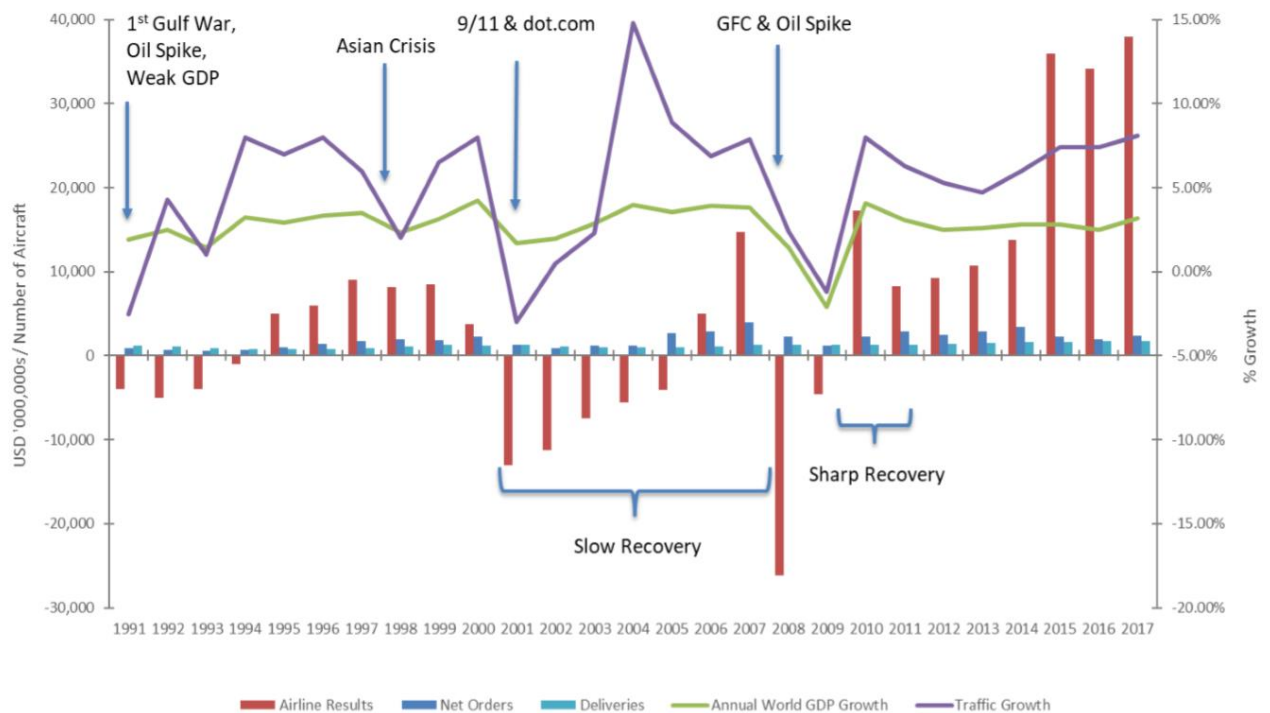


Figure 1: GDP, traffic growth, airline results, aircraft orders and deliveries

Source [2]

This trend is now changing and in 2019 a slowdown is expected to levels close to 2.9% [3], below the 3.3% [4] of 2018. This continued growth encouraged by an expansive economic policy, although slowing down, allows the industry to remain profitable and enjoy positive results. However, there are risk factors such as trade wars or Brexit, whose uncertainty harms the development of the industry.

2.2 Key drivers for market evolution

In this section, some of the most relevant drivers for the future of the market will be discussed. Those can be summarized in the following groups [1]:

2. Market Outlook

Robust demand for air travel.

During the last 5 years, demand exceeded by 1.7 points the average long-term expected growth, which was 5%. This is due in large part to the improvement of living standards, the competitiveness of the market for offering low fares and the development of emerging countries.

In the last decade, routes to emerging countries or between them have accounted for 40% of air traffic and this figure will continue to grow, as the middle class in countries such as China or India is expected to grow by 300 million. In addition, tourist trips are growing enormously and according to the World Travel and Tourism Council, in 2029, they expect 700 million tourist trips more than in 2018, which will cause the demand for air traffic to continue increasing.

In Figure 2 the estimated air traffic growth until 2038 is shown.

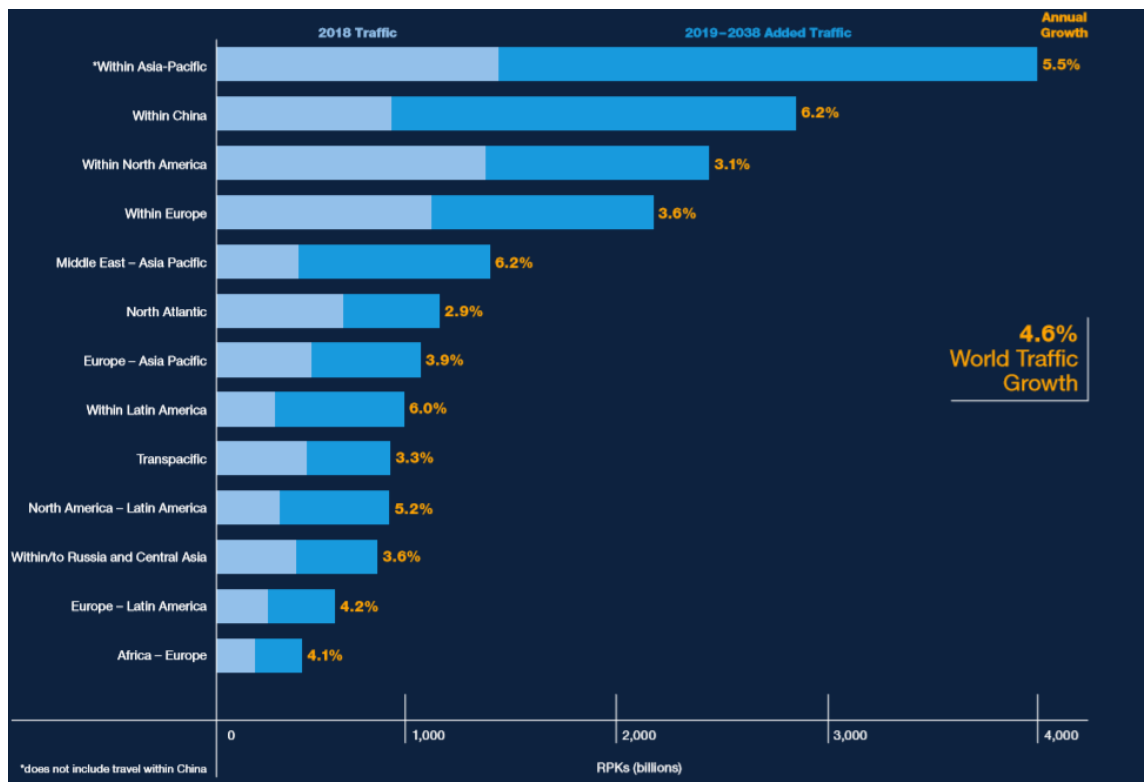


Figure 2: Air traffic growth 2019-2038

Source [1]

As it can be seen, the greatest development of the market is going to occur in the Asia-Pacific region (excluding China) and in China, which will grow to 5.5% and 6.2% annually respectively, being the average global growth 4.6%.

2. Market Outlook

Airline's strategies and products offered.

On one hand, low cost carriers are going to lead the demand for narrow-body aircraft. According to Boeing, they will add about 13,000 aircraft of this type, with 62% of the orders for capacity growth and only 38% for replacement.

On the other hand, traditional airlines are adapting to compete with the LCCs through their low-cost subsidiaries and, in addition, they increasingly provide more connectivity and diverse offers of services and fares.

It is also worth mentioning the development of the long-haul low-cost model, in which more and more airlines, both independent LCCs and subsidiaries of traditional carriers, are entering. It is still early to know if this model is going to be beneficial, due to the operational and economic complexity involved, but, as it can be seen in Figure 3, there are more and more passengers that opt for this type of offer.

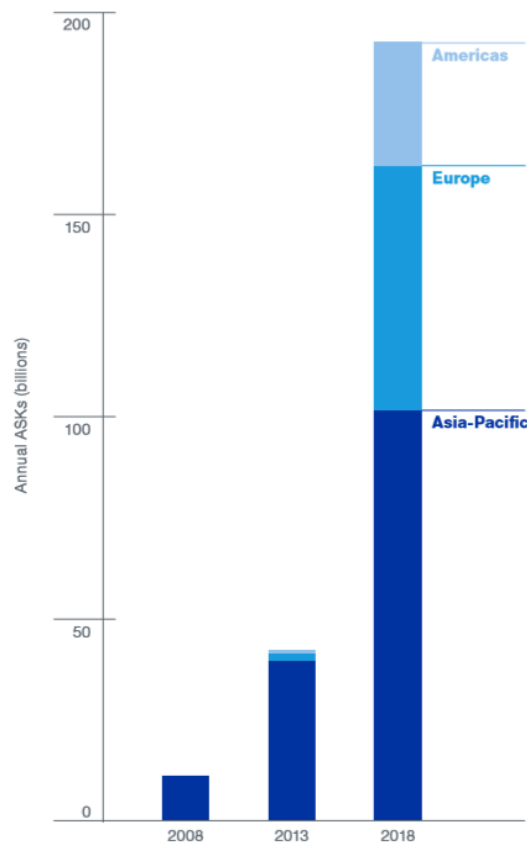


Figure 3: Low-Cost Long-Haul evolution measured in ASK (available seats per kilometres flown)

Source [1]

2. Market Outlook

Liberalization and technological developments.

The growing liberalization of the industry is crucial for growth, since it allows new airlines and entrepreneurs to enter the market, increasing competitiveness and reducing prices. Thus, all this leads to greater efficiency of the airlines and to lower prices, while there are increasingly more routes and there is more frequency of services.

The increasing number of low-cost airlines is a direct consequence of these policies and it is expected that this trend will continue and that the market will keep developing.

In terms of environmental regulations, the aviation industry has committed to reduce emissions, producing in 2050 half of emissions than in 2005. This entails a heavy investment in technology and development by manufacturers, to produce more efficient aircraft and engines.

3 Commercial Aircraft Market

3.1 Introduction

Commercial aircraft transactions can be classified into three main categories, depending on the status of the asset involved and the main participants in the transaction. If the aircraft is new, i.e., it has just left the factory, its sale will take place in the primary market. If it has already been used, it will be traded in the secondary market. Finally, if the aircraft is at the end of its useful life it will be traded in the tertiary.

The main participants in this market are:

- Original Equipment Manufacturers (OEM's).
- Airlines.
- Lessors.
- Part-out companies¹.

The figure below shows the dynamics of this market and its players.

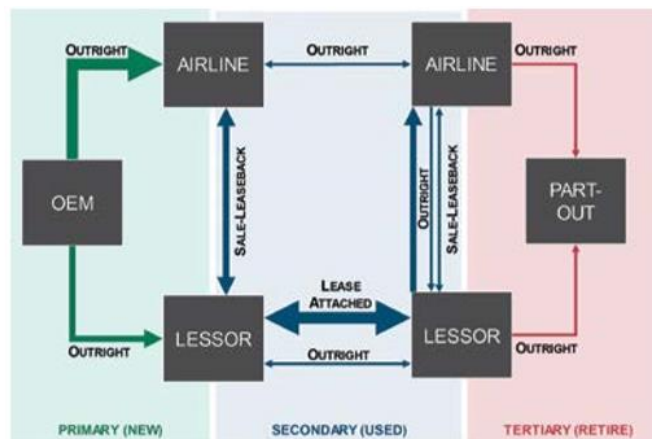


Figure 4: Aircraft transaction market

Source [5]

Regarding the size and evolution of this market, the value of the transactions carried out has doubled over the last ten years, as can be seen in Figure 5, going from \$84 billion in 2007 to \$160 billion in 2017.

Comparing the different segments of the market, both the primary and secondary markets have grown considerably, maintaining quotas around 70% and 30% of the global volume of transactions, respectively. On the other hand, the tertiary market is practically non-existent in comparison, reaching a maximum of \$1.4 billion in 2014.

¹ Part-out companies carry out the purchase and sale of parts from aircrafts that are at the end of their useful life.

3. Commercial Aircraft Market

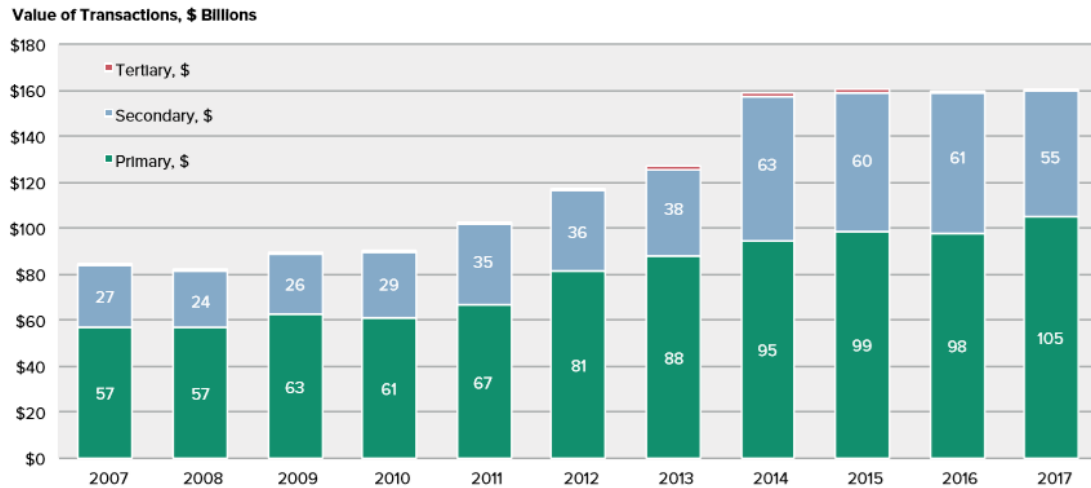


Figure 5: Commercial Aircraft Market evolution by segments

Source [5]

This chapter contains a brief explanation of the operation and interactions of the different participants in the commercial aircraft market. Thus, in the following pages, each one of the sectors and types of transactions will be commented, to give a global vision of the market dynamics.

Later, chapters 4 and 6 will focus in greater depth on the aircraft leasing industry and the financial structures applied therein, since they are the main subject of study of this project.

3.2 Primary market

Primary market transactions include the sale by manufacturers of aircraft to airlines and lessors. Most of the new aircraft, around 80%, are sold to airlines, while the remaining 20% is sold to lessors.

On one hand, airlines that buy first-hand aircraft tend to be the largest and with the greatest purchasing power, or airlines that plan a large growth and need an increase in capacity of their fleet. However, during the last decade, orders from the largest airlines only cover 30% of the total value of airplanes delivered by OEMs, corresponding the other 70% to the pool of the remaining airlines. This is shown in Figure 6.

3. Commercial Aircraft Market

Source: Alton Aviation Consultancy analysis

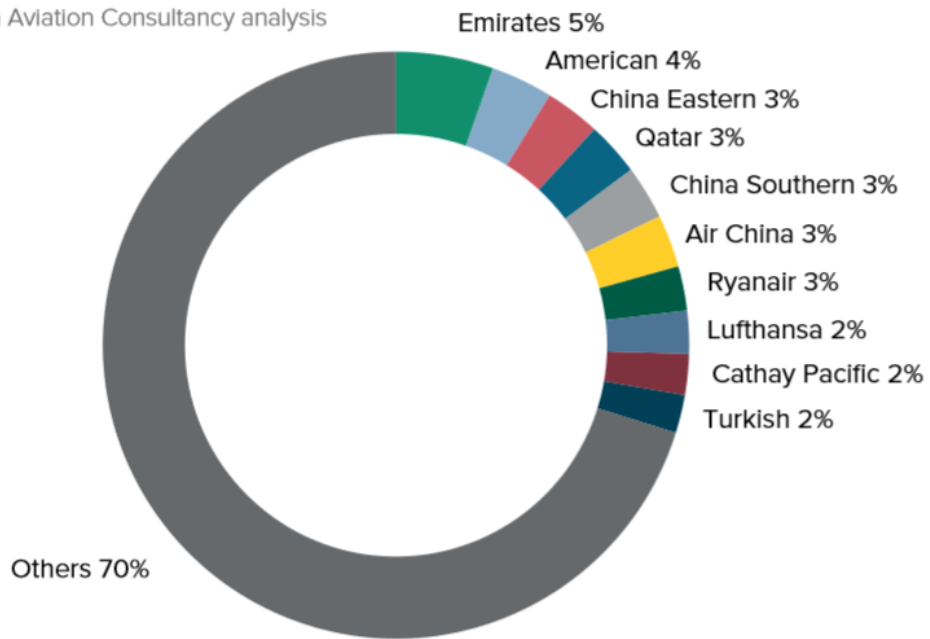


Figure 6: Distribution of OEM deliveries to airlines in the past decade

Source [5]

On the other hand, orders from lessors are more concentrated, with a 63% in hands of the 10 largest companies, as shown in Figure 7.

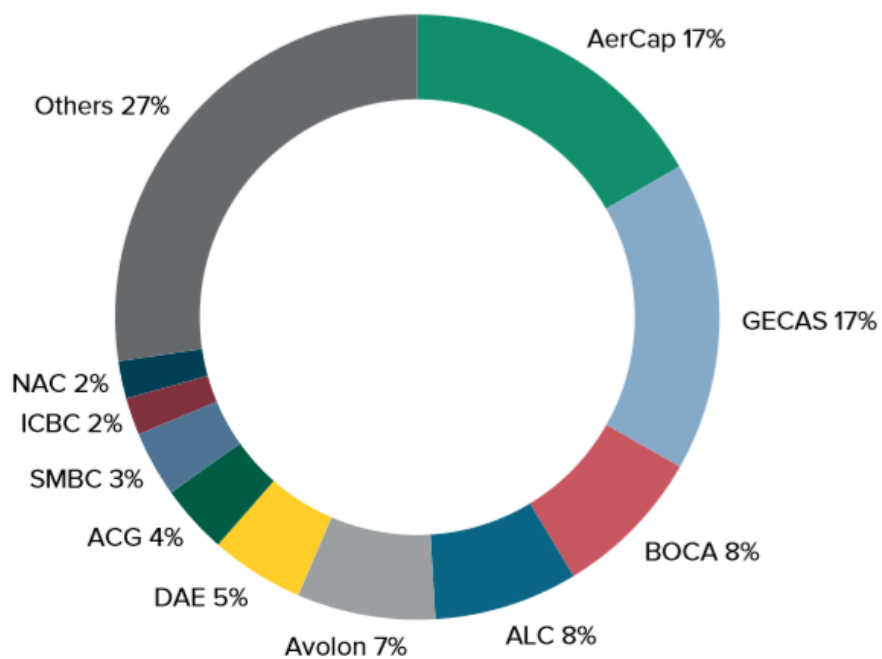


Figure 7: Distribution of OEM deliveries to lessors in the past decade

Source [5]

3.3 Secondary market

In the secondary market, the main players are airlines and lessors (as shown in Figure 4) and the types of transactions that can be categorized according to the participants are:

- Airline-lessor
- Airline-airline
- Lessor-lessor

3.3.1 Lessor and airline

Between lessors and Airlines, outright and leasing transactions are carried out.

New or young aircraft

For new or young aircraft, the most used types of transactions are sale and leasebacks (SLB). A SLB is a type of operating lease² in which an airline sells a plane to a lessor, with the right to rent it later. Thus, the airline has the right to use the plane, but does not own it.

The SLB is attractive to lessors, since it reduces the risk with respect to the purchase of airplanes without having a specific client that will use them.

It is also a good financing method for airlines, since it works as a loan in which the payments are the income of the asset. In addition, it allows the release of capital, provides airlines with greater liquidity for their operational needs and reduces the risk derived from the fluctuation in the value of the asset.

Used aircraft

For used or older aircraft, two types of transactions are used, SLBs and outright.

In this case, SLBs are not so common, since the negotiation of the sale and rental conditions is more complex and include other important variables such as the condition of the aircraft or maintenance reserves, that result of higher importance given the age of the aircraft. This type of transaction is attractive for airlines with old aircraft, that want to manage the risk of the residual value of these assets and dispose of part of their fleet.

A representative example of this type of transaction is the purchase and leaseback program between Aircastle and easyJet in 2016 for 10 Airbus A319-100. In this case the CEO of Aircastle, Ron Wainshal, explained the reasons behind this business as follows:

² Operating lease: “forms of leasing in which the capital cost of the asset is not fully amortized at the end of the lease and the benefit of the lessor does not derive from the rents obtained by renting the equipment to a single customer, but to several. In addition, in an operating lease, the lessee seldom acquires the asset at the end of the leasing contract, even if it includes a purchase option under certain circumstances.” [20]

3. Commercial Aircraft Market

"We are excited to complete our first transaction with easyJet, one of the world's top airlines and one of the few with investment grade credit ratings. These aircraft, which are a core part of easyJet's current fleet, have a unique and economical lay-out, and we expect they will find good demand once the current leases expire in a few years." [6]

Regarding direct transactions, these occur when a lessor buys or sells used aircraft from/to airlines. In the case of the lessor who buys, direct purchases of used aircraft normally occur when the company already has a potential client and the airline wants to get rid of an asset that does not fit its strategy before it has no value. When it comes to the sale of an airplane, this takes part when the airline executes a purchase option at the end of a lease or when the airline seeks to acquire an aircraft in a framework of financial prosperity and high demand for air traffic.

3.3.2 Airline to airline

Between airlines there are only direct transactions. Usually, an airline operating in a developed market sells used aircraft that do not take part in its future strategy, to airlines in emerging markets where these assets are still attractive.

3.3.3 Lessor to lessor

Among lessors there are two types of transactions, lease-attached sales and direct sales.

Lessors sell their aircraft because it allows them to manage their portfolio in terms of their age or variety. However, sales with a lease-attached are much more attractive, since they have a much lower risk than direct sales, being made without the uncertainty of having to find as soon as possible a lessee with a certain credit quality.

3.3.4 Lease attached versus outright transactions

As mentioned, transactions with a lease attached constitute the most attractive type of deal in the secondary market, given the security they provide to lessors and the financing opportunity that a SLB entails for an airline.

To reaffirm this statement, some numbers are shown in Figure 8 and Figure 9, which highlight the huge difference between the amount of money invested in transactions that involve a lease (\$48 billion in 2017), compared to direct sales (\$7 billion in 2017).

3. Commercial Aircraft Market

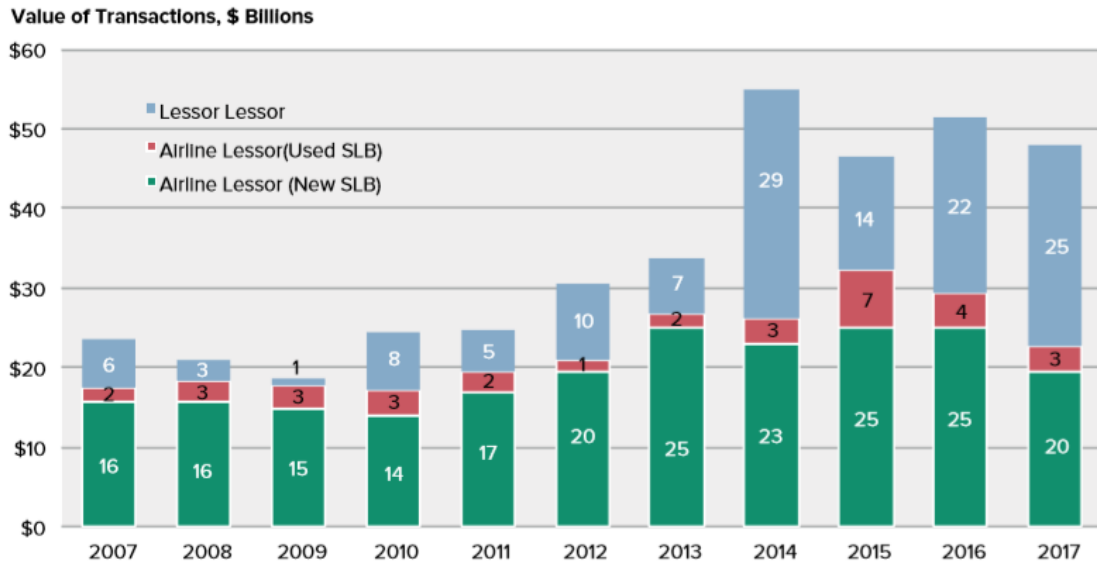


Figure 8: Lease attached transactions volume

Source [5]

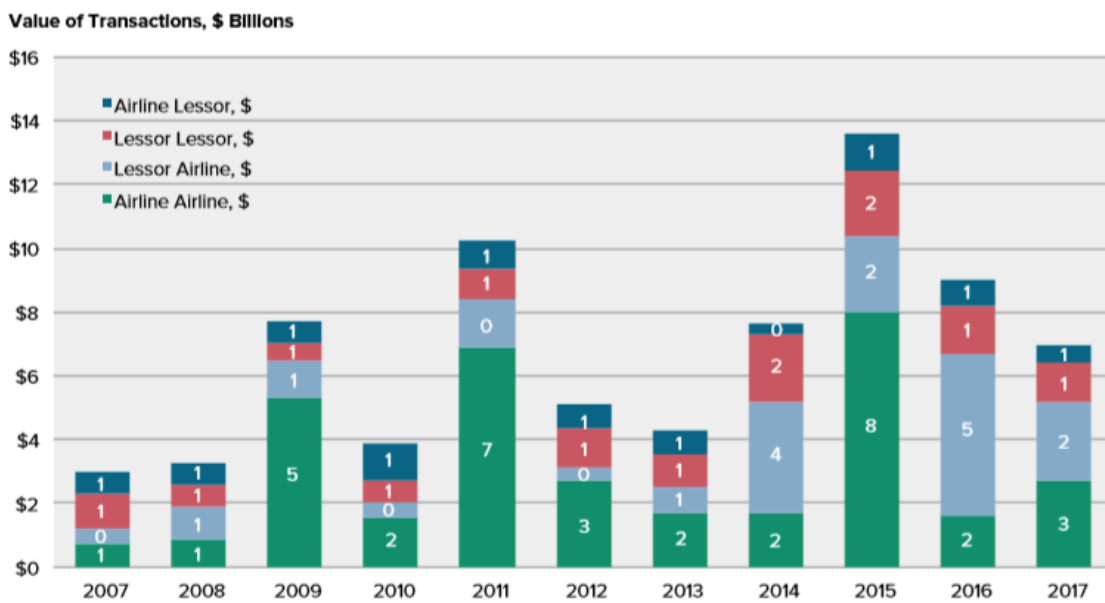


Figure 9: Outright transactions volume

Source [5]

3.4 Tertiary market

In the tertiary market, airlines and lessors sell useful parts of aircraft that are at the end of their lives. These sales are carried out when the value of the parts separately is greater than the value of the aircraft itself.

3. Commercial Aircraft Market

There are two ways of making these transactions:

- Direct sale of the entire aircraft, which will then be dismantled by the company specialized in parts trading.
- Indirect sale of parts. In this case, the airline or the lessor is still the owner of the plane but orders the sale to the part-out specialist.

4 Aircraft Leasing Structure

4.1 Introduction

The large volume of investment involved in acquiring commercial aircraft for airlines entails that they have to be financed either through traditional methods or through the use of leasing structures.

Initially, the leasing was used by low-cost airlines that made the sale of an airplane and its subsequent "leaseback", since they did not have the capacity to finance it, or the manufacturer did not put these assets at their disposal. Currently, leasing is one of the most used forms of financing in the commercial aircraft market and also the largest airlines benefit from this type of leasing, due to the great advantages it offers.

Within aircraft leasing structures, two main types can be differentiated: finance lease and operating lease.

On one hand, in finance lease the lessee (the airline) assumes possession of the aircraft for a period of time and the aircraft is considered an asset of the company from an accounting point of view. During this time, the airline pays a fee for the rental of the plane, which includes the amortization of the capital and the interests (benefits of the lessor), acquiring then the aircraft at the end of the contract. In this type of lease, the lessor finances the purchase of the airplane and receives payments from the lessee, being only exposed to credit risks.

On the other hand, as discussed in Chapter 3, in the operating lease the amortization of capital and the benefits of the lessor are derived from the rental of the aircraft to more than one airline. In this type of agreement, the purchase of the asset is normally not made at the end of the contract and it is returned to the lessor under specific conditions.

From the two methods explained, the most widespread among airlines and lessors is the operating lease, whose success lies in the great advantages it provides to both parties of the contract.

When it comes to airlines, the operating lease allow them to have a greater financial liquidity, since they are exploiting an asset that is not really on the balance sheet and for which there is no additional debt. Thus, the lessee should only take into account the rental expenses in the financial statements and should not worry about the residual value of the aircraft. In addition, the operating lease provides greater flexibility in the decision making of the lessee, who can acquire aircraft and manage capacity in less time and with a lower commitment.

Regarding lessors, they benefit through the margin between the cost of the assets and the incomes obtained from them. More specifically, the attractiveness of airplanes lies in their status of mobile asset, with a global market and whose lease provides large cash

4. Aircraft Leasing Structure

flows. Nevertheless, it is important to take into account the risk derived from the residual value of the asset.

Although there are many benefits from leasing, the multiple terms and conditions that are introduced in the contract can pose problems or setbacks for the lessees, since both parties have different interests and points of view in this contract.

In this chapter, the outline, clauses and different conditions stated in an aircraft lease are going to be presented, as well as the problems that may arise in each of the phases of the lease. In addition, the use of Special Purpose Vehicles for structuring leasing transactions and Ireland's position as a global leader in aviation leasing will be discussed.

4.2 Operating lease practical analysis³

As mentioned earlier in Chapter 3, leasing operations in the commercial aircraft market take place in the secondary market, between a leasing company and an airline.

In the leasing operations, the transaction of aircraft, both new and used, is carried out and certain conditions are established for the good performance of the contract. However, there is no uniform protocol for leasing contracts, so the purpose of this analysis will be to briefly explain the most common structure and practices followed in these transactions, as well as the problems that may arise and some of the conditions that the leasing companies impose in their leasing contracts.

As it is specified in its title, this part is going to be focused in operating leases instead of finance leases, which are more interesting to analyze in terms of the structure of the contract, as they include also clauses and conditions associated with the return of the plane at the end of the rental period.

4.2.1 Parties

First of all, the parties of the contract, lessor and lessee should be identified, clarifying who is the beneficiary and if a guarantee of the obligations of both parties is needed.

³ The development and structuring of this section is based on chapter 3 of the book, *Aircraft Operating Leasing: A Legal and Practical Analysis in the Context of Public and Private International Air Law*.

4.2.2 Definitions

Typically, the definitions of the terms used in the lease are included in the contract, as a part of it or attached to the lease, in order to give consistency to the document.

4.2.3 Representations and warranties

Both parties give representations and warranties as a basis to induce the other party to enter into the operating lease, where representations are affirmations of a present or a past fact, and the warranties provide indemnity in case those representations are false.

4.2.4 Conditions precedent

These are the conditions that must be satisfied by one or both parties before the contract comes into force.

Some general conditions that apply to both parties are:

- Making payments in advance, as a security deposit or a month rent, in the case of the airline.
- Providing copies of their constitutional documents and corporate approvals.
- Proving that both parts have the external consents to meet the contract obligations.
- Legal opinions from both lessor and lessee to confirm the legal viability of the lease structure to the other party.

Conditions precedent that must be satisfied by the lessee, include documents that ensure the airline competency to operate the aircraft, such as the certificate of insurance, certificate of registration or air transport license. Nevertheless, sometimes the lessor can agree to deliver an aircraft without the fully satisfaction of these conditions by the lessee, being such conditions temporarily or permanently waived by the lessor. For instance, a typical of a condition waived by the lessor, is the certificate of registration, which is not usually available until sometime after the delivery.

4.2.5 Term and delivery

The duration of the lease and the extension and termination options, as well as the notice period stipulated for these modifications, should be clearly stated in the contract.

During the delivery, the main objective is to receive the asset on time and in the agreed state between the airline and the lessor. Thus, failure to deliver the aircraft in the final date of the timeframe provided and its consequences must be stated in the contract, as well as the result of not meeting the delivery conditions agreed. Normally, if the lessor does not comply with the delivery date, the lessee could ask for the security deposit. In addition, if the conditions of the asset are not as negotiated, the airline could refuse the delivery.

4.2.6 Payments

In this section, some of the payments carried out by the airline during the lease are going to be examined:

- **Rent.** Is the principal payment obligation of the lessee. Rent is a fixed or variable (due to the fluctuation of a reference interest rate) amount of money that the lessee pays periodically and in advance. Generally, it is paid monthly but there can also be other types of periodicity, such as quarterly.
- **Security deposit.** Is an amount requested by the lessor, in order to be protected against any failure of the airline to fulfil its payment obligations. The security deposit is negotiated between the parties and it is usually equivalent to a certain number of month's rent (2 or 3 typically).
- **Maintenance reserves.** In addition to the current maintenance costs, the airline has to contribute also to the future maintenance costs, proportionally to its use of the aircraft. These reserves are paid periodically (usually monthly) and are typically divided out by frame, engines, auxiliary power unit, landing gear and life limited parts. Afterwards, this money can be used for covering the cost of the scheduled works if the airline has not complied with its maintenance obligations or to reimburse airlines for heavy maintenance events, such as the sixth-year check of an engine.

Besides cash payments as security deposits or maintenance reserves, some lessors may accept standby letters of credit or a bank guarantee by a creditworthy institution.

Regarding the timeframe for the payments, the contract must contemplate the scenario of a late payment and set an interest rate for late payments. This rate should not be very low to avoid providing a good way of financing to the airline.

4.2.7 Taxes

The common practice is that the lessee is liable for all the taxes related to the transaction and the possession of the aircraft, with the exception of those derived from the lessor's corporate income.

4.2.8 Manufacturer warranties

Airframe and engine manufacturers grant warranties to their customers for determined period of time after the purchase. As the lessor is normally the buyer, it will receive the benefits from the warranties.

Nevertheless, when the lessor leases the aircraft, the airline will also want to benefit from such warranties in case they have some difficulties with the aircraft. Thus, very often, the lessor assigns these warranties to the lessee just during the term of the lease.

4.2.9 Covenants

Regarding lessors, they grant two type of covenants in favor of the lessee:

- **Quiet enjoyment.** According to this covenant, the lessor does not break into the operation of the airline as long as there is not an event of default and fulfils its obligations of the deal.
- **Reimbursement from reserves and other payments.** As long as there is not default by the lessee, the lessor should pay the operator the cost of the scheduled works of maintenance.

When it comes to the lessees, some of their covenants are related to:

- **Maintenance of the aircraft.** Operators must maintain the aircraft according to the authority's requirements.
- **Liens.** Lessees cannot allow liens on the aircraft that are not permitted by the lessor. Some liens are under the lessor control and others are derived from legal situations or from the contract of third parties linked to maintenance.
- **Aircraft registration.** According to the Chicago Convention, an aircraft is only allowed to be registered in one state at the same time and its registration can be changed from one state to another. In addition, registration procedures are very different depending on the national law.
- **Possession and replacement of parts and engines.** The lessee cannot leave the aircraft or any of its components to another party during the lease, except for maintenance carried out by an authorized company or subleasing the aircraft to a third party authorized by the lessor. As for the replacement of parts, it can only be given if its repair or replacement is necessary. In such cases, the repair will be carried out according to the terms and procedures agreed in the lease, and the replacement equipment will be from the OEM or another manufacturer approved by the lessor.

4.2.10 Indemnities

As lessors do not have control over the operation of the aircraft during leasing, they request compensations from the lessee for any claim they may receive regarding the aircraft.

Indemnities can be given for the principal following reasons:

- Liability for physical damage or loss of the aircraft.
- Liability for damage to third parties (passengers or non-passengers).

In order to face these compensations, normally the lessor requires that the lessee obtains an insurance to cover its obligations of facing the claims derived from any

4. Aircraft Leasing Structure

problem occurred during the operation of the airplane. Besides, the lessor should be included in it as one of the insured parties.

4.2.11 Insurances

Apart from what has been mentioned about compensations in the previous section, mainly, the lessee is required by law to insure the aircraft, but normally the lessor uses the leasing contract to ensure that the airline complies with it.

Aircraft insurances are typically divided into hull and liability:

- Typically, in hull insurances the lessor requires the operator to insure the aircraft at a negotiated value upon signing the contract and is normally greater than the market value of the aircraft. In case of total loss of the aircraft, that is, if it is so damaged that the amount of money necessary for the repair exceeds its current value, the lessor will be the only beneficiary.
- Liability insurances provide limited coverage of damage to third parties as passengers, cargo or baggages.

4.2.12 Redelivery

The conditions and the necessary steps in the return of the plane are established in the lease contract. The main objective is that the aircraft is returned on the date, complies with the specified physical conditions and is delivered along with all its relevant records. In addition, sometimes its deregistration is also included as a condition.

The dates and conditions in the redelivery are very important, since it is common for the lessor to lease the plane right after again, so if it is not in a certain physical state and is not returned on time, the new operator can reject the contract or delay the reception until fulfilling the status agreed. If this happens, the first lessee would be in charge of making the necessary repairs on the plane.

4.2.13 Events of default

The Events of Default (EoD), are breaches of the contract that trigger the lessor remedies. The EoD clauses are normally negotiated as a part of the lease.

Some of the EoD contemplated in operating leases are:

- **Non-payment of rent, maintenance reserves or other obligations.** For these payments, normally, a short grace period is agreed, as the cause of a non-payment in the scheduled day could be a delay due to an issue of electronic banking.

4. Aircraft Leasing Structure

- **The non-maintenance of an insurance policy during the lease period.** For insurances, no grace period is given. If this happens, the lessor would oblige the airline to put the aircraft out of service.
- **Bankruptcy.** In case of bankruptcy the law that applies is not the governing law of the lease, but the law of the state that has jurisdiction over the airline.
- **Change of ownership.** The change of ownership of the lessee is limited to prior consent of the Lessor.
- **Adverse change.** This is any change to the financial or operational situation of the lessee.
- **Cross default.** This is a provision that allows a default of the lessee on any other contract, to be considered as a default to the contract in question.

4.2.14 Remedies

In case of default and previous to the lessee being declared bankrupt, the airline's main concern before recovering payments is to repossess the aircraft, canceling the registration made by the operator and exporting it from the country in which the airline has it located.

Depending on the applicable law (governing law of the leasing contract, the law of the jurisdiction where the aircraft is located, etc), the lessor may have the power to carry out certain actions or remedies. However, in addition to this, a series of remedies are usually agreed upon in the contract, including the right of termination of the contract and recovery of the aircraft.

4.2.15 Governing law

Regarding the jurisdiction that governs the lease, it should be mentioned that normally most of the leases are governed by the English or New York laws. However, there are many other governing laws and in international operations where the Cape Town Convention applies (introduced in section 4.3 and brief report included in Annex 2), both parties of the contract can decide which law will govern the agreement or parts of the same.

4.2.16 Dispute resolution

In an operating lease contract, a dispute resolution clause is usually included, specifying or not a jurisdiction for the litigation, or giving the option to solve the situation through arbitration. This is so because normally an international contract may involve characteristics of the jurisdiction of different states and this gives rise to the plaintiff in any dispute to choose one state or another according to what benefits him most.

4. Aircraft Leasing Structure

To make the decision of how to face the disputes, both parties must be guided by the jurisdictional questionnaire to decide the forum and if they are going to opt for litigation or for arbitration.

In case there is not a clause for dispute resolution, the jurisdiction will be for the courts of the jurisdiction whose law is governing the lease.

4.3 Cape Town Convention

In 2017, a Convention on International Interests in Mobile Equipment and its Protocol on Matters Specific to Aircraft Equipment, known as the Cape Town Convention, established an international legal regime for all aircraft equipment, including engines and airframe.

Thanks to this international legal framework, confidence in leasing transactions has grown, leading to a decrease in the cost of financing aircraft and, therefore, increasing the available capital in the aviation industry and the development of modern and profitable air transport systems.

In conclusion, the legal regime established with the CTC gives a position of security to both lessors and financiers at an international level, which results in a reduction of the financing costs for lessees.

4.4 Special Purpose Vehicles for structuring leasing transactions

One of the tools used for financing and leasing commercial aircraft is the Special Purpose Vehicle (SPV). This structure is normally used by lessors of medium or small size seeking funding for an aircraft. For that, they create an SPV, which is a subsidiary of the leasing company, financed through equity from the parent company and non-recourse debt secured by the aircraft.

A key feature of SPVs, is that they are bankruptcy remotes companies, because if the parent company goes bankrupt for any reason, this would not affect the SPV and vice versa.

4.4.1 Ireland and aviation leasing

When speaking of SPV structures for financing aircrafts, it is interesting to mention the Section 110 SPV structure established in Ireland.

There are two big advantages of the S110 SPV [7].

4. Aircraft Leasing Structure

- First of all, it is structured as an orphan company, in which the equity is held by a third party that has no legal connection to principal parties involved, the asset operators and the lenders that finance the asset. This concept is similar to the bankruptcy remote explained before.
- Secondly, it allows to create a tax neutral SPV participating in a Capital Markets transaction and without a minimum profit requirement. And above all, S110 SPVs have withholding tax exemptions and VAT exemptions for investment management, investment administration, collateral administration, servicing, corporate administration and marketing services.

The financing structure and the role of each of the parties involved is well defined in Figure 10.

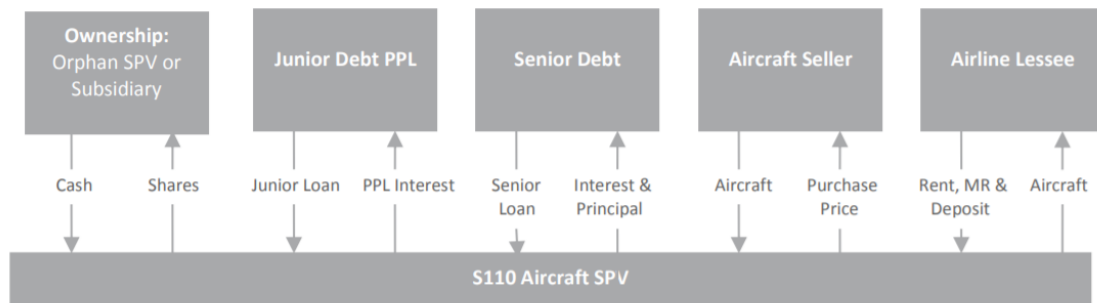


Figure 10: Section 110 SPV financial structure

Source [8]

5 Airlines Creditworthiness

5.1 Introduction

The creditworthiness of an airline constitutes a key information for lessors. It reflects the economic situation of an airline and its future capability to meet financial commitments as they come due. This information is usually summarized in a rating, that results from a previous analysis of significant financial parameters from the airline.

The main objective of this chapter is to identify the key financial variables that must be considered in such analysis in order to develop an accurate methodology to easily conclude whether the airline is creditworthy or not. For that purpose, it is necessary to provide an overview of the key financials of the commercial aviation business and illustrate such parameters with current values from different airlines.

On the other hand, externalities as political stability, economic growth, oil prices or environmental regulations, are some of the factors that must be considered to identify global trends of creditworthiness among the industry.

This chapter will focus only on commercial airlines, so some of the most important parameters to be taken into account are derived directly from the Profit and Loss account, such as gross revenue from ticket sales or operating margin, while others will be specific to the aviation industry, such as EBITDAR, Revenue Passenger Kilometers (RPK), Available Seat Kilometers (ASK) or Load Factor.

Regarding its content, chapter 2 includes a Moody's analysis on their perspective of global commercial airlines for 2019 and the fundamental business conditions taken into account when evaluating financial solvency, as well as airline creditworthiness classifications according to various sources and an in-depth study of the most relevant metrics and ratios in aircraft financing.

5.2 Moody's 2019 global airlines outlook

To understand the ratings awarded to airlines regarding their creditworthiness as debtors, it is interesting to know the internal process carried out by risk rating agencies, as well as the different factors they take into account to establish their ratings.

In this particular case, the data used is based on Moody's documentation dated December 2018, regarding its perspective of the fundamental commercial conditions of the global airline market for 2019.

5. Airlines Creditworthiness

These general industry conditions constitute Moody's vision of the future and determine what the overall trend of each debtor's individual ratings will be. Therefore, a negative perspective suggests that the set of the given ratings will be more negative on average, with respect to a year with positive expectations. This would mean that organizations will have a lower capacity to deal with their debt payments. However, the general approach for 2019 does not represent at any time an average of the ratings of debt issuers in the commercial aviation market.

On the other hand, given a determined industry scene for the next 12 to 18 months, an initial rating of the companies is established, taking into account their current situation and the expected outlook.

5.2.1 Global airlines industry qualification and main outlook drivers

Moody's qualifies the global passenger airlines industry as stable and they base their vision on the economic growth among regions, the likely evolution of aggregate operating profit margin, demand and fuel costs.

Despite the global GDP slowing growth, expected to be 2.9% in 2019 with respect to the 3.3% of 2018 Moody's assumption is that margins in the industry will remain steady at around 8% over the following 12 to 18 months. Meanwhile operating profit will continue to fall moderately.

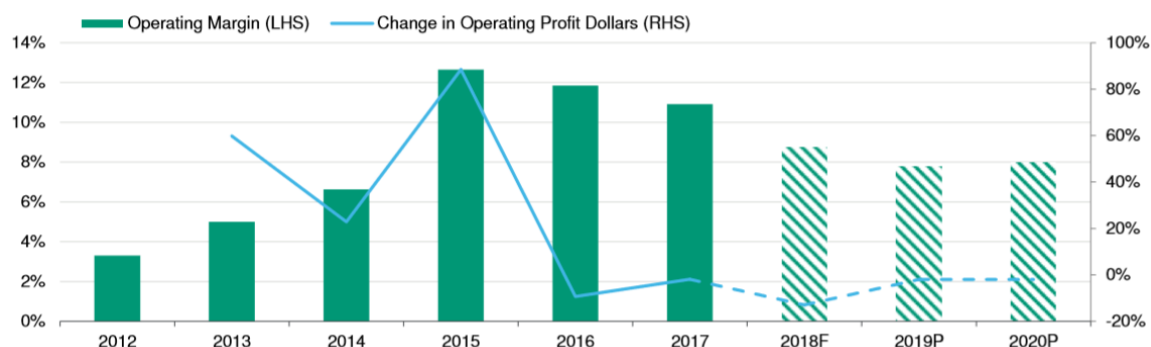


Figure 11: Evolution of Operating Margin and Operating Profits

Source [9]

Margins will be supported by pricing increases (fares and fees), lower jet fuel costs and a passenger demand that will likely continue to exceed capacity.

Indeed, Brent price as of January 21st (2019) was \$62.5 per barrel, with respect to an average of \$71 during 2018. Moody's expects an average price level of \$70 per barrel for 2019, which would give a slight margin compared to the previous year.

5. Airlines Creditworthiness

Furthermore, according to IATA (International Air Transport Association) capacity is forecasted to grow 5.8% during 2019, compared to a 6% growth on demand, although both growth rates will continue to decrease as it is shown in Figure 12.

Note that capacity is measured in Available Seat Kilometers (ASK), that stands for the number of available seats per the number of kilometers flown, whilst demand is measured in Revenue Passenger Kilometers, that is the real number of actual passengers by the kilometers travelled.

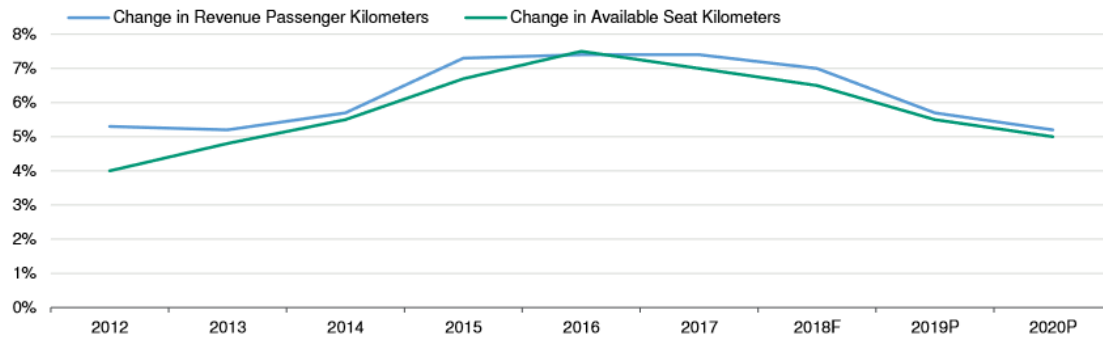


Figure 12: Capacity and demand growth evolution according to IATA

Source [9]

On the other hand, it is interesting to study what factors can cause this situation to change from stable to negative or positive.

To change to positive, according to the agency, it would be necessary for the operating margin to be greater than 10% or to expect a growth of more than 20% of the operating profit, with the operating margin being above 5%.

For the perspective to change to negative, Moody's highlights three major potential triggers:

- An excessive rise in the price of Brent, reaching \$100 for example. In this case, it would not be possible to offset the cost with a rise in fares.
- A global recession.
- The operating profit margin falls below 4%, or operating profit decreases more than 20%, while the operating margin is greater than 5%.

5.2.2 Further factors of interest and expectations

The first macro factor that can have a relevant impact on the airlines industry is the outcome of Brexit, which can trigger several scenarios at European level. A Brexit outcome in which current aviation agreements are respected will minimize the impact on European airlines. On the other hand, a Brexit outcome with a period of transition, would lead to negotiations and new agreements for European aviation. The worst-case

5. Airlines Creditworthiness

scenario would occur if Brexit is carried out without an agreement, as it could result in the temporary suspension of traffic rights.

Another issue to highlight is the relevance of environmental concerns in the industry. Although Europe already had a system of emission rights for internal flights, the International Civil Aviation Organization (ICAO) has agreed to a Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), in order to establish a CO2 emissions market for international flights. This plan has been voluntarily adopted by more than 70 countries and will come into force in 2021, setting an emissions base line in 2020. Given these measures, companies must decide if it is more profitable to pay compensation for exceeding the emissions base line or investing in the development of less polluting technologies.

5.2.3 Airlines ratings

Moody's is currently evaluating a set of 21 airlines around the world using the scale detailed in Figure 13.

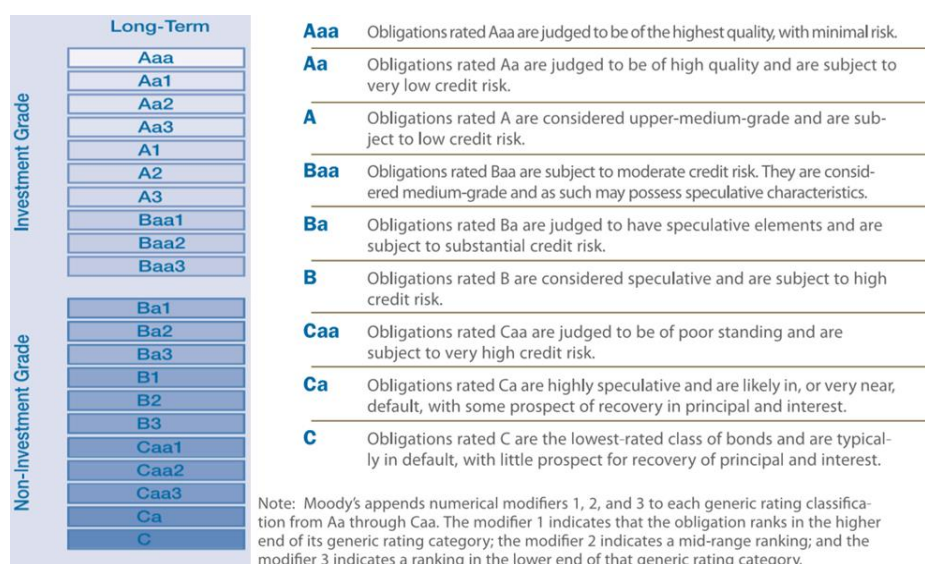


Figure 13: Moody's long-term rating definitions and scale

Source [10]

To illustrate the comments in previous sections, below, 3 examples of airlines qualified by Moody's are shown.

5. Airlines Creditworthiness

- » **American Airlines Group (Ba3 stable)**
 - Needs to rationalize cost structure to close gap with peers, which began with headcount reductions across G&A functions in second half of 2018; free cash flow to remain about break even as capex rises about \$900 million. Will remain the most leveraged airline in our rated universe of 21 airlines, with debt/EBITDA of about 4.5x to 5.0x.
- » **Southwest Airlines Co. (A3 stable)**
 - Commencement of service to Hawaii will enhance the network's appeal to customers. At least comparable revenue and earnings growth versus peers in 2019 would demonstrate the strength of the brand.
- » **British Airways Plc (Baa3 stable)**
 - A disorderly Brexit constitutes the greatest risk to the company's credit metrics, although the Baa3 rating would likely hold if the impact is modest and temporary. Even in the unlikely event that service to Europe or the US were to be disrupted for a month, it would be manageable for BA because of its very strong liquidity.

Figure 14: Rating examples

Source [9]

According to the scale used, Southwest Airlines would be the company with the highest credit rating, followed by British Airways and finally by American Airlines. On the other hand, the obligations of Southwest are considered low risk, while those of British Airways are moderate risk and those of American Airlines would be outside the range of ratings that are considered investment grade, from the agency's perspective.

5.3 Global airlines rating sample

In addition to the Moody's analysis and in order to compare results, this section includes a rating example, in which financial evaluations from Fitch, Moody's and Standard & Poor's are taken into consideration. Table 1 shows a selection of airlines and its ratings from each of the three most relevant agencies.

Airlines

	Fitch	Moody's	S&P
Aeroflot	BB-(stable)	-	-
Air Canada	BB-(pos)	Ba2(stable)	BB(pos)
Air New Zealand	-	Baa2(stable)	-
Alaska Air Group	BBB-(stable)	-	BB+(stable)
Allegiant Travel Company	-	Ba3(stable)	BB-(stable)
American Airlines Group	BB-(stable)	Ba3(stable)	BB-(stable)
Avianca Holdings - IFRS	B(stable)	-	B(stable)
British Airways	BBB-(stable)	Baa3(stable)	BBB-(stable)
Delta Air Lines	BBB-(stable)	Baa3(stable)	BBB-(stable)
EasyJet	-	Baa1(stable)	BBB+(stable)
Ethiad Airways	A(stable)	-	-
Gol	B(stable)	B2(stable)	B-(stable)
Hawaiian Airlines	BB-(stable)	Ba3(stable)	BB-(stable)
Jetblue	BB(pos)	Ba1(stable)	BB(stable)
Latam Airlines Group	B+(pos)	Ba3(stable)	BB-(stable)
Lufthansa Group	-	Baa3(stable)	BBB-(pos)
Qantas Airways	-	Baa2(stable)	BBB-(stable)
Ryanair	BBB+(stable)	-	BBB+(stable)
SAS	-	B1(stable)	B+(stable)
Southwest Airlines	BBB+(pos)	A3(stable)	BBB+(stable)
Spirit Airlines	BB(neg)	-	BB-(stable)
Turkish Airlines	-	Ba3(neg)	B+(stable)
United Continental Holdings	BB(stable)	Ba2(stable)	BB(stable)
US Airways Group	-	-	-
Virgin Australia	-	B2(stable)	B+(stable)
Westjet	-	Baa3(neg)	BBB-(neg)
Wizz Air	BBB(stable)	Baa3(stable)	-

Table 1: Airline ratings from S&P, Moody's and Fitch

Source: [11]

According to the results displayed, Table 2 shows the best 3 rated airlines:

Airline	Fitch	Moody's	S&P
Southwest Airlines	BBB+(pos)	A3	BBB+(stable)
Ryanair	BBB+(stable)	-	BBB+(stable)
EasyJet		Baa1(stable)	BBB+(stable)

Table 2: Top 3 airlines ratings

Only few airlines are included in this example and not all them are rated by all the agencies, but the fact that the first 3 airlines are low cost is not a coincidence. Indeed, global low-cost carriers are expanding both in domestic markets and international long-distance routes, putting pressure on traditional operators. In addition, with the slowdown of the economic growth, low fare strategies and higher capacity are required, which favors the development of low-cost and challenges the capacity of other carriers to maintain and increase their operating margins.

5.4 Best credit rating variables for airlines

This section includes a personal analysis of the best variables to analyze airlines creditworthiness, based on the investigation of the most relevant financial parameters in the industry.

Each variable considered as significant is going to be explained through its calculation. Afterwards, a credit rating comparison will be carried out between two recognized and strategically different airlines, British Airways and Ryanair, taking information from their latest annual reports (2018) and drawing some conclusions about the financial differences between a low-cost carrier and a flagship carrier.

5.4.1 Variable selection and explanation

Here it is provided a brief description of the chosen variables:

- **Passenger Revenues:** mostly ticket sales, but also increasingly ancillary revenues.
- **Net Income and Net Income Margin:** profit after taxes and profit after taxes as a percentage of total sales, respectively. These variables are simple but are important because they reflect the portion of ticket sales that covers costs versus the portion that goes to earnings.
- **Passenger Revenue per Passenger:** passenger revenue in an average length flight.

5. Airlines Creditworthiness

Its formula is:

$$\text{Passenger Revenue per Passenger} = \frac{\text{Passenger Revenues}}{\text{RPK}} * \text{Trip length}$$

- **Passenger Yield:** passenger revenue per kilometer.

Its formula is:

$$\text{Passenger Yield} = \frac{\text{Passenger Revenues}}{\text{RPK}}$$

- **Load Factor:** gives us information about the percentage of occupancy of the airline's aircrafts.

Its formula is:

$$\text{Load Factor} = \frac{\text{RPK [passenger * kilometer]}}{\text{ASK [seats * kilometer]}}$$

ASK and RPK have been explained before in section 2.2.1.

- **RASK-CASK Margin:** provides the profit margin of an airline for each seat available and per kilometer.

Its formula is:

$$\text{RASK} - \text{CASK} = \text{Revenue per ASK} - \text{Cost per ASK}$$

- **EBITDAR:** earnings before interest, tax, depreciation, amortization and aircraft rentals. The EBITDAR is only calculated for airlines, since in fact the leases are usually accounted as interest in other businesses. According to its definition, EBITDAR margin is neutral to the degree of financial leverage of an airline and the way of financing aircraft. Besides, as it is independent from the financing strategies chosen, it is a good variable for measuring success in airline management and financial viability of the business.

- **Fixed Charge Cover:** financial flexibility indicator that indicates the capacity of the airline to cover its charges (net interests and aircraft rentals) with EBITDAR.

Its formula is:

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$$\text{Fixed Charge Cover} = \frac{\text{EBITDAR}}{\text{Net Interests} + \text{Aircraft Rentals}}$$

- **Adjusted Net Debt – EBITDAR ratio:** this ratio gives the number of years that the company needs to pay its debt if it and its EBITDAR remain constant. Net debt is adjusted by the total value of the lease (length average of aircraft leasing contracts is usually 8 years).

Its formula is:

$$\text{Adjusted Net Debt - EBITDAR} = \frac{\text{Net Debt} + (8 * \text{Aircraft rent})}{\text{EBITDAR}}$$

5.4.2 Ryanair-British Airways credit rating comparison

The results of the variables discussed in the previous section for the Ryanair and British Airways cases are shown in Table 3.

	Ryanair	British Airways
Passenger Revenues (million €)	5,148.72	12,398.39
Net Income (million €)	1,450.20	1,559.51
Net Income Margin	0.20	0.11
Passenger Revenue per Passenger (€/passenger)	39.47	274.51
Passenger Yield (c€/passenger*kilometer)	3.17	9.6
RPK (passenger*kilometer) (in millions)	162,676.33	146,561
ASK (seat*kilometer) (in millions)	170,265.70	179,077
Load Factor (passenger/seat)	0.96	0.82
RASK-CASK Margin (c€/seat*kilometer)	0.98	0.99
EBITDAR (million €)	2,310.60	3,094.25
Fixed Charge Cover	16.50	9.3
Adjusted Net Debt - EBITDAR	0.40	1.19

Table 3: Variable results

The conclusions derived from the analysis of variables are the following:

- Firstly, it can be seen that the Net Income of both companies is similar, while Ryanair's Passenger Revenues are less than half of those of British Airways. This means that the ASK of British Airways sells more expensive but has costs much higher than those of Ryanair. Therefore, Ryanair's Net Income Margin is higher since its benefits are more similar to its income.
- On the other hand, Ryanair's Load Factor is 14% higher than the British Airways, which means that they attain a higher occupancy of their aircraft on each flight they carry out.

5. Airlines Creditworthiness

- As per the Fixed Charge Cover values, it can be also concluded that both airlines have a good capacity to meet their rent and interest payments, which indicates that financing them does not involve much risk.
- Finally, it can be observed that British Airways is much more indebted than Ryanair, with its Adjusted Net Debt ratio with respect to EBITDAR being 79% higher.

This example clearly shows the difference between the business model of a low-cost airline such as Ryanair, with lower revenues per passenger but with very low costs and a capacity use close to 100%, compared to a traditional carrier such as British Airways, in which both ticket sales revenues and costs are much higher.

Besides, variables that indicate financial flexibility, clearly highlight the superior creditworthiness of Ryanair with respect to British Airways, with a Fixed Charge Cover of 16.5 versus 9.3 and Adjusted Net Debt - EBITDAR ratio of 0.4 versus 1.19.

6 The Aircraft Leasing Market

6.1 Introduction

The aircraft leasing market has grown enormously, from being virtually non-existent in the 70s, to currently account for about 45% of the commercial aircraft fleet, thus becoming one of the largest sources of aircraft financing.

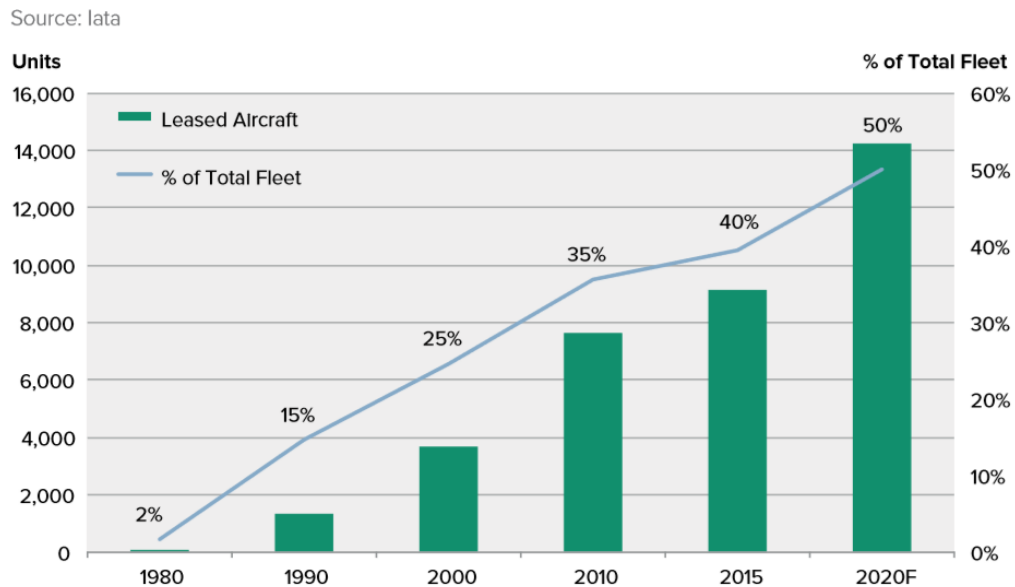


Figure 15: Leased aircraft as a proportion of total fleet

Source [5]

These data support the great importance that leasing companies have acquired in the aviation industry and all the business that has been developed around aircraft leasing.

Thus, many Airlines, instead of buying a new aircraft that would be very expensive for them, rent the airplane they want and upgrade their fleet when their capacity needs change. Besides, typically, as leasing companies do not buy just one airplane, they have more bargaining power with the OEMs and obtain better deals than the airlines. This is especially true in the case of large lessors (such as AerCap or GECAS), with good creditworthiness and low financing costs due to their affiliation with large financial entities.

Regarding the content, as chapter 5 focuses on airlines, their creditworthiness and the explanation of the key financial variables for their analysis, this chapter directs its attention to the party in the other side of the lease, the lessor. Thus, chapter 6 includes an analysis of the leasing market, the lessors, its trends and future developments.

6.2 Leasing market evolution in the last decade

From 2008 to 2018, almost 100 new players have entered the commercial leasing market, attracted by the market growth and the margins from leasing offers. Thus, a large amount of liquidity has been introduced into the sector, with the establishment of many new leasing companies (Zephyrus Aviation Capital, Cerberus Aviation Capital, Sirius Aviation), the mass entry of Chinese banks and the formation of sidecar investment funds⁴.

Besides, merger and acquisitions have also increased among different lessors, who seek to join to have access to different types of financing and compete with the largest companies in the market.

As a result of these dynamics, a super competitive market is being created in which the number of offers placed by lessors for agreements with airlines (especially in sale and leasebacks) can be greater than 30 for a single plane.

All this suggest that leasing companies have to lower the lease factor rates (LFRs) to levels below 0.6% or even 0.5% in some cases. Which, according to the example in Figure 16, means that it is not possible to obtain a positive IRR equity with those rates, being the example taken a liquid narrow-body.

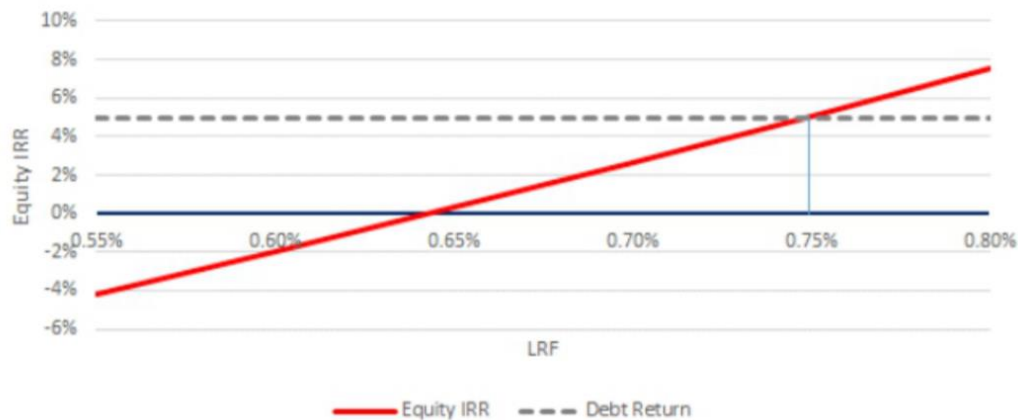


Figure 16: Sensitivity of Equity IRR to changes in LRF

Source [12]

In addition to the decline in LFRs, some airlines are trying to take advantage of the situation to negotiate more flexible contracts, with a reduction or elimination of maintenance reserve payments.

⁴ Sidecar investment funds: investment vehicle in which different investors with various interests are involved. In aviation, these funds are used by lessors for financing off-balance sheet aircraft.

6. The Aircraft Leasing Market

However, most lessors believe that this situation is not sustainable and do not agree to the extreme lowering of the LFRs or other requests of that type. Even so, given this highly competitive situation, it is not foreseeable that the LFRs will rise again to 1% levels and the leasing companies should be cautious with the conditions of the contracts they close.

6.3 Lessor competitive landscape

Looking at the global set of leasing companies, it can be seen that there are mainly two, GECAS (General Electric Capital Aviation Services) and AerCap, which have a fleet of airplanes considerably larger than the other lessors, with more than 1,000 aircraft. This is shown in Table 4, which brings together a ranking of 30 top lessors, according to the size of their fleet (as of June 30th, 2018).

Rank	Lessor	Total	% change since last year		Turboprop	Regional jet	Narrowbody	Widebody
1	GECAS	1,225	↓	-3.8%	20	273	770	162
2	AerCap	1,089	↓	-2.9%	-	-	795	294
3	Avolon	582	↑	1.7%	-	52	437	93
4	BBAM ¹	450	↑	10.2%	-	2	327	121
5	Nordic Aviation Capital	428	↑	5.8%	264	157	7	-
6	SMBC Aviation Capital	408	↓	-7.1%	-	3	362	43
7	DAE Capital	327	↓	-2.1%	51	-	217	59
8	Air Lease	323	↑	13.9%	-	2	252	69
9	BOC Aviation	297	↓	-0.7%	-	-	246	51
10	Aviation Capital Group	275	↑	0.4%	-	-	265	10
11	ICBC Leasing	267	↑	6.4%	-	5	231	31
12	Aircastle	240	↑	10.8%	-	6	199	35
13	ORIX Aviation	232	↑	9.9%	-	-	207	25
14	Macquarie AirFinance	195	↓	-3.6%	-	3	181	11
15	Apollo Aviation Group	192	↑	22.9%	-	-	162	30
16	CDB Leasing	190	↑	5.8%	-	20	143	27
17	BOCOMM Leasing	184	↑	37.5%	-	10	151	23
18	Castlelake	182	↑	19.8%	14	14	126	28
19	Avmax	172	↑	9.3%	80	79	11	2
20	Jackson Square Aviation	151	↑	3.3%	-	-	133	18
21	Standard Chartered Bank	135	↑	1.5%	-	-	123	12
22	Deucalion Aviation Funds	123	↑	10.6%	-	-	94	29
23	Goshawk ²	115	↑	26.1%	-	1	108	6
24	China Aircraft Leasing	112	↑	17.0%	-	-	106	6
25	Cargo Aircraft Management	93	↑	5.4%	-	-	9	84
26	Tokyo Century Leasing	92	↑	10.9%	-	6	67	19
27	CMB Financial Leasing	79	↑	59.5%	-	4	57	18
28	Elix Aviation Capital	77	↓	-2.6%	77	-	-	-
28=	Falko	77	↑	3.9%	17	56	4	-
30	CCB Leasing	76	↑	5.3%	-	2	62	12

Table 4: Top 30 leasing companies ranked by number of aircraft

Source [13]

6. The Aircraft Leasing Market

According to the data shown, only the first 3 lessors would possess 34.5% of the total number of aircraft collected in the ranking.

Following with the analysis, it is observed that all the lessors mainly have narrow-body aircraft, which are the most liquid. However, Nordic Aviation Capital is the exception, with 264 turboprop (propeller-type) aircraft, 157 regional jets and only 7 narrow-body type aircraft. This type of fleet places Nordic Aviation Capital as the most influential lessor in the niche markets of these aircraft.

On the other hand, if the ranking by value of the fleet is carried out (Table 5), AerCap will climb to the first place, since it has a greater number of narrow-body and wide-body, which are what have the most value. Meanwhile, Nordic Aviation Capital will be dropped to the 16th place, since it mainly has small and regional aircraft.

Rank	Lessor	Total	% change since last year	Turboprop	Regional jet	Narrowbody	Widebody
1	AerCap	\$36,831	↑ 4.7%	-	-	\$18,490	\$18,342
2	GECAS	\$26,713	↓ -6.0%	\$274	\$1,762	\$16,162	\$8,514
3	BBAM ¹	\$22,350	↑ 11.8%	-	\$33	\$9,987	\$12,330
4	Avolon	\$21,419	↑ 0.8%	-	\$964	\$13,408	\$7,047
5	SMBC Aviation Capital	\$16,300	↓ -6.7%	-	\$52	\$11,870	\$4,378
6	Air Lease	\$15,994	↑ 13.9%	-	\$40	\$8,874	\$7,080
7	BOC Aviation	\$14,219	↑ 2.5%	-	-	\$9,163	\$5,056
8	ICBC Leasing	\$12,019	↑ 2.0%	-	\$126	\$8,819	\$3,074
9	DAE Capital	\$11,323	↓ -2.9%	\$791	-	\$6,427	\$4,105
10	Aviation Capital Group	\$8,812	↑ 3.9%	-	-	\$8,107	\$705
11	BOCOMM Leasing	\$8,281	↑ 30.6%	-	\$262	\$5,685	\$2,334
12	CDB Leasing	\$7,296	↑ 4.2%	-	\$425	\$5,290	\$1,580
13	ORIX Aviation	\$7,132	↑ 6.8%	-	-	\$5,573	\$1,559
14	Jackson Square Aviation	\$6,929	↑ 2.0%	-	-	\$5,178	\$1,751
15	Aircastle	\$6,533	↓ -1.4%	-	\$142	\$4,432	\$1,959
16	Nordic Aviation Capital	\$6,237	↑ 1.9%	\$3,122	\$2,881	\$233	-
17	Amedeo	\$5,715	↑ 53.9%	-	-	\$38	\$5,677
18	Macquarie AirFinance	\$5,333	↓ -9.2%	-	\$48	\$4,631	\$654
19	Standard Chartered Bank	\$5,282	↓ -5.6%	-	-	\$4,578	\$704
20	Goshawk ²	\$4,914	↑ 28.4%	-	\$22	\$4,144	\$749
21	China Aircraft Leasing	\$4,329	↑ 16.5%	-	-	\$3,920	\$409
22	CMB Financial Leasing	\$4,189	↑ 64.7%	-	\$118	\$2,235	\$1,835
23	CCB Leasing	\$3,890	↑ 3.0%	-	\$45	\$2,533	\$1,313
24	Tokyo Century Leasing	\$3,648	↑ 1.6%	-	\$111	\$2,282	\$1,255
25	Deucalion Aviation Funds	\$3,463	↑ 23.0%	-	-	\$1,731	\$1,732
26	Apollo Aviation Group	\$3,399	↑ 20.5%	-	-	\$2,547	\$852
27	IAFC	\$3,251	↑ 26.7%	-	-	\$1,088	\$2,162
28	FPG Amentum	\$3,150	↑ 41.9%	\$70	-	\$1,605	\$1,474
29	Novus Aviation	\$2,958	↑ 42.1%	-	-	\$479	\$2,479
30	Aircraft Leasing & Management	\$2,939	↑ 83.9%	-	\$393	\$1,638	\$908

Table 5: Top 30 lessors by portfolio value in millions (as of June 30th 2018)

Source [13]

Finally, leasing companies could also be classified by the number of orders placed to manufacturers (Table 6). This is an interesting ranking, since it provides an idea of the lessor's growth strategy.

6. The Aircraft Leasing Market

Rank	Lessor	Total	Turboprop	Regional jet	Narrowbody	Widebody
1	GECAS	415	11	5	389	10
2	AerCap	397	-	50	301	46
3	Air Lease	362	-	-	274	88
4	Avolon	309	-	-	254	55
5	China Aircraft Leasing	238	-	30	208	-
6	SMBC Aviation Capital	237	-	-	236	1
7	CDB Leasing	191	-	-	183	8
8	BOC Aviation	184	-	-	169	15
9	Aviation Capital Group	163	-	-	159	4
10	ICBC Leasing	133	-	50	83	-
11	ALAFCO	125	-	-	117	8
12	Ilyushin Finance	106	2	30	73	1
13	AVIA Capital Services	85	-	-	85	-
14	VEB Leasing	68	-	7	61	-
15	Macquarie AirFinance	60	-	-	60	-
16	Jackson Square Aviation	56	-	-	54	2
17	Nordic Aviation Capital	52	35	17	-	-
18	China Construction Bank	50	-	-	50	-
18=	China Huarong Financial Leasing	50	-	20	30	-
20	Goshawk	49	-	-	47	2
21	ABC Financial Leasing	45	-	-	45	-
22	Everbright Financial Leasing	33	-	-	33	-
23	BOCOMM Leasing	32	-	-	32	-
24	Aircastle	25	-	25	-	-
25	Fly Leasing	22	-	-	22	-
26	Incline Aviation	22	-	-	22	-
27	Amedeo	20	-	-	-	20
27=	Lease Corporation International	20	-	3	17	-
27=	Comsys Aviation Leasing	20	-	20	-	-
30	State Transport Leasing	19	-	19	-	-

Table 6: Top 30 lessor's orderbooks (as of June 30th 2018)

Source [13]

Removing from the scene the giants, GECAS and AerCap, Air Lease climbs in the ranking to be the third companies with more orders placed, and specifically, the one that more wide-body aircrafts accumulates in its order book. It should also be noted that in 2018 Air Lease had in its order book a greater number of aircraft than in its portfolio. All this is related to the growth strategy of the American company, expecting a growth in demand for this type of aircraft, since, according to data obtained from its reports:

- More than 3,000 Boeing and Airbus jets will reach 20 years between 2020 and 2025, as shown in Figure 17.

6. The Aircraft Leasing Market



Figure 17: Prevision Boeing and Airbus jets older than 20 years

Source [14]

- Air lease keeps being optimistic about the wide-body demand, having a large number of companies interested in leasing them, as shows Figure 18.



Figure 18: Prevision of Airbus and Boeing wide-body aircraft older than 25 years and customers

Source [15]

6.4 Trends in the global leasing industry

The analysis of the industry trends will be carried out using financial values of a representative sample of 20 lessors from 2013 to 2018. As not all the leasing companies are considered, the data are not exact, but they show us the line followed by market in general.

The data are taken from the Airfinance Journal and presented Table 7.

		Leasing Industry				
		2013/2014	2014/2015	2015/2016	2016/2017	2017/2018
Revenues (\$bn)		19,4	19,9	21,5	22,2	22,9
PP&E⁵ (\$bn)		150,6	149,1	160,1	168,2	181,2
Net Income (\$bn)		2,3	3,9	4,1	4,7	5,4
Lease yield		12,2%	12,8%	12,8%	12,7%	12,3%
Debt/equity		2,5	2,8	2,7	2,8	2,9
Debt (\$ bn)	Secured	46	47	47	51	40
	Unsecured	30	37	59	59	68
	Parent company	6	7	9	9	8
	Subordinated	1	1	2	2	2
Average interest cost		4,5%	4,4%	4,5%	4,2%	4,0%
ROE		5,4%	9,6%	9,0%	9,7%	11,1%

Table 7: Leasing industry financial highlights

Source [13]

6.4.1 Profitability

From the values of revenues and assets, it is determined that the industry maintains a growth trend, reaching a global portfolio value of \$ 181 billion in the last year and a profit of \$ 22.9 billion. It is worth mentioning that the joint contribution of GECAS and AerCap to profit is \$ 10.43 billion (\$ 5.4 billion from GECAS and \$ 5.03 billion from AerCap [16]), with almost half of the benefits of the group included in the study.

Regarding the lease yield, it reached its maximum between 2014 and 2016, with a 12.8%, while from 2016 to 2018 there has been a downward trend until reaching a 12.3% (Figure 19).

⁵ PP&E: Property, Plant and Equipment

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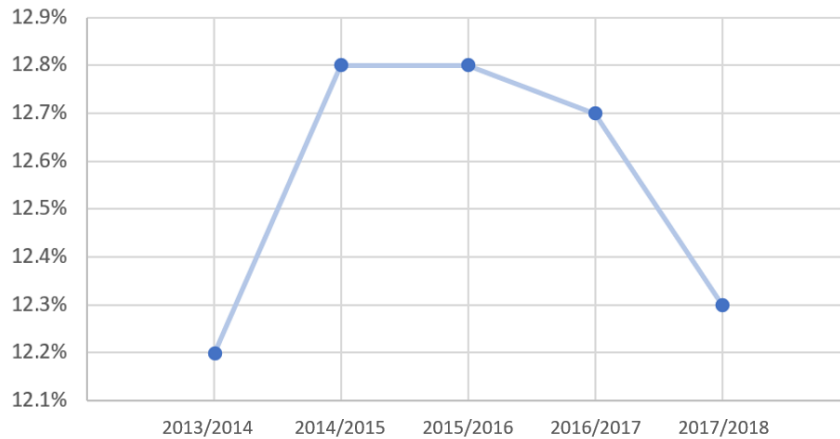


Figure 19: Lease yield evolution

One of the causes of these decreasing margins is the evolution towards an increasingly competitive market, as mentioned in section 6.1, in which airlines press to find cheaper prices.

6.4.2 Financial flexibility

Leverage of the lessors has increased during these five years, from a debt to equity ratio of 2.5 to 2.9, as shown in Figure 20. This means that they have a conservative capital structure mostly based on debt.

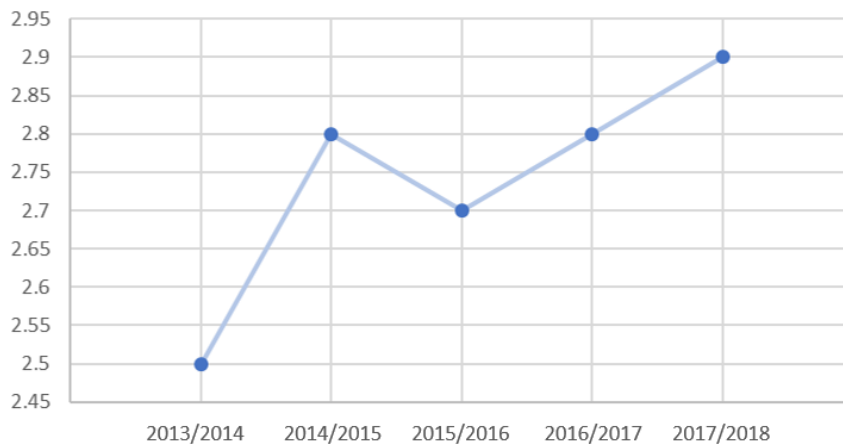


Figure 20: Debt to equity ratio evolution

However, the past trend of financing mostly through secure debt has decreased considerably in the last two years, leading to an increase in unsecure debt. Meanwhile, the levels of subordinated debt and debt covered by parent companies have also increased but maintain more stable levels.

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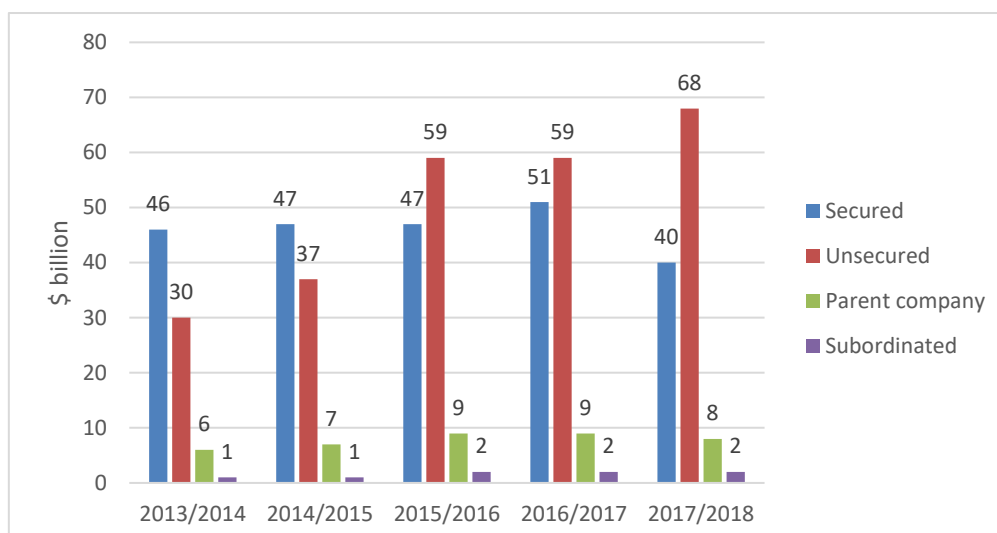


Figure 21: Debt structure

Financing through unsecured debt allows lessors to have greater financial flexibility, with lower transaction costs, but with higher coupons. In addition, rating agencies value positively that the lessors have little volume of secured debt to grant them investment grades. Thus, as observed in Table 8 and according to the information in Annex 1, companies such as Aircastle, ALC, SMBC AC, ACG and BOC Aviation (apart from the giants AerCap and GECAS) obtain investment grades from the 3 major rating agencies.

	Fitch	Moody's	S&P
AerCap	BBB-(stable)	-	BBB-(stable)
ALC	BBB(stable)	-	BBB(stable)
Aircastle	BBB-(stable)	Baa3(stable)	BBB-(stable)
Avation	BB-(stable)	-	B+(pos)
ACG	BBB+(pos)	-	A-(stable)
Avolon	BB(pos)	Ba2	BB+(stable)
AWAS	-	Ba3(pos)	BB+(stable)
BOC Aviation	A-(stable)	-	A-(stable)
DAE	-	Ba2(pos)	BB+(stable)
FLY	-	Ba3(neg)	BB-(stable)
ILFC	BBB-(stable)	Baa3(stable)	-
Park Aerospace (Avolon)	BB(pos)	Ba3	-
SMBC AC	A-(stable)	-	BBB+(stable)

Table 8: Lessor credit ratings

Source [13]

6.4.3 Returns

According to the analysis, the average group's ROE has increased from 9% to 11% during the period studied, as shown in Figure 22.

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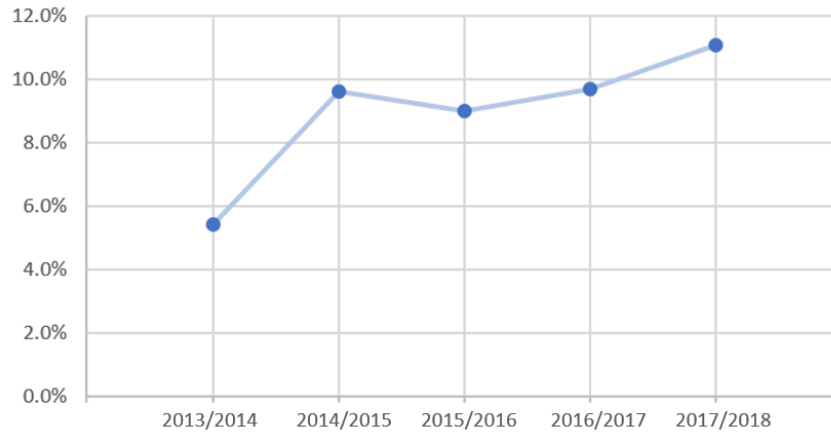


Figure 22: Return on equity evolution

Despite the leasing yield decrease mentioned before in the chapter, this increasing trend of ROE could be derived from various causes, as different variables influence its value. To study the reasons to its changes, the Dupont analysis formula is going to be used:

$$\text{Dupont formula of ROE} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Equity}}$$

$$\text{Dupont formula of ROE} = \text{Margin} \times \text{Asset turnover} \times \text{Leverage}$$

Thus, from Dupont analysis of ROE, although the lease yield drop would contribute to a decrease in the margin, ROE could be increasing due to:

- An increase in leverage, promoted by low LIBOR rates.
- More efficient management of assets.
- A reduction in costs of any type, that would mean a positive impact to margins.

6.5 Lessor analysis and comparison

In this section a financial analysis of Aircastle is carried out, taking the data from its Annual Report of 2018, and it is compared with other lessors in the industry, using an Airfinance Journal study that includes 20 leasing companies.

Aircastle has been chosen since it is one of the companies included in the study of the industry, has public financial information and is among the investment grade leasing companies.

6.5.1 Profitability

Beginning with the financial variables of profitability, Aircastle obtained profits of \$ 796.62 million (related to lease rentals) and a Net Income of \$ 147.87 million in the fiscal year of 2017. These numbers place it as company number 8 in terms of revenues and ninth in relation to net income, being passed by BOA Leasing and ACG, which means that

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these companies have a more efficient cost structure even with lower revenues. The comparison with the other companies in the study is shown in the following charts.

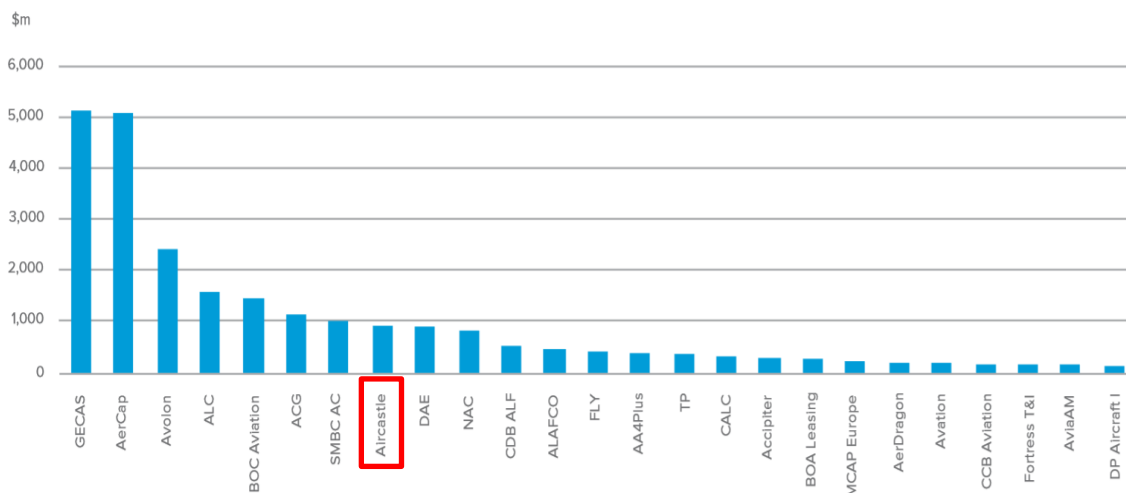


Figure 23: Revenues comparison (in descending order)

Source [13]

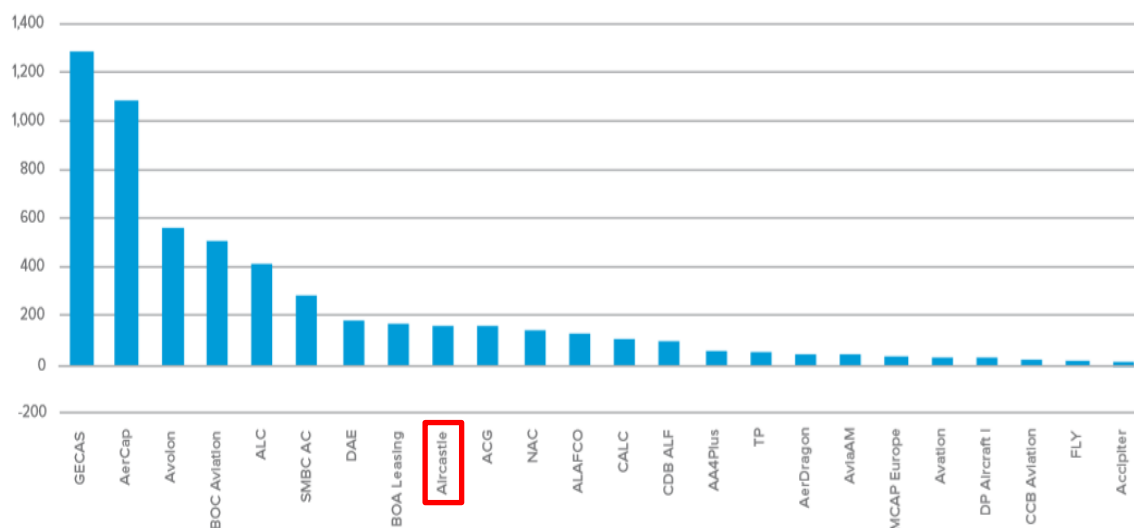


Figure 24: Net income comparison (in descending order)

Source [13]

Regarding the financial margin obtained from the leases, Aircastle portfolio's yield was 12.2%, according to information provided in its annual report [7] for the year 2017, while the cost of the debt was approximately 5.04%.

To determine the cost of the debt, the following process is carried out:

Taking the information from Table 9, the cost of debt can be calculated as the weighted-average cost of outstanding borrowings secured and unsecured.

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Debt Obligation	At December 31, 2017			At December 31, 2016	
	Outstanding Borrowings	Number of Aircraft	Interest Rate	Final Stated Maturity	Outstanding Borrowings
Secured Debt Financings:					
ECA Financings ⁽¹⁾	\$ 227,491	6	3.02% to 3.96%	12/03/21 to 11/30/24	\$ 305,276
Bank Financings ⁽²⁾	634,898	23	2.22% to 4.45%	09/11/18 to 01/19/26	933,541
Less: Debt Issuance Costs	(12,515)				(19,783)
Total secured debt financings, net of debt issuance costs	849,874	29			1,219,034
Unsecured Debt Financings:					
Senior Notes due 2017	—		6.750%	04/15/17	500,000
Senior Notes due 2018	400,000		4.625%	12/15/18	400,000
Senior Notes due 2019	500,000		6.250%	12/01/19	500,000
Senior Notes due 2020	300,000		7.625%	04/15/20	300,000
Senior Notes due 2021	500,000		5.125%	03/15/21	500,000
Senior Notes due 2022	500,000		5.500%	02/15/22	500,000
Senior Notes due 2023	500,000		5.000%	04/01/23	500,000
Senior Notes due 2024	500,000		4.125%	05/01/24	—
Unsecured Term Loan	120,000		3.589%	04/28/19	120,000
Revolving Credit Facilities	175,000		3.680%	11/21/19 to 05/13/20	—
Less: Debt Issuance Costs	(31,268)				(32,789)
Total unsecured debt financings, net of debt issuance costs	3,463,732				3,287,211
Total secured and unsecured debt financings, net of debt issuance costs	\$ 4,313,606				\$ 4,506,245

(1) The borrowings under these financings at December 31, 2017 have a weighted-average rate of interest of 3.59%.

(2) The borrowings under these financings at December 31, 2017 have a weighted-average fixed rate of interest of 3.68%.

Table 9: Outstanding amounts of secured and unsecured term debt financings

Source [17]

First the interests are calculated:

2017	
Unsecured Debt Financings	Interests (\$ thousands)
Senior Notes due 2017	9,843.75
Senior Notes due 2018	18,500
Senior Notes due 2019	31,250
Senior Notes due 2020	22,875
Senior Notes due 2021	25,625
Senior Notes due 2022	27,500
Senior Notes due 2023	25,000
Senior Notes due 2024	14,609
Unsecured Term Loan	4,307
Resolving Credit Facilities	6,440
Total	185,949.93

Table 10: Interests related to unsecured outstanding borrowings

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2017	
Secured Debt Financings	Interests (\$ thousands)
ECA Financings	8,166.93
Bank Financings	23,364.25
Total	31,531.17

Table 11: Interests related to secured outstanding borrowings

Then, the costs of unsecured and secured debt are calculated, with the interests and the total outstanding borrowings:

$$\text{Cost of unsecured debt} = \frac{185,949.93}{3,463,732} = 5.37\%$$

$$\text{Cost of secured debt} = \frac{31,531.17}{849,874} = 3.71\%$$

Last, the cost of debt is the weighted average of the costs of secured and unsecured debt.

$$\begin{aligned} \text{Cost of debt} &= \frac{\text{Unsecured}}{\text{Secured} + \text{Unsecured}} * \text{Cost of unsecured debt} \\ &+ \frac{\text{Secured debt}}{\text{Secured} + \text{Unsecured}} * \text{Cost of secured debt} = \mathbf{5.04\%} \end{aligned}$$

All this leaves a financial margin of 7.16%, being its debt cost one of the highest in the industry, as it is observed in Figure 25.

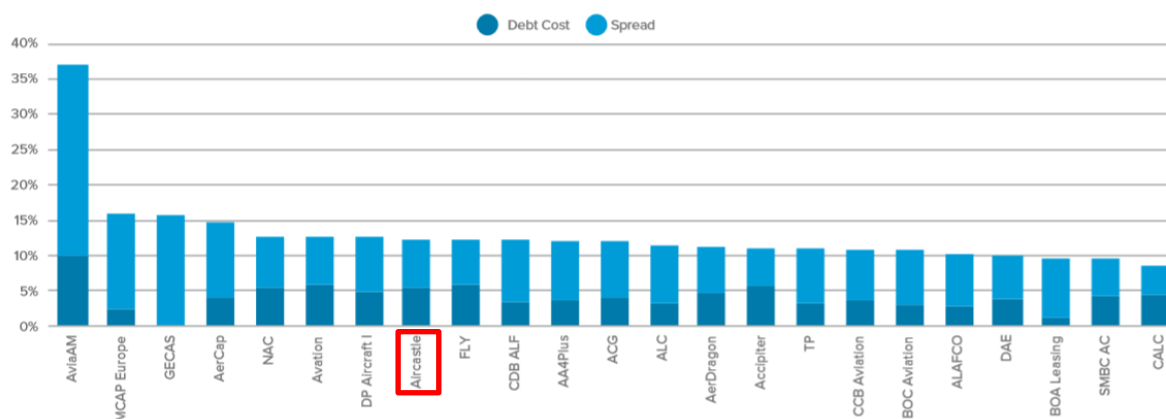


Figure 25: Yield and debt cost comparison (in descending order of yield)

Source [13]

Besides, it is worth mentioning that Aircastle obtained a profit of \$ 55,167 million with the sale of flight equipment, which corresponds to 37.7% of its PBT.

The comparison with the other lessors can be seen in the Figure 26.

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Figure 26: Gain on disposal of aircraft comparison

Source [13]

Finally, it is important to take into account that in 2017 impairments⁶ totalled around \$80.43 million for Aircastle, which is a considerable cost for the company and one of the highest of the industry.

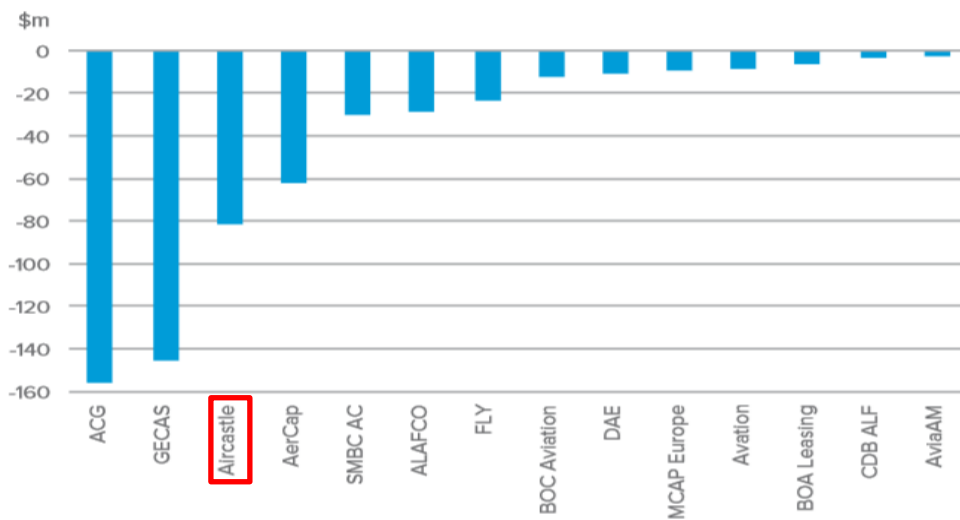


Figure 27: Impairment cost comparison

Source [13]

⁶ Impairment: when the market value of an asset is less than the book value, because its quality has decreased.

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6.5.2 Financial flexibility

The first measure used to assess Aircastle's financial flexibility is the debt to equity ratio, that shows the leverage of the company, providing the proportion of debt that the company has in its capital structured, compared to its equity.

Using the data provided in the 2017 annual report, it is obtained that:

$$\text{Debt to equity ratio} = \frac{4,313,606}{1,907,564} = 2.26$$

Thus, Aircastle's leverage levels are inside the common rank of the industry, between 2x and 4x, as shown in Figure 28.

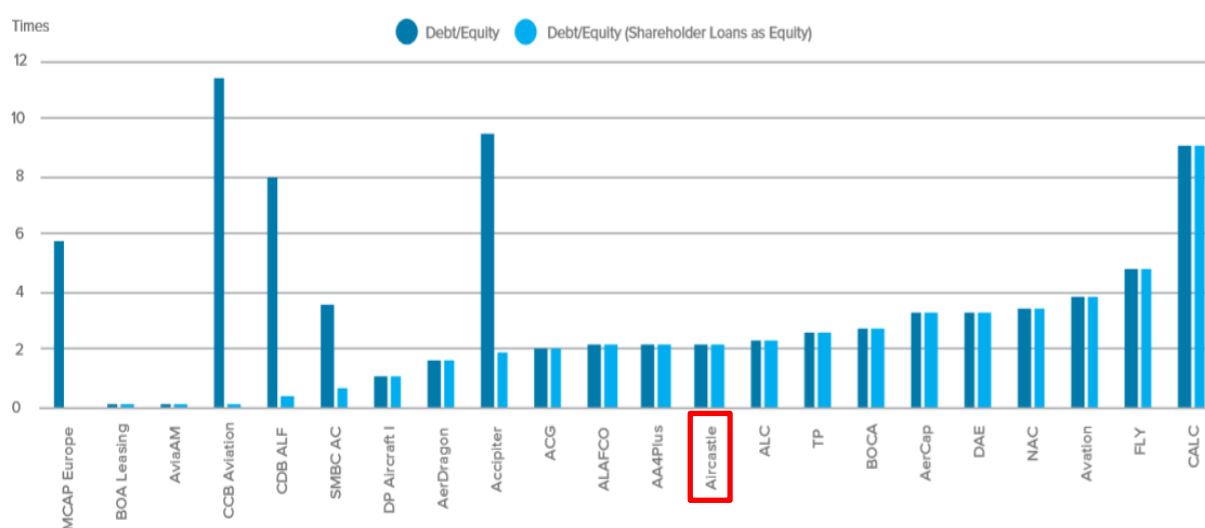


Figure 28: Debt to equity ratio comparison

Source [13]

This chart also shows the debt to equity ratio, assuming as equity the shareholder loans. This does not affect Aircastle because they do not have debt granted by another business from their company, but it is interesting to see how all the companies that have a high debt level based on intercompany loans, are subsidiaries of a larger corporation (for example: CCB Aviation and its parent company, China Construction Bank) and benefit from this situation obtaining cash with a short notice, with no credit application requirement and with longer repayment terms.

Once the debt level is known, it is important to consider which is the debt structure to assess the financial flexibility.

As it has already be seen in Table 9, Aircastle's debt structure for 2017 is the following:

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Debt (in thousands \$)	2017	
	Borrowings from secured financings, net of debt issuance costs	849,874
Borrowings from unsecured financings, net of debt issuance costs	3,463,732	75.5%

Table 12: Aircastle's debt structure

Having 75.5% of unsecured debt, positions Aircastle as a good candidate in the eyes of rating agencies to obtain an investment grade (as mentioned in section 6.4.2), which will facilitate finding new financing and with better conditions

Other variables that can be taken into account to determine if the company has a good state of financial flexibility, are the coverage ratios, such as the interest coverage, that indicates the degree to which the EBITDA of the company covers the finance costs. In this case, basing the calculus on the data of the annual report of 2017, the ratio is:

$$\frac{EBITDA}{Net\ Interests} = \frac{705,525}{241,231} = 2.92$$

As per this result, Aircastle has a healthy financial situation, being able to cover its interest payments with its EBITDA by 2.92 times. Nevertheless, this ratio is somewhat low compared to the levels of its competitors, as seen in Figure 28.



Figure 29: EBITDA to interest ratio comparison

Source [13]

6.5.3 Returns

Regarding returns, ROE is going to be the variable analyzed, and the value for Aircastle in 2017 was:

$$\frac{Earnings}{Equity} = \frac{146,305}{1,907,564} = 7.67\%$$

6. The Aircraft Leasing Market

In relation with the lessors compared, a ROE of 7.67% is a low value, as more than half of them had a ROE higher than 10%.

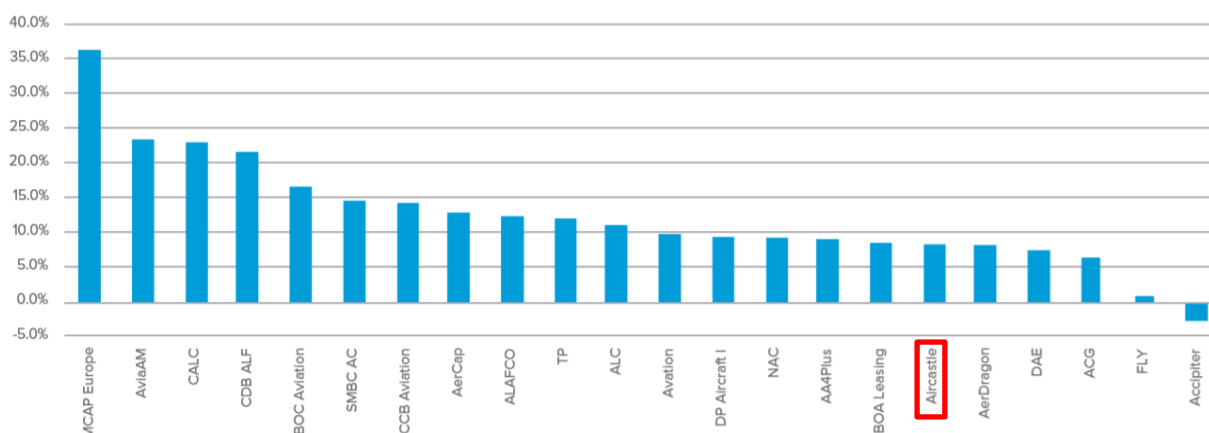


Figure 30: Return on Equity comparison

Source [13]

6.6 Future developments in the leasing industry

Regarding the economic development of the industry, after the growth experimented during the last decade, with the attraction of a large number of investors in an environment of low interest rates and high yields obtained from aircrafts, it is expected that the market experience a correction or moderation of this uptrend.

Some of the macroeconomic causes for which this deceleration is foreseen, are the following:

- Trade disputes between the US and various global locations, such as Mexico or China. In the case of the trade war with China, it is being forecasted that 25% tariffs could result in a decrease of between 2% and 3% in global GDP [12]. As a direct consequence, this would cause a decrease in the growth of air traffic, affecting both airlines and lessors.
- Brexit could seriously impact the aviation industry as a restrictive measure, and even more in the case of a no-deal exit. Currently, the UK parliament has not already approved an exit agreement.

In addition to these situations, at the end of 2018, interest rates were expected to experience two risings during 2019, but finally the Federal Reserve of the United States decided not to carry out these risings, given a situation of slower economic growth. In fact, the rates have remained at a range between 2.25% and 2.5% since December 2018

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[18]. Therefore, interest rates changes could be considered for the moment as a neutral factor for the future of the industry and for the lessors.

That being said, mergers and acquisitions between lessors are expected to increase during this period of greater economic vulnerability, being a growth opportunity for the strongest leasing companies and with higher financial flexibility.

7 Aircraft selection and valuation

7.1 Introduction

In the aviation industry, the valuation analysis of an aircraft is a key aspect during its useful life and diverse transitions, beyond the price that is determined in their purchase based on the amount of assets involved in the transaction and the bargaining power of the buyer. This is especially relevant for lessors, who are the players that risk the most in the market with the acquisition of an aircraft. Thus, to deal with the financial risk involved in aircraft purchase and leasing transactions, lessors carefully select the assets in their portfolio and assess their value and profitability over time.

To value an aircraft, there are two main type of factors to take into account: macroeconomic and microeconomic. From the macroeconomic situation, some factors that affect aircraft valuation can be derived, such as supply and demand of the type of aircraft considered or the GDP of a given country. On the other side, microeconomic factors include some variables as the fiscal situation of the parties taking part in the deal (buyer and seller, or lessor and lessee), or the physical condition of the aircraft.

That said, usually, valuations are carried out by appraisers, which are external companies dedicated to determining the financial and physical condition of aircraft (examples of appraisers are: Flight Ascend Consultancy or Avitas Incorporated). Thus, these appraisers carry out an asset valuation and then sell it to the owner of the plane.

Likewise, as mentioned before, the selection of an aircraft and its characteristics is a crucial aspect, since not all aircrafts are the same and the choice of some or other characteristics, as well as their demand and acceptance among operators, determine what is going to be the evolution of the aircraft value and the profitability that will obtain the lessor throughout its useful life.

This chapter presents the diverse kind of values that can be derived from an appraisal and some of the factors that come into play when carrying out the selection and valuation. In addition, two aircraft valuation examples will be commented.

7.2 Aircraft value patterns

Within the aircraft appraisals, the different types of values used for these assets must be taken into account.

- **Base Value:** economic value of the aircraft in a stable market with a reasonable balance of supply and demand. Typically, it is based on historical and projected value trends.

- **Market Value or Current Market Value:** is the Appraiser's opinion of the most likely trading price of the aircraft according to the market conditions.
- **Soft Market Value:** is the value of the aircraft in a market in which supply exceeds demand.
- **Salvage Value or Residual Value:** is the estimated value at the end of the aircraft's useful life. This value is used to calculate the asset's annual depreciation.

To obtain reliable appraiser values, sound methodology and data points are required, as well as knowledge about the market, operating patterns and leasing activity.

7.3 Aircraft characteristics impact on value retention

Among the values explained in section 7.3, the Residual Value is one of the most relevant for the lessors, since they are interested in incorporating assets that hold their value and are profitable throughout their useful lives.

Therefore, the selection of the aircraft is a crucial process and the type of features that are generally sought out in the purchase of such assets are:

- To be a highly demanded aircraft and used by a large and prosper industry sector.
- That a large number of units of the same model have been sold and that there is a large number of orders in backlog.
- In case of being a lessor who buys the airplane, that the airlines that operate with this type of aircraft have a good credit quality.
- To have a long useful live, with low remarketing costs and low probability of default.

In contrast, some of the undesired characteristics in one of these assets are:

- That the airplane is only used by a small group or niche market.
- To be at the end of its useful life.
- To have an atypical design configuration that is not flexible to be used by many different operators.
- That there is a lot of inventory of that type of aircraft.
- To be a type of aircraft for which there are not enough independent MROs to carry out the maintenance and, therefore, that market is dominated by the manufacturer.

7. Aircraft selection and valuation

According to the aforementioned characteristics, narrow-body airliners are generally those with the largest operator base, with the easiest conversion into cash and with lowest transition costs. On the other hand, wide-body aircrafts offer higher quality airline credits, but they have higher transition costs and default risks. Other types of assets such as cargo aircraft are a market niche (fewer than 700 aircraft under 20 years old), with a smaller operator base and therefore more vulnerable to economic changes. However, one point in favor is that they tend to have lower transition costs than airliners.

As an example of these characteristics, a comparison between a Boeing 737 and an Airbus A380 is introduced below.

Narrow body vs Wide body	Boeing 737	Airbus A380
Operators	<ul style="list-style-type: none">• All airline types• Leasing companies	<ul style="list-style-type: none">• National airlines• Flag carriers
Credit quality	Very broad, depending on the type of airline	High quality
Market volume	Very large. Operator fleets from less than 5 to 400 aircraft	Smaller global fleet. Operator fleets generally between 10 to 20 aircraft
Default probability	Medium-High	Low
Remarketing difficulty	Medium-Low	High
Remarketing costs	Low	Very high

Table 13: Asset characteristics comparison

Source [19]

In line with what was mentioned before, Figure 31 shows the dominance of narrow-body aircraft (NB) within the group of financeable aircraft, under 20 years of age and belonging to the segment of passenger aircraft (which constitutes the 97 % of the global commercial aircraft fleet).

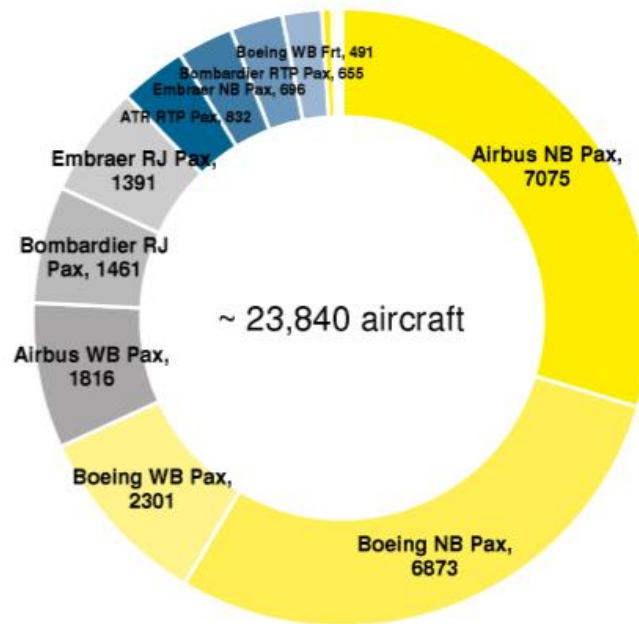


Figure 31: Financeable passenger aircraft by type and manufacturer

Source [19]

On the other hand, apart from the volume of operators, transition costs, remarketing options or the credit quality of the airlines operating the aircraft, it is also important to take into account the maintenance status of the aircraft and the technology it incorporates, since a change towards more efficient technologies is taking place and the obsolescence of certain equipment would weaken the retention of value.

This transition towards greater economic efficiency includes some of the following developments to take into account:

- Seats increase, changing the interior of the fuselage or making wider the cross section of the airplane.
- Engine technology development to cut maintenance costs and decrease fuel burn.
- Improve aerodynamic efficiency of wings.
- Using new materials to save weight and to reduce airframe maintenance.
- Improve systems for higher reliability, durability and operational efficiency.

7.4 Appraiser valuation example

This section shows an example of valuation by the appraiser Flight Ascend in Q2 of 2018, for the Airbus A321-200 neo model (neo stands for new engine option). The valuation

7. Aircraft selection and valuation

includes a market comment specifying some of the factors that benefit or harm the attractiveness of the asset, as well as the future values of this asset estimated by the company.

7.4.1 *Airbus A321-200 neo*

This model is the new version of Airbus A320, a narrow-body commercial aircraft with two jet engines.

7.4.1.1 *Market commentary*

Factors that benefit the position of the neo A330-900 model in the market:

- Approximately 1,900 orders for this aircraft have been made from a group of more than 60 customers, including major airlines, national carriers and LCCs.
- It is a more efficient model with a reduction of more than 15% in fuel consumption over the previous one. This is due to the changes in the engines, since there are practically no changes in the airframe.
- This model has a greater number of seats than those offered by the Boeing 737 Max 9 or 10.

Factors that make it less attractive:

- There were delays in the first deliveries in 2017, due to production problems of Pratt & Whitney engine manufacturer. These delays meant that many operators had to change their capacity plans.
- Strong competition from the Boeing 737 Max 10 that was developed by the American manufacturer to deal with the 321 that offers 220 seats more than the 737 Max 9. Although, Max 10 still had less seats than A321-200 neo, Boeing assured that the 737 Max 10 was going to reduce the cost of flights by 5% and the cost per seat.

7.4.1.2 *Valuation*

Flight Ascend value estimates and a generic monthly base lease rate (LRF) for A321-200 neo, from 2019 to the year 2044, can be seen in the following table. Soft market values and base values of the airplane in full life or half-life condition are included. In addition, two inflation scenarios are proposed, one with 0% inflation and another assuming a 2% inflation.

7. Aircraft selection and valuation

Year	Future values (in USD millions)								
	Half Life Base Value		Half Life Soft Market Value		Full Life Base Value		Full Life Soft Market Value		Generic monthly Base Lease rate (LRF)
	Constant	2% Inflated	Constant	2% Inflated	Constant	2% Inflated	Constant	2% Inflated	
2019	59.77	-	-	-	62.01	-	-	-	0.426
2020	55.66	56.72	41.75	42.54	60.19	61.33	45.14	46	0.41
2021	51.85	53.82	38.89	40.37	58.7	60.95	44.02	45.71	0.395
2022	48.3	51.09	36.23	38.32	57.53	60.87	43.15	45.66	0.38
2023	45.01	48.5	33.76	36.38	54.33	58.58	40.75	43.94	0.366
2024	41.95	46.05	31.47	34.54	51.37	56.44	38.52	42.33	0.353
2025	39.11	43.74	29.34	32.8	48.62	54.43	36.47	40.82	0.34
2026	36.47	41.55	27.36	31.16	46.08	52.56	34.56	39.42	0.328
2027	34.02	39.48	25.52	29.61	43.72	50.82	32.79	38.12	0.316
2028	31.74	37.52	23.81	28.14	41.54	49.2	31.15	36.9	0.305
2029	29.63	35.67	22.22	26.75	39.52	47.7	29.64	35.78	0.294
2030	27.66	33.91	20.74	25.43	37.65	46.31	28.24	34.73	0.284
2031	25.83	32.25	19.37	24.19	35.92	45.02	26.94	33.77	0.274
2032	24.12	30.69	18.09	23.02	34.31	43.84	25.74	32.88	0.265
2033	22.54	29.2	16.9	21.9	32.83	42.75	24.62	32.06	0.256
2034	21.06	27.8	15.8	20.85	31.46	41.76	23.6	31.32	0.247
2035	19.69	26.48	14.77	19.86	30.19	40.85	22.64	30.64	0.239
2036	18.41	25.22	13.81	18.92	29.02	40.03	21.76	30.02	0.232
2037	17.22	24.04	12.92	18.03	27.93	39.28	20.95	29.46	0.224
2038	16.11	22.92	12.08	17.19	26.93	38.62	20.2	28.97	0.217
2039	15.08	21.86	11.31	16.39	26.01	38.03	19.5	28.52	0.211
2040	14.11	20.85	10.59	15.64	25.15	37.52	18.86	28.14	0.205
2041	13.22	19.91	9.91 1	4.93 2	4.36 3	7.07	18.27 2	7.80 0	0.199
2042	12.38	19.01	9.28 1	4.26 2	3.63 3	6.69	17.73 2	7.52 0	0.193
2043	11.59	18.17	8.69 1	3.63 2	2.96 3	6.37	17.22 2	7.28 0	0.188
2044	10.86	17.37	8.14 1	3.02 2	2.35 3	6.12	16.76 2	7.09 0	0.183

Table 14: A321-200 neo estimated values by Flight Ascend

Source [20]

As expected, soft market values are lower than the base values and values for full life condition are greater than for half-life status.

In addition, it can be seen that LRF values decrease as the value of the aircraft falls. LRF is calculated as the average monthly lease divided by the price of the airplane, therefore it can be concluded that, in comparison, decreases in monthly rent of the airplane are much greater than those of the aircraft value.

8 Case study: aircraft finance lease structure

8. Case study: aircraft finance lease structure

8.1 Introduction

In this chapter a financing model for a 12-year aircraft finance lease is going to be developed. As mentioned in chapter 4, “in finance lease the lessee (the airline) assumes possession of the aircraft for a period of time and the aircraft is considered an asset of the company from an accounting point of view. During this time, the airline pays a fee for the rental of the plane, which includes the amortization of the capital and the interests (benefits of the lessor), acquiring then the aircraft at the end of the contract. In this type of lease, the lessor finances the purchase of the airplane and receives payments from the lessee, being only exposed to credit risks”.

Airbus A330-900 neo is the aircraft chosen for the model and Flight Ascend valuations from 2019 to 2031 have been taken as starting data. In addition to the financing structure and calculation of rental payments, a risk assessment will be conducted using the Loan to Value (LTV) study and the return of equity will be calculated and analyzed in different scenarios of asset residual value.

8.2 Appraiser valuations

As mentioned above, future valuation assessments from Flight Ascend have been chosen to take the approximate values of purchase and residual value.

Table 15 shows future values of model A330-900 neo. For the study, the underlined values corresponding to the column of full life base value with constant inflation, have been chosen.

Year	Future values (in USD millions)								
	Half Life Base Value		Half Life Soft Market Value		Full Life Base Value		Full Life Soft Market Value		Generic monthly Base Lease rate (LRF)
	Constant	2% Inflated	Constant	2% Inflated	Constant	2% Inflated	Constant	2% Inflated	
2019	109.95	-	-	-	113.96	-	-	-	0.847
2020	100.81	102.83	73.09	74.55	108.89	111.07	78.95	80.53	0.804
2021	92.41	96.14	67	69.7	104.65	108.88	75.87	78.94	0.764
2022	84.68	89.87	61.4	65.15	101.18	107.36	73.35	77.83	0.725
2023	77.59	83.98	56.25	60.89	94.24	102	68.33	73.95	0.688
2024	71.07	78.47	51.53	56.89	87.89	97.02	63.72	70.34	0.652
2025	65.08	73.3	47.19	53.14	82.08	92.41	59.5	67	0.618
2026	59.59	68.45	43.2	49.63	76.75	88.14	55.64	63.9	0.586
2027	54.54	63.91	39.54	46.33	71.88	84.18	52.11	61.03	0.556
2028	49.92	59.65	36.19	43.25	67.42	80.54	48.88	58.39	0.527
2029	45.67	55.67	33.11	40.36	63.35	77.18	45.93	55.96	0.499
2030	41.77	51.94	30.28	37.66	59.63	74.09	43.23	53.72	0.473
2031	38.2	48.45	27.69	35.12	56.24	71.27	40.77	51.67	0.448

Table 15: A330-900 neo estimated values by Flight Ascend

Source [21]

8. Case study: aircraft finance lease structure

8.3 Finance structure of the lease

First, the acquisition cost for the airline is calculated, which takes into account the purchase price of the aircraft, a structuring fee for the financing, a commission on the debt that could be paid at aircraft delivery (\$1,035,000 in this case) and costs of lawyers and others that may take place.

Table 16 presents the acquisition cost broken down, for which a purchase price of \$110 million was considered, taking a close figure to the estimated value of the asset for 2019 shown in Table 15.

Airbus A330-900 neo	Values in USD
Purchase price	110,000,000
Structuring fee (for equity provider)	1,000,000
Debt Up-Front	1,035,000
Lawyers and other costs	300,000
Acquisition cost	112,335,000

Table 16: Total acquisition cost for the airline

Once the acquisition cost has been obtained, the financing of that amount is structured through equity and debt. Table 17 shows the structure used and the interest's rates of each tranche.

Debt	Values (USD)	Interest rates
Senior Loan Amortizing 12 years	57,335,000	3.70%
Senior Loan Balloon	25,000,000	4.45%
Junior Loan Principal (fully amortizing)	5,000,000	4.50%
Equity	25,000,000	6.00%

Table 17: Financing structure and interest rates

The lessor finances \$30 million with \$25 million of equity and a fully amortizing junior loan of \$5 million. The remaining amount is financed through a senior loan, which is divided into a \$25 million balloon and \$53.335 million amortizing over the 12 years.

Regarding interest rates for senior debt:

- For the amortizing debt tranche, the base interest is the USD swap rate for 6-year maturity (1.8%), being the interest premium a 1.9%.
- For the balloon tranche, the base interest is the USD swap rate for 12-year maturity (2.05%) and the premium interest is 2.4%.

The total debt and equity payments are made quarterly and are shown separately in Table 18, along with the operating and maintenance fees (\$100,000 / year).

8. Case study: aircraft finance lease structure

Quarterly	Debt - Amortizing 12 years				Debt - Balloon				Total Debt	Junior Financing				Equity			O&M +Agency	Total
	Balance	Repayment	Interest	Debt Service	Balance	Repayment	Interest	Debt Service	Debt Service	Balance	Repayment	Interest	Debt Service	Balance	Repayment	Interest	O&M +Agency	Payments
01-Oct-2019	57,335,000				25,000,000					5,000,000				25,000,000				
01-Jan-2020	56,387,935	(947,065)	(542,134)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	4,920,868	(79,132)	(56,250)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2020	55,426,119	(961,816)	(527,384)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	4,840,847	(80,022)	(55,360)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Jul-2020	54,455,308	(970,811)	(518,388)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	4,759,924	(80,922)	(54,460)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2020	53,481,014	(974,294)	(514,905)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	4,678,092	(81,832)	(53,549)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2021	52,497,507	(983,507)	(505,693)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	4,595,339	(82,753)	(52,629)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2021	51,493,910	(1,003,597)	(485,602)	(1,489,199)	25,000,000	0	(278,125)	(278,125)	(1,767,324)	4,511,655	(83,684)	(51,698)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,302,706)
01-Jul-2021	50,486,322	(1,007,588)	(481,611)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	4,427,029	(84,625)	(50,756)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2021	49,474,499	(1,011,823)	(477,376)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	4,341,452	(85,578)	(49,804)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2022	48,453,108	(1,021,390)	(467,809)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	4,254,912	(86,540)	(48,841)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2022	47,412,100	(1,041,008)	(448,191)	(1,489,199)	25,000,000	0	(278,125)	(278,125)	(1,767,324)	4,167,398	(87,514)	(47,868)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,302,706)
01-Jul-2022	46,366,336	(1,045,764)	(443,435)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	4,078,899	(88,498)	(46,883)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2022	45,315,556	(1,050,780)	(438,419)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	3,989,405	(89,494)	(45,888)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2023	44,254,840	(1,060,716)	(428,484)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	3,898,904	(90,501)	(44,881)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2023	43,174,998	(1,079,842)	(409,357)	(1,489,199)	25,000,000	0	(278,125)	(278,125)	(1,767,324)	3,807,386	(91,519)	(43,863)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,302,706)
01-Jul-2023	42,089,605	(1,085,393)	(403,806)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	3,714,837	(92,549)	(42,833)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2023	40,998,386	(1,091,219)	(397,981)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	3,621,247	(93,590)	(41,792)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2024	39,896,849	(1,101,537)	(387,663)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	3,526,605	(94,643)	(40,739)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2024	38,780,796	(1,116,053)	(373,146)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	3,430,897	(95,707)	(39,674)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Jul-2024	37,654,305	(1,126,491)	(362,708)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	3,334,113	(96,784)	(38,598)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2024	36,521,148	(1,133,157)	(356,042)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	3,236,241	(97,873)	(37,509)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2025	35,377,277	(1,143,872)	(345,328)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	3,137,267	(98,974)	(36,408)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2025	34,215,317	(1,161,960)	(327,240)	(1,489,199)	25,000,000	0	(278,125)	(278,125)	(1,767,324)	3,037,179	(100,087)	(35,294)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,302,706)
01-Jul-2025	33,046,126	(1,169,191)	(320,008)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	2,935,966	(101,213)	(34,168)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2025	31,869,396	(1,176,730)	(312,469)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	2,833,614	(102,352)	(33,030)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2026	30,681,540	(1,187,856)	(301,343)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	2,730,110	(103,503)	(31,878)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2026	29,476,145	(1,205,395)	(283,804)	(1,489,199)	25,000,000	0	(278,125)	(278,125)	(1,767,324)	2,625,443	(104,668)	(30,714)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,302,706)
01-Jul-2026	28,262,629	(1,213,516)	(275,684)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	2,519,597	(105,845)	(29,536)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2026	27,040,669	(1,221,960)	(267,239)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	2,412,561	(107,036)	(28,345)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2027	25,807,154	(1,233,515)	(255,685)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	2,304,321	(108,240)	(27,141)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2027	24,556,671	(1,250,483)	(238,716)	(1,489,199)	25,000,000	0	(278,125)	(278,125)	(1,767,324)	2,194,863	(109,458)	(25,924)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,302,706)
01-Jul-2027	23,297,145	(1,259,526)	(229,673)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	2,084,173	(110,689)	(24,692)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2027	22,028,233	(1,268,912)	(220,287)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	1,972,239	(111,935)	(23,447)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2028	20,747,323	(1,280,910)	(208,289)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	1,859,045	(113,194)	(22,188)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2028	19,452,168	(1,295,154)	(194,045)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	1,744,577	(114,467)	(20,914)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Jul-2028	18,144,901	(1,307,268)	(181,932)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	1,628,822	(115,755)	(19,626)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2028	16,827,272	(1,317,629)	(171,570)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	1,511,765	(117,057)	(18,324)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2029	15,497,183	(1,330,088)	(159,111)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	1,393,391	(118,374)	(17,007)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2029	14,151,333	(1,345,850)	(143,349)	(1,489,199)	25,000,000	0	(278,125)	(278,125)	(1,767,324)	1,273,685	(119,706)	(15,676)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,302,706)
01-Jul-2029	12,794,488	(1,356,845)	(132,354)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	1,152,632	(121,053)	(14,329)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2029	11,426,268	(1,368,220)	(120,979)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	1,030,218	(122,415)	(12,967)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2030	10,045,110	(1,381,158)	(108,042)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	906,426	(123,792)	(11,590)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2030	8,648,828	(1,396,282)	(92,917)	(1,489,199)	25,000,000	0	(278,125)	(278,125)	(1,767,324)	781,242	(125,184)	(10,197)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,302,706)
01-Jul-2030	7,240,519	(1,408,309)	(80,891)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	654,649	(126,593)	(8,789)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2030	5,819,783	(1,420,736)	(68,463)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	526,632	(128,017)	(7,365)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Jan-2031	4,385,613	(1,434,170)	(55,029)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	397,175	(129,457)	(5,925)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)
01-Apr-2031	2,936,980	(1,448,632)	(40,567)	(1,489,199)	25,000,000	0	(278,125)	(278,125)	(1,767,324)	266,262	(130,913)	(4,468)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,302,706)
01-Jul-2031	1,475,250	(1,461,730)	(27,469)	(1,489,199)	25,000,000	0	(281,215)	(281,215)	(1,770,415)	133,876	(132,386)	(2,995)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,305,796)
01-Oct-2031	0	(1,475,250)	(13,949)	(1,489,199)	25,000,000	0	(284,306)	(284,306)	(1,773,505)	0	(133,876)	(1,506)	(135,382)	25,000,000	0	(375,000)	(25,000)	(2,308,887)

Table 18: Debt amortization and total payments

8. Case study: aircraft finance lease structure

Being a finance lease, the column of total payments will correspond to the amount that the lessee must pay in each quarterly rent. As it can be seen in the last column of Table 18, this value is about \$2.3 million.

Once the values from Table 18 have been obtained, the debt repayment profile of the airline can be drawn, as shown in Figure 32.

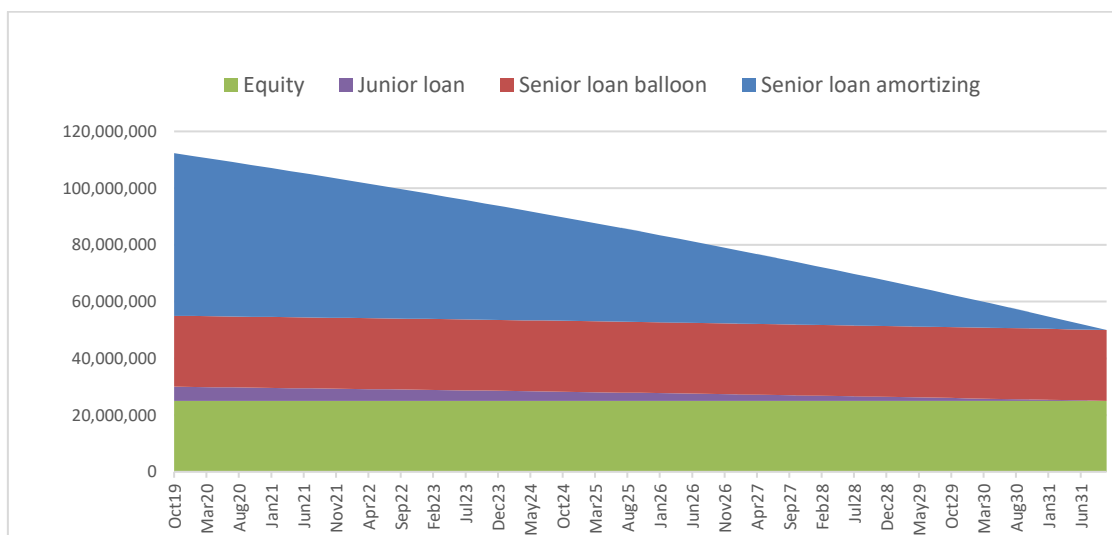


Figure 32: Amortization profile

This profile shows the financing structure used, ordered from bottom to top according to the financial risk of repayment to its investors. Thus, equity is the one with the highest interest rate associated but the first one affected in case of losses, while senior lenders get a lower interest but have a much safer position.

8.4 Equity and Junior Loan Interest Rate of Return

It is interesting to analyze the return of the lessor in both junior loan and equity, for the residual value estimated in 2031 by Flight Ascend (\$56.24 million).

Thus, Table 19 shows the cash flows of each financing tranche, taking into account that the structuring fee is paid to the lessor at the beginning of the leasing period and assuming, for the purpose of calculating the IRR, that it is distributed proportionally between equity and junior loan. The cash flows of the following periods correspond to the interest generated and the last cash flow of the equity tranche is calculated as follows:

$$\text{Cash Flow 01Oct2031} = \text{Interest} + (\text{Residual Value} - \text{Senior Loan Balloon})$$

8. Case study: aircraft finance lease structure

Junior L. IRR	4.95%
Structuring fee	100,000

Equity IRR	7.96%
Structuring fee	900,000

Date	Cash Flows
01Oct19	-4,900,000
01Jan20	135,382
01Apr20	135,382
01Jul20	135,382
01Oct20	135,382
01Jan21	135,382
01Apr21	135,382
01Jul21	135,382
01Oct21	135,382
01Jan22	135,382
01Apr22	135,382
01Jul22	135,382
01Oct22	135,382
01Jan23	135,382
01Apr23	135,382
01Jul23	135,382
01Oct23	135,382
01Jan24	135,382
01Apr24	135,382
01Jul24	135,382
01Oct24	135,382
01Jan25	135,382
01Apr25	135,382
01Jul25	135,382
01Oct25	135,382
01Jan26	135,382
01Apr26	135,382
01Jul26	135,382
01Oct26	135,382
01Jan27	135,382
01Apr27	135,382
01Jul27	135,382
01Oct27	135,382
01Jan28	135,382
01Apr28	135,382
01Jul28	135,382
01Oct28	135,382
01Jan29	135,382
01Apr29	135,382
01Jul29	135,382
01Oct29	135,382
01Jan30	135,382
01Apr30	135,382
01Jul30	135,382
01Oct30	135,382
01Jan31	135,382
01Apr31	135,382
01Jul31	135,382
01Oct31	135,382

Date	Cash Flows
01Oct19	-24,100,000
01Jan20	375,000
01Apr20	375,000
01Jul20	375,000
01Oct20	375,000
01Jan21	375,000
01Apr21	375,000
01Jul21	375,000
01Oct21	375,000
01Jan22	375,000
01Apr22	375,000
01Jul22	375,000
01Oct22	375,000
01Jan23	375,000
01Apr23	375,000
01Jul23	375,000
01Oct23	375,000
01Jan24	375,000
01Apr24	375,000
01Jul24	375,000
01Oct24	375,000
01Jan25	375,000
01Apr25	375,000
01Jul25	375,000
01Oct25	375,000
01Jan26	375,000
01Apr26	375,000
01Jul26	375,000
01Oct26	375,000
01Jan27	375,000
01Apr27	375,000
01Jul27	375,000
01Oct27	375,000
01Jan28	375,000
01Apr28	375,000
01Jul28	375,000
01Oct28	375,000
01Jan29	375,000
01Apr29	375,000
01Jul29	375,000
01Oct29	375,000
01Jan30	375,000
01Apr30	375,000
01Jul30	375,000
01Oct30	375,000
01Jan31	375,000
01Apr31	375,000
01Jul31	375,000
01Oct31	31,615,000

Table 19: Equity and Junior Loan cash flows and IRR

8. Case study: aircraft finance lease structure

In the previous formula, the relevance of the residual value of the aircraft is observed, since a too small value can give rise to negative returns. This is demonstrated below, with an equity IRR analysis as a function of different residual values.

Aircraft Residual Value (USD millions)	Equity IRR
25	-4.46%
30	-0.62%
35	1.87%
40	3.76%
45	5.29%
50	6.58%
55	7.71%
60	8.70%
65	9.60%
70	10.41%

Table 20: Equity IRR obtained with different residual values

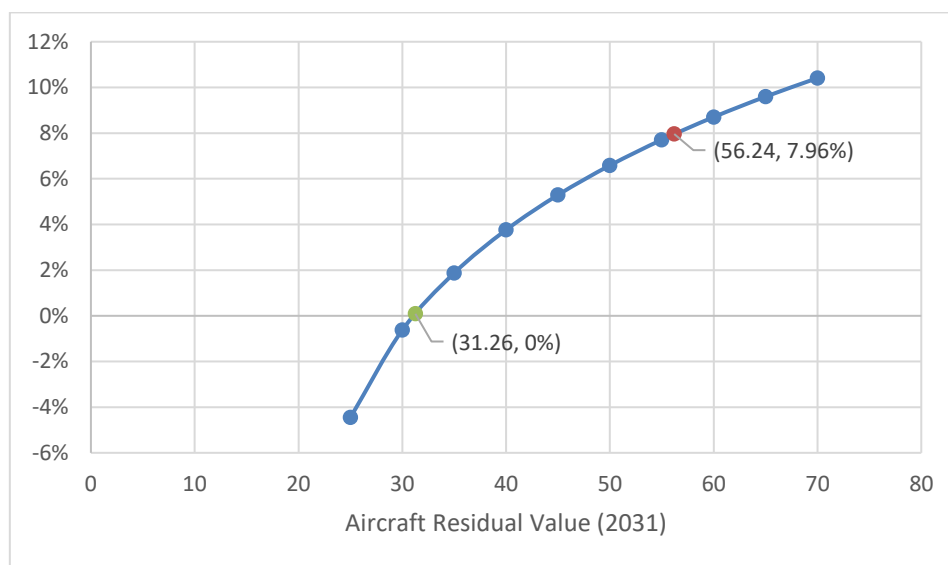


Figure 33: Equity IRR curve as function of aircraft residual value

From the curve in Figure 33, it is obtained that equity's break-even is reached when the residual value of the aircraft in 2031 is approximately \$31,260,473, this being 55.58% of the residual value estimated by the appraiser for 2031, according to the conditions determined above. Both points are highlighted in the curve showing the existing margin.

8. Case study: aircraft finance lease structure

8.5 Loan to Value analysis

Finally, a Loan to Value analysis is carried out, which provides the relationship between the loan and the appraised asset value. It is interesting to conduct this analysis, since it shows what percentage is the amount obtained for financing at each moment of the lease, with regard to the value determined by the appraiser. Therefore, the lower this ratio is, the lower the risk for investors.

In this case, several LTVs have been calculated, using the total value of the senior loan or the total of equity plus debt, versus the full life base value with and without inflation. Table 21 shows all the data and results obtained.

Date	Full Life Base Value (0% inflation)	Full Life Base Value (2% inflation)	Senior Loan Total	Junior Loan	Equity	Total	LTV Senior Loan vs Full Life Base Value (0% inflation)	LTV Senior Loan vs Full Life Base Value (2% inflation)	LTV vs Full Life Base Value (0% inflation)	LTV vs Full Life Base Value (2% inflation)
10/1/2019	113,960,000	113,960,000	82,335,000	5,000,000	25,000,000	112,335,000	72%	72%	99%	99%
10/1/2020	108,890,000	111,070,000	78,481,014	4,678,092	25,000,000	108,159,106	72%	71%	99%	97%
10/1/2021	104,650,000	108,880,000	74,474,499	4,341,452	25,000,000	103,815,951	71%	68%	99%	95%
10/1/2022	101,180,000	107,360,000	70,315,556	3,989,405	25,000,000	99,304,961	69%	65%	98%	92%
10/1/2023	94,240,000	102,000,000	65,998,386	3,621,247	25,000,000	94,619,634	70%	65%	100%	93%
10/1/2024	87,890,000	97,020,000	61,521,148	3,236,241	25,000,000	89,757,389	70%	63%	102%	93%
10/1/2025	82,080,000	92,410,000	56,869,396	2,833,614	25,000,000	84,703,010	69%	62%	103%	92%
10/1/2026	76,750,000	88,140,000	52,040,669	2,412,561	25,000,000	79,453,230	68%	59%	104%	90%
10/1/2027	71,880,000	84,180,000	47,028,233	1,972,239	25,000,000	74,000,471	65%	56%	103%	88%
10/1/2028	67,420,000	80,540,000	41,827,272	1,511,765	25,000,000	68,339,036	62%	52%	101%	85%
10/1/2029	63,350,000	77,180,000	36,426,268	1,030,218	25,000,000	62,456,485	58%	47%	99%	81%
10/1/2030	59,630,000	74,090,000	30,819,783	526,632	25,000,000	56,346,415	52%	42%	94%	76%
10/1/2031	56,240,000	71,270,000	25,000,000	0	25,000,000	50,000,000	44%	35%	89%	70%

Table 21: Loan to Value data and results

In addition, LTV evolution is presented in Figure 34.

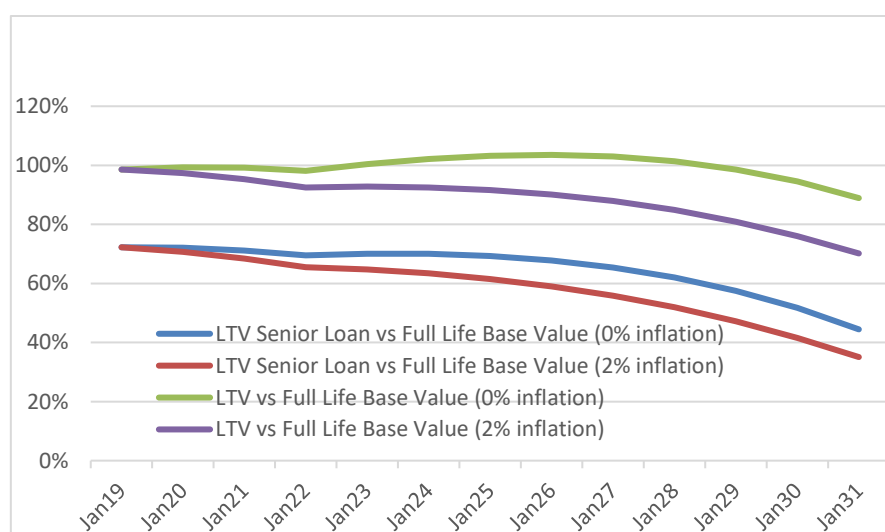


Figure 34: LTV evolution over the lease period

8. Case study: aircraft finance lease structure

In general, it is observed that the LTV decreases as the lease progresses, lowering the risk of the lenders. However, there are some sections in which the LTV increases above 100%, as in the case of the green curve in Figure 34. These values above 100% pose a high risk because if the aircraft is sold at that moment, its market value would not be enough to pay back the investors, and in particular for the equity providers who are the last to get paid.

9 Conclusions and Future Research

9. Conclusions and Future Research

The aviation industry and all the parties it entails, manufacturers, airlines, lessors, investors or maintenance companies, make up an attractive sector that enjoys sustained growth, mainly due to 2 factors:

- A demand for air travel that continues to expand every year thanks to the growth of the global middle class with economic access to air travel and tourism.
- From a financial point of view, this growth is also supported by an expansive economic policy with low interest rates, which allows and promotes the investment of private capital and the request for loans.

However, the forecast for the future is that this growth will slow down due to factors such as: an increase in fuel prices, trade wars between major global powers such as China and the United States, Brexit agreement in the case of Europe, the cessation of the expansive policy or other political and fiscal situations that may occur.

That said, the slowdown does not mean that growth ceases. On the contrary, airlines are expected to demand greater capacity to meet the demand and, in fact, big manufacturers estimate around 44,000 orders for new aircrafts by 2037.

This outlook entails a challenge for manufacturers, airlines and lessors.

- On one hand, manufacturers will have to cope with a large number of orders for new airplanes, in which clients are increasingly demanding fuel efficiency, due to environmental policies, and a greater number of seats, in order to increase capacity and reduce costs per passenger.
- On the other hand, airlines seek to be as competitive as possible through their strategies. Whether they are low cost or more traditional airlines, they want to have the greatest possible capacity flexibility to cope with changes in demand. To achieve this operational flexibility and maintain a solvent financial position, airlines are increasingly using leasing operations.

At the same time, operators must take into account the environmental impact of their aircraft, since the ICAO has agreed to implement CORSIA to reduce CO2 emissions, as explained in section 5.2.2. Therefore, they must consider the technology and efficiency of the aircraft they choose to lease, as well as deciding whether to implement new technologies to increase the efficiency of their own assets or face the cost that will mean an excess of emissions.

- Finally, lessors are facing an attractive business opportunity, as there is a large amount of new assets entering the market and a need from airlines to finance their aircraft (finance lease) or operate leased aircraft during a determined period of time (operating lease). However, it can be said that this situation

represents a challenge for lessors, due to the complexity of the leasing structures and their contracts, the added difficulty of carrying out transactions of this type in a global legal environment and the control of operational and financial risks, such as airlines creditworthiness and compliance with the conditions of maintenance or redelivery of the assets.

Additionally, regarding the legal framework of leasing contracts, it is worth highlighting the introduction of an international legal regime for this kind of transactions, established in the Cape Town Convention.

Therefore, in line with everything mentioned above, today the commercial aircraft market is characterized by a high level of competitiveness between airlines, in terms of its operating strategies, efficiency and fares. All this makes necessary an increasing flexibility to allow them to offer the quantity demanded in each moment. At this point, the leasing companies come into play, which already have an important place in the industry, with around 45% of the aircraft in the world fleet under lease.

Following this reasoning, it would be interesting that the future developments of this project focus its studies in the emergence of new leasing practices or other types of operations that arise as means to meet the growing needs of airlines. An example of this could be wet leasing, which is: "hiring aircraft with crew, maintenance and insurance (ACMI) to either cover an unforeseen short-term need or when business needs a longer-term (seasonal) capacity increase without necessarily buying and manning new aircraft." [22] These types of practices are growing fast today and are expected to develop even more in the near future.

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11 Annexes

11. Annexes

11.1 Credit rating scales

Moody's		S&P		Fitch		Rating description		
Long-term	Short-term	Long-term	Short-term	Long-term	Short-term			
Aaa	P-1	AAA	A-1+	AAA	F1+	Prime	Investment-grade	
Aa1		AA+		AA+		High grade		
Aa2		AA		AA		High grade		
Aa3		AA-		AA-		High grade		
A1		A+	A-1	A+	F1	Upper medium grade		
A2		A	A-1	A	F1	Upper medium grade		
A3	P-2	A-	A-2	A-	F2	Upper medium grade		
Baa1		BBB+		BBB+				F2
Baa2	P-3	BBB	A-3	BBB	F3	Lower medium grade		
Baa3		BBB-		BBB-				F3
Ba1	Not prime	BB+	B	BB+	B	Non-investment grade speculative	Non-investment grade aka high-yield bonds aka junk bonds	
Ba2		BB		BB		Non-investment grade speculative		
Ba3		BB-		BB-		Non-investment grade speculative		
B1		B+		B+		Highly speculative		
B2		B		B		Highly speculative		
B3		B-		B-		Highly speculative		
Caa1		C	CCC+	C	CCC	C		Substantial risks
Caa2			CCC					Extremely speculative
Caa3			CCC-					Default imminent with little prospect for recovery
Ca			CC					
C	C							
/		D	/	DDD	/	In default		
				DD	/			
				D	/			

Figure 35: Credit rating scale from Moody's, Fitch and S&P

Source [23]

11. Annexes

11.2 Cape Town Convention

The Cape Town Convention (The Convention on International Interests in Mobile Equipment, and its Protocol on Matters specific to Aircraft Equipment) (CTC) was created in 2001⁷ in order to establish an international legal regime to govern security interests in aircraft⁸. The CTC was an initiative under the International Civil Aviation Organization (ICAO) and the International Institute for the Unification of Private Law (UNIDROIT). The increased predictability and confidence in transactions under the CTC ultimately translates into a decrease in cost of financing for aircraft by reducing the risks to creditors, thereby increasing the availability of credit within the aviation industry. This in turn allows for the development of cost effective air transportation systems, using modern aircraft equipment.

As of July 2015, sixty-four states (as well as the European Union) have ratified or acceded to the CTC, and therefore references to the CTC often feature in the provisions of a lease. It is worth noting, however, that the CTC does allow for an "opt-out" or "declaration" system, allowing contracting states to modify the effect of the CTC. Therefore one cannot assume total harmonization of security interests in aircraft across the aforementioned contracting states. Generally the CTC applies if the aircraft is registered, or the debtor is situated, in a contracting state⁹.

In establishing an international legal regime for security interests in aircraft, the CTC lays out priority rules. These priority rules operate in a way that a previously registered international interest will have priority over a subsequently registered one, as well as over unregistered interests. It is worth noting here that the establishment of priorities will be subject to any declared local priorities, as per the "declaration" system referred to above.

The mechanism used by the CTC to establish these priority rules and perfect a security interest is the International Registry of Mobile Assets (<http://www.internationalregistry.aero>). This is an electronic system which, through registration of one's interests, allows for the establishment of priority over those interests. In practice this means that there will often be a provision in a lease agreement, usually contained in the sections relating to protection of title, or registration and filings, or the CTC directly, that obligates the Lessee to register the aircraft on the International Registry. It is a fairly simple process that entails minimal costs totaling in the hundreds of US dollars.

The CTC also offers default remedies for creditors, including termination, possession, or control of the aircraft, relief pending final determination of claims, and safeguards for debtors. One of the main default remedies for creditors is the Irrevocable De-registration and Export Request Authorization ("IDERA"). This tool allows the creditor to designate an authorized party (the Lessor) which would have the right to exercise the IDERA. In practice, this means that once the IDERA is registered with the applicable Civil Aviation Authority, and repossession becomes necessary under the lease as a result of default of the Lessee, a Lessor would be able to submit a deregistration request to the applicable CAA for its aircraft under the previously registered IDERA. This particular remedy is a self-help remedy in that the Lessor does not need an application to the local courts to exercise the IDERA¹⁰, in order to achieve deregistration and export of its aircraft, and the CAA would have to comply with the exercise of the IDERA, subject to local law. A Lessee may find IDERA provisions in its lease, obligating the cooperation and assistance of the Lessee with the IDERA registration where necessary.

One can conclude from the above that the CTC will provide Lessors and financiers with the benefit of a partially harmonized and internationally recognized security position across their portfolios, which will in turn reduce funding costs for borrowers.

Figure 36: Cape Town Convention brief report

Source [24]